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24TH ASIAN CONGRESS ON OCCUPATIONAL HEALTH 2026

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Shaping a Sustainable Future:
Global Perspectives on Occupational Health

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Plenary Session

Plenary Session

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Strength in synergy: advancing occupational and environmental medicine for the region

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Occupational safety and health (OSH) and occupational and environmental medicine (OEM) are a global priority. In an increasingly interconnected global economy, the health and safety of workers are no longer isolated within national boundaries. Varied OSH or OEM policies, limited data sharing and collaboration across the countries with different levels of OSH or OEM maturity and resources necessitate the need for regional collaboration and shared standards. A "Networked OEM" — a strategic approach that bridges the gap between local initiatives and regional standards is proposed by examining the synergy between Malaysian national bodies (such as DOSH, SOCSO, MOH, and MyFOSH) and international regional networks (SEA OEMNet, AAOEH and APOSHO). A unified OEM platform focusing on how collaborative frameworks — including joint research, joint workshops and training programs, professional exchange programs, shared incident learnings and harmonized best practices — can translate into improved workplace outcomes across the South-East Asian region and beyond. We need to move forward beyond the siloed operations towards a resilient, borderless ecosystem for OEM and occupational safety and health in general.

Keywords: Synergy; Network; Regional collaboration; Occupational and environmental medicine

Plenary Session

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Towards Occupational Health 5.0

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Digital transformation is fundamentally reshaping the world of work through artificial intelligence (AI), automation, robotics, wearable technologies, smart workplaces and data-driven decision-making. While these advances create unprecedented opportunities to enhance worker health, safety and wellbeing, they also introduce emerging challenges, including psychosocial risks, digital fatigue, algorithmic management, climate-related hazards and increasingly complex human–AI interactions. Occupational health must therefore evolve beyond simply digitising existing practices.

Occupational Health 5.0 is a vision for the future – a human-centred, AI-enabled and continuously connected model that shifts occupational health from episodic, reactive care towards predictive, personalised, preventive, participatory and planetary approaches. Building on advances in precision occupational health, digital biomarkers, wearable sensors, smart environments, digital twins and predictive analytics, Occupational Health 5.0 harnesses continuous workforce health intelligence to anticipate risks, personalise interventions and redesign work to promote health, resilience and sustainable performance.

Beyond technology, focus must also be given to examine the leadership, ethical and governance challenges required to ensure that innovation strengthens, rather than diminishes, worker wellbeing. As a macro-ecosystem, the implications of Industry 5.0, an ageing workforce, new employment models and climate change would also impact the future practice of occupational health.

Occupational Health 5.0 challenges our profession to move beyond protecting workers from harm towards designing healthy work, enabling human flourishing, and positioning occupational health as a strategic driver of organisational resilience and sustainable societal development.

Plenary Session

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Health and wellbeing: the foundation of sustainable business performance

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As organisations navigate increasingly complex operational, social, and environmental challenges, workforce health and wellbeing have emerged as strategic business imperatives. At PETRONAS, Occupational Health is positioned as a foundational pillar of the Health, Safety and Environment (HSE) strategy, recognising that sustainable business performance depends on a workforce that is physically healthy, mentally resilient and fit for work.

This presentation examines PETRONAS' leadership journey in integrating Occupational Health and wellbeing into enterprise-wide sustainability efforts. Guided by the vision of sustaining optimal health in support of the Company's Statement of Purpose, PETRONAS adopts an Integrated Health approach that encompasses occupational health protection, wellness promotion, mental health, fitness for work, and the prevention and management of non-communicable diseases.

It also highlights the role of Generative HSE Culture and Personal Accountability in empowering employees to take ownership of their health and wellbeing, while leaders and the organisation create psychologically safe and supportive workplaces. Key initiatives under MESTIfit4health, PETRONAS' signature employee wellness programme, include fitness enhancement, sleep hygiene and fatigue risk management, preventive health screening, mental health first aid, employee assistance, and resilience-building initiatives.

Through a risk-based and preventive approach, PETRONAS demonstrates how investing in workforce health strengthens organisational resilience, supports Mission: ZERO-Possible as PETRONAS' HSE aspiration, and serves as a critical enabler for sustainable business performance in the energy sector.

Keynote Session

Keynote Session

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Future trends in industrial disaster management

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Industrial disaster management is undergoing a significant transformation in response to rapid technological advancement, climate change, digitalisation, and increasingly complex global interdependencies. Traditional industrial disasters such as chemical explosions, fires, structural collapses, and toxic releases are now compounded by emerging threats including cyber-physical attacks, artificial intelligence failures, supply chain disruptions, and climate-induced technological disasters (Natech events). These evolving risks challenge conventional approaches to disaster prevention and response, requiring a paradigm shift from reactive management towards predictive, preventive, and resilient systems.

This presentation explores the major global trends reshaping industrial risk, including climate change, rapid industrialisation, digital transformation, artificial intelligence, geopolitical instability, ageing infrastructure, and the energy transition. Lessons from major disasters such as the Beirut Port Explosion, Fukushima Nuclear Disaster, East Palestine chemical release, and critical infrastructure cyberattacks highlight a common finding: warning signs often exist, but failures occur when information is not effectively translated into action.

The presentation further examines the role of Fourth Industrial Revolution technologies, including Artificial Intelligence, Internet of Things (IoT), Digital Twins, Big Data Analytics, Robotics, and Cloud Computing, in enhancing predictive safety and disaster preparedness. These technologies offer unprecedented opportunities to improve hazard detection, risk forecasting, operational monitoring, and emergency response capabilities. However, technological solutions alone are insufficient. Human factors, leadership, organisational culture, communication, and psychological preparedness remain critical determinants of disaster resilience.

Finally, the presentation discusses the importance of strengthening organisational resilience, emergency preparedness systems, and multi-sectoral collaboration, with reference to Malaysia's ongoing efforts in disaster preparedness, public health emergency response, digital health transformation, and national resilience initiatives. The future of industrial disaster management will be defined not only by the hazards industries face, but by their capacity to anticipate, adapt, respond, recover, and continuously learn from emerging threats. Building safer, smarter, and more resilient workplaces is therefore essential for sustainable development, workforce protection, and national security in an increasingly uncertain world.

Keynote Session

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Global trends in occupational health: sustainability and innovation

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Occupational health is undergoing a profound evolution, transitioning through three distinct stages of risk management. Traditional occupational health has primarily focused on a hazard-based approach, including dust, noise, chemicals, and other risks that can be mitigated by improving the working environment. Without proper management of environmental hazards, workers may suffer from occupational diseases such as pneumoconiosis, chemical poisoning, and other conditions. In this Hazard-Based Stage, occupational hazards can be controlled mainly through engineering controls. Therefore, occupational physicians need insight into industrial hygiene to manage this stage effectively.

However, even when external working environments have improved, workers may still suffer from lifestyle related diseases, such as cardiovascular diseases and musculoskeletal disorders. These conditions may be caused, aggravated, or accelerated by working conditions such as long working hours, shift work, job stress, and poor work design. This can be understood as the Disease-Based Stage, which is particularly prominent in aging worker societies. Although these diseases may naturally develop with aging and degenerative changes, effective occupational health services and primary health care can help prevent their aggravation and support workers' health.

Beyond the Hazard-Based and Disease-Based Stages, workers may still experience health problems such as rare diseases with unclear causes and mental health conditions. In this stage, epidemiologically proving a direct causal relationship between workplace exposure and disease is often difficult, particularly with rare diseases. Broader social conditions, including poverty, inequity, and discrimination, affect workers' health status. This Social-Based Stage cannot be managed by individual workplaces alone but requires broader reform of social protection and social security systems.

Beyond these three stages, we are now facing an AI-driven challenge in occupational health as well as other fields. While physical AI and automation can reduce physical risks, they simultaneously introduce severe psychosocial hazards- such as extreme isolation. AI may deepen social polarization by expanding simple-task and precarious platform work, pushing vulnerable workers toward poverty. Future occupational health should therefore focus more on social environmental issues that increase workers' vulnerability.

Keynote Session

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Managing occupational safety and health for informal & gig workers

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Traditional occupational safety and health (OSH) frameworks were prescriptive, developed around structured workplaces, fixed working hours, and clearly defined employer-employee relationships. However, the rapid evolution of the global economy has accelerated the growth of decentralized labour segments, particularly informal and gig workers. These vulnerable groups operate outside the boundaries of conventional labour laws, leaving them disproportionately exposed to unique occupational risks. Gig workers face severe psychosocial hazards driven by algorithmic management, fatigue and high-risk working environments, while informal workers navigate unregulated settings with limited access to safety resources and heightened vulnerability to climate-induced risks like heat stress.

This address explores the strategic transformation of regulatory bodies like DOSH, pivoting from defensive policing toward proactive, inclusive frameworks designed to bridge existing protection gaps. Using Malaysia as a case study, the presentation highlights two landmark regulatory milestones: the enforcement of the Occupational Safety and Health (Amendment) Act 2022, which expands OSH protections universally across all economic sectors and the historical Gig Workers Act 2025 (Act 872). With its enforcement on March 31, 2026, Act 872 provides the regulatory architecture necessary to safeguard more than 1.6 million gig workers nationwide.

Special focus will be given to Part IX of the Act 872, which establishes a groundbreaking statutory framework holding contracting entities and platform providers legally accountable for gig worker safety and health. Under Part IX, platforms are mandated to conduct rigorous hazard risk assessments, ensure safe equipment and facilities, prevent dangerous work arrangements, and provide accessible safety training and information. By classifying platform workers under a distinct category, Malaysia preserves economic flexibility while legally anchoring OSH accountability. Ultimately, this presentation argues that shaping a sustainable future requires an expanded occupational health horizon that fiercely protects the safety, health and welfare of every worker.

Symposium

Symposium

S1 Cross-Cultural Approaches to Managing Occupational Health in Multinational Companies

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Global standards, local realities: harmonising occupational health across borders

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In an increasingly interconnected global economy, global organizations strive to implement uniform occupational health (OH) standards to ensure equitable protection for their workforce in various countries. However, the ambition of global harmonization frequently collides with deeply entrenched local realities.

Corporate health directives have to navigate a complex landscape of disparate national regulations, varying economic development, distinct cultural attitudes toward workplace safety, and local healthcare infrastructure limitations.

I had the opportunity to work in national as well as global corporations as OH leader/ Chief of Medical Services.

My presentation explores the critical friction points between global OH frameworks and local execution. It examines the operational and ethical challenges of managing cross-border health strategies, from varying regional disease burdens to local definitions of mental well-being.

Moving beyond theoretical compliance, I will try to share a practical framework for "glocalization" in occupational health: how global organizations can maintain core, non-negotiable safety principles while dynamically adapting delivery models to respect and leverage local context from my experience.

The presentation will dwell upon experiences with implementation of transnational initiatives and practical ways to sell occupational health and safety to local management.

The presentation will also share insights into cross-border compliance, bridging cultural communication gaps, and building resilient health programs that protect workers equally, regardless of geography.

Symposium

S1 Cross-Cultural Approaches to Managing Occupational Health in Multinational Companies

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Bridging borders: cross-cultural strategies in occupational health management

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Developing global occupational health (OH) standards is only the first step. The greater challenge for multinational organisations is translating these requirements into consistent frontline practice across different regulatory, cultural and operational environments.

This paper presents a practical OH management framework developed through implementation and assurance experience across multinational operations. It combines global minimum requirements with local adaptation based on risk profiles, legislation, workforce arrangements and cultural realities. Governance, digitalisation, assurance and leadership support implementation across employees, contractors and supply chains.

Recurring challenges include varying occupational safety and health maturity, differing perceptions of health and risk, hierarchy and power distance, communication barriers, stigma, psychological safety and contractor dynamics. These factors can create gaps between corporate requirements and workforce behaviour.

The framework addresses these gaps by defining accountabilities, embedding OH considerations into operational processes and decision-making, using digital systems to monitor performance and applying independent assurance to identify priority risks. Visible leadership and workforce engagement further reinforce health as part of daily operations.

Experience indicates that effective multinational OH management depends on consistent expectations supported by locally relevant execution. Integrating governance, culture, leadership and data-driven assurance can strengthen implementation, improve health risk management and support healthier, more resilient workforces.

Symposium

S2 Occupational Health in the Informal Economy: A Global Perspective

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Improving occupational health in informal economy workplaces in South Asia: application of participatory training methods

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Workers and employers in the informal economy require practical support to improve the health and safety in their workplaces. Informal economy workplaces include home-based manufacturing work, unregistered construction sites, waste collection and recycling, pedicabs and rickshaws, small mining sites, agriculture and fishing, etc. According to International Labour Organization (ILO) estimates, South Asian countries have a high percentage of informal economy workers in the total employment. The estimates for Bangladesh, India, Nepal, Pakistan and Sri Lanka are 89.0%, 88.2%, 94.3%, 82.4% and 70.4%, respectively. Informality of women workers is higher than men. Workers in the informal economy are usually outside the scope of existing occupational health and safety (OHS) legislation and seldom receive adequate OHS inspection and service. The formalisation of the informal economy is a top priority of the ILO, and numerous development cooperation projects addressing their OHS have been implemented. The present study aimed to develop practical support measures to improve the health and safety of informal economy workplaces. The ILO's participatory training methods such as WISE (Work Improvements in Small Enterprises) and WIND (Work Improvements in Neighbourhood Development) were applied in selected informal economy workplaces comprising home-based manufacturing, small-scale construction, waste collection and recycling, sewage cleaning, and cotton and tea farming. The following steps were common to organize the participatory training: (1) collaboration with worker and employer organizations and local NGOs to reach informal economy workplaces; (2) collection of local good practices in OHS for designing participatory training tools such as action checklists and good example photo sheets; (3) development of worker and employer OHS trainers; (4) assistance to trained worker and employer trainers in conducting cascading training activities in their workplaces; and (5) follow-up support for sustainability. The training programme covered technical areas of materials handling, workstations, safe use of machinery and electricity, control of heat, dust, noise and hazardous chemicals, work-related welfare facilities and work organization including the reduction of work-related stress. After the training, the participating workers, employers and farmers were able to implement OHS improvements by using low-cost methods. The trained worker and employer trainers organized and carried out cascading training activities and used the participatory training tools skilfully. In conclusion, the present study found that practical OHS training activities reached informal economy workplaces through the networks of local trade unions, employer organizations, farmer associations and NGOs. The participatory training methods assisted workers, employers and farmers in identifying practical OHS ideas and implementing improvements. The trained local OHS trainers were able to extend the participatory training to neighbouring workers and farmers. OHS practitioners and service providers should find more opportunities to collaborate directly with workers, employers and farmers and their organizations to reach informal economy workplaces and deliver participatory training support in OHS.

Symposium

S2 Occupational Health in the Informal Economy: A Global Perspective

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Occupational melioidosis in Southeast Asia: prevalence, risk factors, and regional burden

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Melioidosis, an infectious disease caused by the saprophytic environmental bacterium Burkholderia pseudomallei, represents a severe public health crisis and a critical occupational hazard across Southeast Asia. Highly endemic to the region's tropical climate, the pathogen thrives in muddy soil and surface water, primarily impacting agricultural laborers, construction workers, and loggers. Epidemiological data from clinical registries reveals a substantial regional burden with stark geographic variations; Northeast Thailand reports a culture-confirmed incidence of 12.7 to 28.3 cases per 100,000 person-years with a 40% case fatality rate, while high seasonal spikes during the monsoon season are heavily documented in Lao PDR, Cambodia, and Malaysia. The primary occupational risk factor is prolonged, direct skin contact with contaminated environments, predisposing manual laborers to percutaneous inoculation through minor abrasions. Furthermore, monsoon-driven environmental shifts facilitate transmission via inhalation of aerosolized bacteria. This occupational exposure is profoundly exacerbated by host risk factors, most notably diabetes mellitus—present in roughly 50% of diagnosed patients—which compromises immune response and drastically increases susceptibility to lethal septic shock. Adult males are disproportionately affected, directly mirroring regional gendered divisions in manual agricultural labor. Despite high mortality, underreporting remains pervasive due to limited diagnostic infrastructure in resource-poor settings. Addressing occupational melioidosis requires integrating the disease into national occupational health frameworks, engineering climatically viable personal protective equipment, and decentralizing microbiological diagnostics. Formally classifying these farming-acquired infections as distinct occupational diseases within regional labor laws is paramount to implementing robust occupational safety policies, securing essential worker compensation, and safeguarding Southeast Asia's vital rural agricultural workforce.

Keywords: Burkholderia pseudomallei; Occupational risk factors; Regional prevalence; Southeast Asia; Agricultural medicine

Symposium

S2 Occupational Health in the Informal Economy: A Global Perspective

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Hidden workers, visible health risks in Hong Kong's informal economy

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The informal economy, encompassing over 60% of the global workforce, represents a critical yet neglected frontier in occupational health. In Hong Kong, this issue is particularly pronounced among diverse groups including gig platform workers, street vendors, waste pickers, and migrant domestic workers, who collectively face a distinct "double burden" of workplace hazards and potential exclusion from legal protections. This presentation examines the occupational health risks confronting Hong Kong's informal workforce, drawing on recent local research that documents high rates of musculoskeletal disorders, respiratory illnesses, physical injuries, toxic exposures, and psychological distress among these vulnerable populations. Studies reveal that informal waste pickers, often elderly women, experience physical strain or illness (63.2%) alongside significant rates of depression and anxiety, while food delivery riders face heightened traffic accident risks driven by algorithmic management and their classification as independent contractors. Migrant domestic workers, though formally employed, exhibit a 30.8% prevalence of depression linked to precarious working conditions and exploitation. In response, Hong Kong has begun taking steps, including a pledge to introduce legislation in 2026 establishing a work injury compensation mechanism for platform workers, complemented by community-led initiatives like the "Pickers' Link" program which has demonstrated measurable improvements in well-being among older waste pickers. However, significant gaps persist, including the absence of regulation over platform algorithms, an outdated list of recognized occupational diseases, and a lack of comprehensive protections for other informal worker groups. This presentation argues that safeguarding the health of Hong Kong's informal economy is not merely a technical challenge but a fundamental issue requiring inclusive policies, expanded social protection, worker empowerment, and continued evidence-based research to build a truly equitable occupational health framework.

Symposium

S3 Affiliate Symposium by Indonesian Occupational Medicine Association (IOMA)

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Immunization for protection and improving worker productivity

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Indonesia is currently benefiting from a demographic dividend, marked by a large proportion of its population being of working age. Nevertheless, it still faces a double burden of disease, with communicable diseases remaining highly prevalent while non-communicable diseases are rapidly increasing. Immunization program plays a crucial role in reducing morbidity and mortality of communicable diseases. It protects workers from vaccine-preventable diseases and contributes significantly to maintaining and enhancing workforce productivity. In occupational settings, infectious diseases can lead to absenteeism and presenteeism, reduced performance, and increased healthcare costs, ultimately affecting organizational efficiency.

The Indonesian Occupational Medicine Association (IOMA) has developed the guideline "*Immunization for Protection and Improving Worker Productivity*." The objective of this guideline is to provide a reference for stakeholders in occupational health to facilitate the implementation of worker vaccination programs in companies, workplaces, institutions, and healthcare facilities. The IOMA recommendations provide comprehensive guidance on the selection of appropriate vaccines for workers based on occupational roles and the associated risk of transmission from biological exposures, including blood-borne, airborne, fecal-oral, vector-borne and zoonotic pathways, geographic location and individual respiratory vulnerability.

The implementation of workplace immunization programs requires the completion of several stages, including securing support and collaboration from both management and workers, conducting vaccination campaigns, and establishing partnerships with relevant stakeholders. It also involves the designation of a workplace vaccination program coordinator, provision of appropriate vaccination facilities, and adherence to proper vaccine storage and handling procedures. Furthermore, it includes the procurement of supplies, provision of training for personnel, implementation of vaccination protocols, and ongoing monitoring and evaluation of the program.

Integrating immunization initiatives with occupational health policies demonstrates a proactive approach to employee well-being and long-term productivity. Immunization is a cost-effective and impactful intervention that supports both worker protection and productivity. Strengthening workplace immunization programs should be prioritized as part of broader efforts to promote sustainable and resilient workforce health.

Keywords: Immunization; Protection; Worker productivity

Symposium

S3 Affiliate Symposium by Indonesian Occupational Medicine Association (IOMA)

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Cadmium biomonitoring and blood pressure in agricultural workers: early evidence from a cross-sectional study

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Background: Agricultural workers are exposed to a complex mixture of occupational and environmental hazards, including pesticides and toxic metals such as cadmium from multiple potential sources. Evidence on the cardiovascular implications of these combined exposures remains limited. This study aims to provide evidence by exploring the association between urinary cadmium levels and blood pressure among pesticide-exposed agricultural workers.
Methods: This preliminary cross-sectional study included 71 participants, all of whom were pesticide applicators. Urinary cadmium levels were measured using inductively coupled plasma mass spectrometry (ICP-MS). Individual characteristics and occupational histories were obtained through structured interviews. Blood pressure was measured and categorized into elevated (≥140/90 mmHg) and normal (<140/90 mmHg) groups. Statistical analysis was performed to assess differences between groups.
Results: The mean age of participants was 51.7 years. Workers with elevated blood pressure had significantly higher urinary cadmium levels than those with normal blood pressure.
Conclusions: These preliminary findings suggest a potential association between cadmium exposure and elevated blood pressure among agricultural workers. Given the likelihood of multiple exposure sources, further studies with larger samples and comprehensive exposure assessment are needed. Biomonitoring remains a key component of sustainable occupational health practice in complex exposure settings.

Keywords: Agricultural workers; Biomonitoring; Blood pressure; Cadmium

Learning Objectives

1. Describe the role of biomonitoring in assessing occupational exposures among agricultural workers.
2. Recognize the potential cardiovascular implications of cadmium exposure in real-world occupational settings.
3. Interpret early evidence linking urinary cadmium levels with elevated blood pressure.

Symposium

S3 Affiliate Symposium by Indonesian Occupational Medicine Association (IOMA)

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Nutritional factors as a critical role to protect lead-exposed workers

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Aim: This study aims to evaluate the role of nutritional factors in mitigating lead absorption and its metabolic effects among workers exposed to lead in occupational settings.
Methods: A cross-sectional approach was applied among workers with documented occupational lead exposure. Blood lead levels (BLL) were measured using standardized laboratory methods. Nutritional intake—including calcium, zinc, iron, and vitamin D—was assessed using a semi-quantitative food frequency questionnaire administered by trained interviewers. Anthropometric measurements were also collected. Statistical analysis was conducted to examine the association between nutrient intake and BLL, as well as potential modifying effects on metabolic indicators.
Results: Workers with lower intake of essential micronutrients, particularly calcium, zinc, and vitamin D, demonstrated significantly higher BLL compared to those with adequate intake. Nutritional deficiencies were also associated with unfavorable metabolic profiles, suggesting increased susceptibility to lead toxicity. Multivariate analysis indicated that adequate micronutrient intake may reduce lead absorption and attenuate its biological effects. These findings support the role of nutritional status as an important modifier in occupational lead exposure.
Discussion: Nutritional factors play a protective role by influencing gastrointestinal absorption and biological interactions of lead. Adequate intake of key micronutrients may serve as a complementary strategy alongside conventional exposure control measures. Integrating nutritional interventions into occupational health programs offers a practical and cost-effective approach, particularly in settings with persistent low-level exposure.

Symposium

S4 Bridging Recovery and Work: Disability Management and Return to Work (Models in South-East Asia)

Ann Occup Environ Med. 2026 Aug;38(Supplement):S-04-01
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Bridging recovery and work: disability management and return to work (models in South-East Asia)

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Disability management has emerged as a critical strategy in occupational health to address the growing burden of work-related injuries, chronic health conditions, and long-term work disability. Across many countries in Asia, workers who experience injury or illness often face prolonged absence from employment, reduced income security, and significant barriers when attempting to reintegrate into the labour market. Without structured rehabilitation and workplace support systems, these challenges may lead to long-term work disability and loss of productivity.

Effective disability management programmes promote early intervention, coordinated rehabilitation, and sustainable Return-to-Work (RTW) outcomes. These programmes typically integrate case management, medical and vocational rehabilitation, workplace accommodation, and employer engagement. Collaboration among occupational health professionals, rehabilitation specialists, employers, and social security institutions plays a crucial role in ensuring successful and sustainable work reintegration.

As workforce demographics shift and the prevalence of non-communicable diseases continues to increase, integrating disability management into occupational health practice has become increasingly important. Such integration helps support worker recovery, maintain workforce productivity, and foster inclusive workplaces that accommodate workers with diverse functional abilities.

Across the region, comprehensive RTW programmes have been implemented to provide coordinated rehabilitation interventions and structured case management, supporting injured and disabled workers in returning to employment. Rehabilitation initiatives under national social security frameworks, along with academic and technological advancements, are contributing to innovations in assistive technology, workplace ergonomics, and rehabilitation solutions that can further enhance RTW outcomes.

This symposium will bring together experts to highlight regional perspectives and emerging practices in disability management across Asia. Through expert presentations and a moderated roundtable discussion, the session will explore practical rehabilitation models, innovative technologies including assistive devices and related tools and policy approaches that support effective RTW systems. The symposium aims to facilitate knowledge exchange, share regional experiences, and stimulate dialogue on strengthening disability management strategies to support healthier, more resilient, and disability-inclusive workforces.

Objectives

The symposium aims to:

1. Enhance understanding of disability management as a key component of occupational health systems, including strategies that support early intervention, coordinated rehabilitation, and sustainable Return-to-Work outcomes.
2. Explore the role of innovative rehabilitation tools and technologies, including assistive devices and workplace solutions, in supporting recovery and facilitating successful work reintegration for workers with injuries or disabilities.
3. Examine regional experiences and policy approaches in implementing disability management programmes within social security and occupational health systems.
4. Promote regional knowledge exchange and collaboration among policymakers, occupational health professionals, rehabilitation practitioners, and researchers to strengthen disability-inclusive employment systems in Asia.

Symposium

S5 National Programmes and Policy in Occupational Medicine: The Philippines Perspective

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Healthy workers, healthy nation: aligning occupational medicine with Universal Health Care

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Background: The Philippines' Universal Health Care (UHC) Act mandates a revolutionary shift toward Primary Health Care (PHC). However, integrating this national mandate into corporate frameworks remains an untapped frontier. Because workers comprise a massive segment of the adult population, the workplace represents a vital, yet currently unutilized, entry point for preventive care. Aligning occupational medicine (OM) with UHC is a novel, urgent economic and public health necessity.
Objectives: This presentation proposes a roadmap to bridge the gap between national health policy and corporate practice. It aims to: explain Philippine UHC and PHC principles; define OM's untapped strategic role in achieving UHC goals; identify proposed workplace health strategies; and outline the newly expanded, future role of occupational physicians in population health.
Key Concepts: The lecture introduces a novel conceptual framework to translate UHC's operational pillars into actionable corporate structures, mirroring PHC concepts like accessibility and preventive care. Proposed strategies include designing in-enterprise primary care clinics, establishing future referral pathways to the national health insurance system (PhilHealth), and implementing comprehensive wellness programs. It challenges traditional boundaries, advocating for occupational physicians to transition from fitness gatekeepers to proactive leaders in population health.
Conclusions: Though not yet totally realized, integrating UHC into OM practice offers a transformative win-win: safeguarding corporate productivity while advancing national health equity. By establishing conceptual framework to leverage workplaces as primary care hubs, this presentation provides occupational physicians in the Philippines and the Asian region a visionary blueprint for holistic worker welfare.

Symposium

S5 National Programmes and Policy in Occupational Medicine: The Philippines Perspective

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The Philippine experience in developing the Medium Term National OSH Program

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Background: Occupational safety and health (OSH) remains a critical public health priority in the Philippines, with a workforce of approximately 50.74 million persons spanning diverse sectors and employment arrangements.
Objective: This presentation synthesizes the Philippine experience in developing and implementing a comprehensive national OSH program, examining the current policy framework, administration, strategic priorities, and emerging challenges.
Methods: Analysis draws on labor force data (2025), occupational injury and disease statistics (2013–2023), existing legislation, and identified gaps from the 2019–2022 National OSH Profile.
Key Findings: The Philippines has established a multi-sectoral OSH regulatory framework encompassing both private and public sectors, supported by ratified International Labour Organization conventions. However, significant gaps persist in policy coordination, enforcement capacity, prevention culture, and research infrastructure. Occupational musculoskeletal disorders, infectious diseases, and mental health conditions represent major disease burdens. Workers in informal sectors and micro-enterprises remain insufficiently protected.
Strategic Roadmap and Moving Forward To bridge these gaps, the National OSH Strategy 2024–2029 outlines four core priority areas: • Enhancing the OSH policy and legal framework to be gender-responsive. • Strengthening inter-agency compliance, enforcement, and data-sharing. • Fostering a preventive safety and health culture via local government units (LGUs) and school curricula. • Promoting knowledge development and demographic-disaggregated OSH research. While technological advancements like electronic inspection logging have streamlined enforcement, the Philippines faces ongoing challenges. Future success hinges on acquiring necessary human and financial resources, leveraging big data analytics, and addressing emerging hazards such as mental health issues, climate change, and evolving work arrangements.

Symposium

S5 National Programmes and Policy in Occupational Medicine: The Philippines Perspective

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Occupational health for all - advancing Universal Health Care in the workplace

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According to the World Health Organization (WHO), universal health coverage (UHC) aims to provide all people, young and old, access to comprehensive quality health care services they need, when and where they need them, and most importantly without financial hardship. It covers the full continuum of essential health services, such as primary to tertiary levels of care, specifically from health promotion to prevention, treatment, rehabilitation and palliative care.

The Department of Health (DOH) together with significant key stakeholders have collaborated to transition into the integration and implementation of the Universal Health Care (UHC) Act of the Philippines - Republic Act 11223 - to ensure health for all Filipinos. It is an integrated and comprehensive approach that all Filipinos are health literate, provided with healthy living conditions, and protected from hazards and risks that could affect their health, such as seen in all workplaces.

Occupational health for all - universal occupational health care is aligned with the global initiative of the International Commission on Occupational Health (ICOH) in ensuring decent work together with healthy workers.

ICOH proposed concrete measures for the International Labour Organization (ILO) in collaboration with the WHO to prioritize the development of universal occupational health coverage (UOHC), ensuring the right to competent occupational health services for all workers of the world (private, public, formal, informal) in all economic sectors and in all types of workplaces.

The Philippine College of Occupational Medicine (PCOM), as a member of the National Technical Working Group for Healthy Workplaces (NTWG HW), together with all its members, strongly supports “Occupational Health for All” to ensure universal health coverage in the workplace.

Symposium

S5 National Programmes and Policy in Occupational Medicine: The Philippines Perspective

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The road to Occupational Medicine Week: milestones, mandates, and the future of worker health under Presidential Proclamation No. 1316

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Occupational Medicine (OM) in the Philippines has undergone a profound paradigm shift from reactive treatment to proactive, systemic prevention. This lecture explores the legislative evolution that culminated in the signing of Presidential Proclamation No. 1316, which officially declared the third week of March as "Occupational Medicine Week." We will trace the structural milestones that paved this path, in collaboration with the Department of Labor and Employment (DOLE) - Occupational Safety and Health Center (OSHC), followed by the landmark passage of Republic Act No. 11058 (the OSH Law). Backed by labor statistics that historically revealed tens of thousands of preventable injuries and illnesses annually, Proclamation No. 1316 serves as a critical national mandate to elevate the clinical interface between worker health and workplace productivity. Attendees will gain insights into how the declaration fosters inter-agency and private-sector cooperation, drives the adoption of modern workplace wellness strategies, and shapes the contemporary role of the occupational health physician. Ultimately, this session highlights how "OM Week" is not merely a yearly observance, but a continuous catalyst for safeguarding Filipino workers and advancing decent work across the archipelago.

Keywords: Presidential Proclamation No. 1316, Occupational Medicine Week, Workplace Safety, Public Health Policy, OSHC, Worker Welfare.

Symposium

S6 Building Psychologically Safe Workplace: Global Mental-Health Strategies

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Psychological safety management pyramid model for managing workplace mental health

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Organizations today face accelerating medical claims and substantial hidden costs stemming from poor employee health and wellbeing. This presentation introduces a novel framework utilizing the Safety Pyramid Model to transform traditional, encounter-based medical data into a longitudinal, "whole-person" view across time. By analyzing a dataset of over 40,000 insured employees and 900,000 claims, the model bridges the gap between lagging indicators (chronic illnesses, medical buyouts) and leading indicators (health screenings, EAP utilization). The analytics reveal that while chronic patients represent a minority (13%) of the workforce, they drive 30% of total claim values, with costs escalating sharply alongside comorbidities. Furthermore, indirect costs—particularly presenteeism, which hurts productivity at 3.4 times the rate of absenteeism—constitute a massive economic burden, absorbing 9.6% of total payroll. Attendees will explore how shifting to proactive primary care and digital coaching effectively contains costs, yielding up to a 56.1% reduction in average annual claims for chronic individuals. Finally, this session will demonstrate a robust cost-containment formula to calculate tangible Return on Investment (ROI), mapping a strategic pathway from reactive status-quo spending to a sustainable, holistic corporate wellbeing ecosystem.

Symposium

S6 Building Psychologically Safe Workplace: Global Mental-Health Strategies

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Building a psychologically safe workplace: global mental health strategies – the Reliance Way

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Mental health has emerged as a critical workplace priority globally, with growing evidence linking psychological well-being to employee engagement, productivity, safety, and organizational resilience. International frameworks advocate psychologically safe workplaces through leadership commitment, stigma reduction, psychosocial risk management, employee participation, access to support services, and a culture that encourages help-seeking without fear of judgment or discrimination. At Reliance, psychological safety is embedded within a comprehensive health and well-being framework that integrates preventive, promotive, and curative interventions across the employee lifecycle. Reliance's flagship wellness initiative, R-Swasthya, promotes holistic well-being through five interconnected domains—Physical, Mental, Social, Spiritual, and Financial Health. The program is supported by a strong occupational health infrastructure, trained medical professionals, leadership-driven wellness initiatives, mental health awareness campaigns, resilience-building workshops, and manager sensitization programs, that help reduce stigma and foster a supportive workplace culture. A comprehensive Mental Health Framework guides efforts to promote psychological well-being and enable early identification and intervention for employees experiencing distress. To further strengthen psychological safety, Reliance has implemented a robust Prevention of Sexual Harassment (POSH) framework that promotes dignity, respect, inclusion, and a safe work environment. In addition, an external professional agency provides 24×7 confidential counselling and psychological support services for employees and their family members, with access to specialized care through structured referral pathways. The organization also provides medical and psychological support during medical or emotional exigencies through REFERS (Reliance Employee and Family Emergency Response Services), which offers coordinated assistance for medical, security, travel, emergency, and crisis situations. The Reliance strategy demonstrates that integrating global mental health principles with holistic well-being programs, accessible support systems, and a culture of trust and inclusion can create a resilient and psychologically safe workplace.

Symposium

S7 Beating NCDs at Work: Integrated Prevention Programmes

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From risk to resilience: handling NCDs in the workplace

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NCDs remain the most significant contributor to premature mortality among adults under 70 years in Malaysia, causing 72% of all premature deaths. The National Health and Morbidity Survey (NHMS) 2023 reveals that 54.4% of Malaysian adults are overweight or obese, with rising rates of diabetes (15.6%) and hypertension (29.2%), severely impacting the prime productive years of the nation's workforce.

As individuals spend over one-third of their lives at work, the workplace is a vital platform for early intervention. This presentation promotes a paradigm shift by considering holistic workplace health as a strategic investment essential for fostering workforce resilience, sustaining productivity, and supporting Malaysia's broader economic trajectory, in contrast to traditional corporate approaches that frequently treat employee wellness as an optional overhead.

Achieving organizational resilience requires a paradigm shift from reactive risk mitigation to proactive health cultivation. This necessitates addressing the synergistic impact of lifestyle-related behavioral risks such as physical inactivity and poor nutrition, alongside broader environmental stressors.

The Ministry of Health (MOH) Malaysia has implemented several key initiatives to address the burden of non-communicable diseases (NCDs) within the workplace. These initiatives aim to shift the focus from "sick care" to "health care" through prevention, health promotion, and early detection. These include KOSPEN WOW, *Inisiatif Penjawat Awam Sihat Sejahtera* (I-PASS) and Integrated Workplace Health Programme (IWHP).

Keywords: NCDs; Workplace; Resilience

Symposium

S7 Beating NCDs at Work: Integrated Prevention Programmes

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NCD burden through scaling prevention in the Asian subcontinent: a risk-stratified model informed by UK and European frameworks

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Background/Introduction: Non-communicable diseases (NCDs) are the leading driver of premature mortality across the Asian subcontinent, where rapid urbanisation, demographic transition, and lifestyle are accelerating metabolic risk. A proposed risk-stratified model to transform NCD prevention is presented, drawing on established frameworks from the UK and Europe.

Marmot's concept of social gradient demonstrates health outcomes worsen progressively with socioeconomic disadvantage, highlighting the need to address both clinical risk factors and living conditions. The workplace represents a powerful scalable platform for change providing opportunities for prevention, early detection, and supportive interventions across diverse populations.

Methods: Using data from the Malaysian National Health and Morbidity Survey (NHMS) as a representative example, this evaluation assesses a risk stratification framework integrating behavioural (e.g., smoking, physical inactivity) and metabolic risk factors applicable across Asian populations.

Epidemiological forecasting models the impact of targeted interventions across population subgroups, including workplace health initiatives, and national policy measures. The approach aligns with European evidence supporting multi-factor, risk-based prevention, encompassing pharmacological innovation alongside lifestyle and occupational health interventions, with large-scale rollout targeting individuals at high cardiovascular risk demonstrating reductions in adverse outcomes.

Results: The proposed model demonstrates strong potential return on investment (ROI), particularly among high-risk and lower socioeconomic populations across Asia. Early intervention significantly reduces projected cardiovascular disease (CVD), metabolic disease burden, and Disability-Adjusted Life Years (DALYs).

Discussion: This underscores that risk-stratified prevention must extend beyond clinical risk to address structural inequality. Across Asia, socioeconomic deprivation amplifies cardiometabolic risk, mirroring patterns observed in the UK.

Symposium

S8 Next-Gen Aviation Medicine: From Cockpit to Cabin

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Pilot incapacitation: when pilots are not airworthy

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Pilot incapacitation is defined as sudden or gradual impairment of flight duties due to medical, physiological, or psychological factors. This presentation examines incapacitation classification (sudden versus subtle), epidemiological patterns, underlying causes and mitigating measures. Pilot incapacitation events on board aircraft are thankfully infrequent, with general aviation showing higher rates than commercial aviation. Causes stem from medical emergencies, physiological events, to common "life events" such as stress, fatigue and distractions. Cardiovascular emergencies make up one of the most common medical causes. Case studies demonstrate the critical importance of crew resource management and the need for pilots to be educated and have insight into their fitness requirements i.e. "pilot airworthiness". Prevention in the guise of medical standards forms the bulwark of successful incapacitation management but individual pilot insight into his day to day health status prior to each flight is equally important. The presentation concludes by sharing ideas on prevention strategies including enhanced medical screening, use of technology and improved training programmes.

Symposium

S8 Next-Gen Aviation Medicine: From Cockpit to Cabin

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Psychoactive substance use in Philippine aviation: keeping safe skies

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Various Pilots and aircrews were subjected to random drug testing and had breath analyzed for alcohol consumption prior to flight deployments. Many aspiring flying students and aviation instructors were tested during a training at their Aviation Training Organization. The team from the Civil Aviation Authority of the Philippines- Flight Standards Inspectorate Service- Office of the Flight Surgeon Aviation Medicine (CAAP-FSIS-OFSAM) comes in a coordinated but unannounced manner to different aerodromes, airline operations and Aviation Training Organizations as part of the nationwide program on keeping safe skies. This conduct is enforced under the framework of 2 provisions: the Philippine Civil Aviation Regulations (PCAR) 1.2.2.15 and (PCAR) 8.5.1.5, together with the current Memorandum Circular No.066-2025 on continuing commitment to strengthen state safety oversight and uphold a drug-free aviation environment. These provisions authorize testing among aviation personnel and the consequence that follows when someone refuses or fails to submit to. Personnel who tested positive shall be immediately result to removal from safety critical duty and shall initiate the Authority to conduct actions necessary that may include suspension of license or even revocation of certification as provided by the regulation. The Philippine framework on Civil Aviation Regulations on Psychoactive drug use is part of its commitment to International Civil Aviation Organization as a member signatory state towards an objective in the elimination of preventable aviation fatalities that is carried through the ICAO Document 9654 on the Prevention of Problematic Use of Substances in Aviation. There is no advance aircraft technology nor a system checklist that can supersede impaired aviation personnel. The Philippines turns this obligation into a regulation.

Symposium

S8 Next-Gen Aviation Medicine: From Cockpit to Cabin

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Development of a cumulative fatigue recovery program for commercial pilots: a multiphase study integrating fatigue monitoring and intervention

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Introduction: Fatigue remains a critical human factor affecting aviation safety. Although Fatigue Risk Management System (FRMS) has been recommended by International Civil Aviation Organization (ICAO), their implementation in many operation settings remains limited due to the complexity of the system, as well as the substantial resources, expertise and organizational commitment required. As a result, fatigue management in practice still relies largely on prescriptive regulation such as flight duty limitation, which may not adequately capture cumulative fatigue resulting from repeated flight duties, circadian rhythm disruption and insufficient recovery. Cumulative fatigue may progressively impair cognitive performance and physiological functioning in pilots, yet it remains insufficiently monitored and addressed.
Objective: This study aims to develop and evaluate cumulative fatigue recovery program for commercial pilots by integrating multidimensional fatigue monitoring and targeted recovery strategies.
Methods: This research adopts a multiphase design. In the first phase, a cumulative fatigue recovery will be developed through expert consensus using focus group discussions and a Delphi study involving aviation medicine specialist, occupational medicine specialist, aviation safety professional, experienced pilots and airline management. The program will include physical exercise, breathing exercise, counselling and fatigue education. In the second phase, a digital platform will be developed to facilitate fatigue monitoring and program implementation. In the third phase, the effectiveness of the program will be evaluated using a randomized controlled trial among commercial pilots. Cumulative fatigue will be assessed using a multidimensional approach including subjective cumulative fatigue measurement (Checklist Individual Strength20 Revised), response time assessment using Psychomotor Vigilance Test (PVT) and physiological indicators through heart rate variability analysis.
Expected Results: The study is expected to produce a structured cumulative fatigue recovery program tailored for commercial pilots and provide evidence regarding its effectiveness in managing cumulative fatigue and improving recovery.
Conclusions: Addressing cumulative fatigue through integrated monitoring and recovery strategies may complement existing fatigue management approaches and support safer flight operation while contributing to pilot health and well-being.

Keywords: Cumulative fatigue; Commercial pilots; Fatigue monitoring; Fatigue recovery; Aviation medicine

Symposium

S8 Next-Gen Aviation Medicine: From Cockpit to Cabin

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Normobaric hypoxia and modes of training

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Normobaric hypoxia training is increasingly emerging as a practical, scalable, and educationally valuable modality for safety and human performance training, particularly in civilian aviation, where access to traditional hypobaric chamber facilities may be limited by cost, infrastructure, logistics, and operational constraints. By reducing inspired oxygen concentration while maintaining normal ambient pressure, normobaric systems allow participants to experience the early physiological and cognitive effects of hypoxia in a controlled, repeatable, and comparatively accessible training environment.

In civilian aviation, this offers clear advantages for pilots, cabin crew, aviation students, and training organisations seeking recurrent and operationally relevant hypoxia awareness training. Different modes of delivery — including classroom demonstrations, individual mask-based exposure, task-based exercises, and simulator-linked sessions — can help learners recognize subtle impairment in attention, judgment, communication, and decision-making before performance deteriorates further.

Beyond aviation, normobaric hypoxia training also holds substantial value in medical education. For medical students and physicians, it provides an experiential means of understanding the signs and symptoms of hypoxia, appreciating individual variability in presentation, and linking physiological concepts with functional and clinical relevance. The approach may also support occupational health education, including in sectors such as oil and gas, where workers may encounter hazardous atmospheres or respiratory compromise. As such, normobaric hypoxia training should be viewed not only as an aviation training tool, but as a broader platform for physiology, human performance, and safety education.

Symposium

S9 Growth of Industrial Hygiene and Anticipating Health Hazard Risks of the Future Workforce in the Asian Region

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Three key components for the future growth of industrial hygiene in Asia: people, technology, and hazards

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Industrial Hygiene (IH) plays a critical role in protecting workers' health from workplace hazards. Looking ahead, the future growth and relevance of IH will be shaped by three interrelated components: hazards, technology, and people. While traditional chemical and physical hazards continue to threaten worker health, emerging industries, novel materials, evolving work patterns, and rising societal expectations for well-being are making workplace risks increasingly diverse, complex, and dynamic.

Over the past half-century, IH has evolved into an independent scientific discipline built upon two pillars: sampling and analysis (S&A) and occupational exposure limits (OELs). Although these methodologies transformed hazards into measurable data and provided an evidence-based risk evaluation framework, they inherently limit timely intervention. Conventional time-integrated sampling rarely supports immediate exposure management and offers little insight into temporal patterns or the determinants of peak exposures.

Today, rapid advances in artificial intelligence (AI), smart sensors, wearable technologies, and Physical AI are reshaping these foundational methods. Continuous real-time monitoring, spatial-temporal exposure mapping, and lifetime exposure profiling are shifting the paradigm from conventional sampling toward AI-enabled, data-driven exposure assessment frameworks capable of interpreting multi-scale time-series data. This transformation will transition IH from an expert-centered model to a user-centered system that enables continuous, proactive workplace decision-making.

Rather than replacing industrial hygienists, these technological shifts will redefine their professional roles. Future IH professionals must spearhead the development of next-generation exposure assessment methodologies, interpret complex data streams, validate AI systems, calibrate advanced sensing technologies, and establish scientifically sound exposure criteria for continuous monitoring. To navigate this AI-driven transformation, international organizations like IOHA and ANOH must provide strategic leadership by fostering collaborative research and cultivating future leaders. Concurrently, academic IH education must expand beyond conventional technical skills, emphasizing the philosophical foundations, scientific rigor, and innovation capacity required to lead the future profession.

Symposium

S9 Growth of Industrial Hygiene and Anticipating Health Hazard Risks of the Future Workforce in the Asian Region

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Building the bridge: developing the industrial hygiene workforce Asia needs for 2030

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Industrial hygiene in Asia faces a workforce challenge that threatens to outpace its growth: the profession is not producing or retaining talent fast enough to meet regional demand. The global shortfall between the number of qualified occupational hygienists needed and those currently available is well documented, and it is most acute in precisely the emerging economies where industrial growth and hazard complexity are accelerating fastest.

This presentation reframes that capability and capacity gap as a question of adequacy, reach, and reinvention and not headcount alone. The region already holds real infrastructure to build from: professional bodies, national accreditation systems, and mentorship networks, though unevenly distributed and still maturing in some countries. Because traditional workforce growth cannot close this gap quickly enough on its own, the more realistic path forward lies in scaling the reach of existing expertise, extending a hygienist's judgment across far more workers and sites than they could ever reach directly.

Closing this gap also demands rethinking what the profession teaches its own future practitioners. Industrial hygiene curriculums must keep pace with the realities of modern work, and training must evolve to reflect the hazards and workforce structures hygienists are actually encountering today.

People remain the foundation of industrial hygiene's growth in Asia, not simply as practitioners applying expertise, but as a professional community that must scale its knowledge outward, modernize how it trains the next generation, and reinvent its own appeal. Strengthening this human capability will determine whether the profession can keep pace with the region it serves.

Symposium

S9 Growth of Industrial Hygiene and Anticipating Health Hazard Risks of the Future Workforce in the Asian Region

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From disclosure to prevention: governance for ESG and responsible AI in occupational health

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Occupational health is entering a new stage in which major risks are increasingly embedded in work organization, management practices, and corporate decision-making. Long working hours, overwork-related diseases, psychosocial stress, and the rapid digitalization of work are becoming prominent occupational health challenges. Unlike traditional chemical, physical, and biological hazards addressed through industrial hygiene, these risks are often less visible and more difficult to measure. As a result, governance has become a critical determinant of whether such risks are recognized, managed, and ultimately prevented.

Taiwan's experience in occupational health governance demonstrates how regulation, ESG disclosure, and corporate accountability can operate as complementary mechanisms. Regulation establishes employer responsibility, ESG disclosure enhances transparency and comparability, and corporate governance translates commitments into preventive actions. Effective prevention depends not only on measuring risks, but also on embedding occupational health considerations into organizational decision-making, including working-time management, psychosocial risk prevention, and mental health protection. Although this presentation draws on Taiwan's experience, the governance principles discussed are applicable to many jurisdictions facing similar occupational health challenges.

The same governance principles are increasingly relevant to the use of digital technologies and artificial intelligence in the workplace. While AI can support the early identification of psychosocial risks and emerging health concerns, it may also intensify work demands, expand surveillance, and create new forms of inequality. Responsible AI in occupational health therefore requires transparency, worker participation, privacy protection, human oversight, and professional judgment. AI may identify patterns, but decisions affecting workers must remain accountable and human-centered.

This presentation argues that the future of occupational health depends not only on disclosure, compliance, or technological innovation, but on governance systems capable of transforming information into prevention. By linking measurable indicators, transparent reporting, and responsible AI governance, organizations can move from documenting risks to preventing harm and promoting worker well-being before adverse outcomes occur.

Keywords: Occupational health; Psychosocial risks; Mental health at work; ESG; Algorithmic management; Responsible AI; Corporate governance

Symposium

S10 Mining and Agriculture: Mitigating High-Risk OH Exposures

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Enhancing productivity among palm oil workers: mitigating fatigue and musculoskeletal problems

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Palm oil workers face significant productivity challenges driven by the dual burden of occupational fatigue and musculoskeletal disorders (MSDs). Fatigue acts as a "silent hazard" in plantation environments, where heavy physical work, heat stress, and long working hours impair cognitive and psychomotor functions, leading to increased unsafe acts. Furthermore, sickness presenteeism—present at work while unwell—is also highly prevalent (43.3%) among these workers and is significantly linked to MSDs such as low back pain and cervical pain. These health issues serve as risk amplifiers, where minor errors and near-misses frequently precede serious workplace accidents.

To tackle this issue and enhancing productivity, companies must implement Fatigue Risk Management Systems (FRMS) and ergonomic hazards management that include sleep management and work posture education. Moreover, company is recommended to have adequate management of near-miss reports; providing thorough investigations and transparent feedback fosters a safety culture that significantly boosts work engagement and prevents subsequent injuries. By proactively addressing this program, it may have a spillover effect not only systematically reduced the likelihood of having an accident but also has a psychological root creating positive mental health and organizational support of the workers to tackle issues on presenteeism and supports long-term worker health and productivity.

Symposium

S10 Mining and Agriculture: Mitigating High-Risk OH Exposures

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Mitigating high-risk exposures in the coal mining industry in Australia

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Mining is a major industry in Australia, with more than 300,000 workers employed nation-wide. Australia has a large repository of natural resources, including coal, gold, iron ore, rare earths, lithium and copper. The coal industry is primarily located in the states of Queensland and New South Wales (NSW). There are many types of hazards in the coal mining industry, including coal dust, crystalline silica and diesel particulate.

These exposures are known to cause a large number of occupational diseases, including coal workers' pneumoconiosis, silicosis, chronic bronchitis, autoimmune diseases, chronic obstructive pulmonary disease and kidney disease. Crystalline silica and diesel particulate are also classified as Group 1 human carcinogens by the International Agency for Research on Cancer.

Australia has introduced a wide range of measures to mitigate these exposures and monitor the health of workers in the coal mining industry. Queensland and NSW have established workplace exposure limits for these exposures and conduct regular air monitoring to monitor compliance. Source reduction measures include water sprays and using such as enclosed cabs. Older diesel engines are being phased out in favour of lower emission vehicles and electric equipment. Despite these measures, surveillance of coal mine workers continues to identify cases of coal mine dust diseases.

Both states conduct regular respiratory health monitoring of coal mine workers. A 2016 review of the Queensland health monitoring program identified many limitations in the design and conduct of these medicals and recommended many improvements. These included using radiologists who are accredited B readers to read the chest x-rays, better training of the doctors doing the medicals and using accredited laboratories to conduct respiratory function tests. Australia has also recently revised its guidance for doctors assessing workers exposed to respirable crystalline silica dust, which has application for workers exposed to other exposures in the coal mining industry.

Keywords: Coal mining; Coal dust; Crystalline silica; Pneumoconioses; Diesel particulate; Lung cancer

Symposium

S10 Mining and Agriculture: Mitigating High-Risk OH Exposures

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From reactive care to proactive governance: managing high-risk occupational health exposures in oil palm plantations

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Agriculture remains one of the more challenging sectors for occupational health (OH) risk management due to the combination of physically demanding work, outdoor environmental exposure and geographically dispersed worksites. In the palm oil sector, high-risk exposure include pesticides, heat stress, ergonomic strain, noise, biological hazards, fatigue and the interaction between work demands and underlying non-communicable diseases.

This presentation discusses practical approaches to mitigating these risks from the perspective of OH governance in a large agricultural organisation. It argues for moving beyond minimum compliance toward an integrated OH system that links health risk assessment, medical surveillance, fitness-to-work assessment, industrial hygiene monitoring, worker education, early case detection and structured return-to-work. Particular attention is given to the realities of implementing controls across dispersed estate and mill operations, where access to healthcare, standardisation of clinic services, data capture, supervision and worker communication are often challenging.

In addition, this presentation explores how OH programmes can be strengthened through risk-based prioritisation, better use of health data, alignment with sustainability and human rights expectations, and closer collaboration between operations teams, HSE personnel, estate clinics and external healthcare providers. Using agriculture as a case study, it demonstrates how high-risk exposures can be systematically identified, monitored and reduced through scalable, worker-centred intervention.

The presentation concludes by proposing a shift from reactive case management to proactive health risk governance, in which OH becomes integral to operational resilience, worker wellbeing and sustainable agricultural production.

Symposium

S11 Strategies and Converging Occupational Stressors (Affiliate Symposium by TEOMA)

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Taiwan experience discussion at the consistency and quality of workload-related cardiovascular and cerebrovascular diseases assessment reports for security guards

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Objective: To evaluate the quality and consistency of official workload-triggered disease assessment reports for cerebrovascular and cardiovascular diseases (CVD) among security guards in Taiwan, using the national determination guidelines as the benchmark.

Methods: A standardized evaluation form was developed based on the national guidelines to assess 49 anonymized workload-triggered CVD reports issued for security guards between 2020 and 2022. Each report was independently reviewed by two experienced occupational medicine specialists. The quality of evidence regarding disease, exposure, temporality, literature consistency, and consideration of other causal factors was evaluated. The internal consistency of the evaluation form was assessed using Cronbach's Alpha.

Results: The evaluation form demonstrated excellent internal consistency (Cronbach's Alpha = 0.978). The quality of "Evidence of Disease" and "Temporality" was rated as excellent. The "Evidence of Exposure" was rated as good, but lacked objective documentation; objective work-hour records were present in only 51.5% of short-term and 75.8% of long-term overload cases. The "Consideration of Other Causal Factors" was rated as needing improvement, with only 53.1% of reports documenting lifestyle habits and significant omissions regarding the treatment status of comorbidities. Furthermore, 10.2% of the evaluations noted the use of outdated guidelines.

Conclusions: While workload-triggered disease reports for security guards are robust in diagnostic and temporal evidence, their quality is compromised by insufficient objective documentation of work exposure and inadequate assessment of non-occupational risk factors. Standardized protocols for collecting objective exposure data and enhanced training on comprehensive risk factor assessment are recommended to improve the validity of these crucial reports.

Symposium

S11 Strategies and Converging Occupational Stressors (Affiliate Symposium by TEOMA)

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An integrated, community-based, and digitally enabled model for occupational injury care and return to work: experience from southern Taiwan

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Background: Occupational injuries remain a major challenge in southern Taiwan, particularly among workers in shipbuilding, manufacturing, agriculture, and fisheries. Vulnerable populations, including older adults, Indigenous peoples, and migrant workers, often face barriers to healthcare access, rehabilitation, and return-to-work (RTW). To address these issues, Kaohsiung Municipal Siaogang Hospital established an Integrated Occupational Injury Care Program in 2022.
Methods: Led by the Department of Occupational Medicine, the program provides a one-stop service integrating occupational disease identification, medical treatment, compensation counseling, occupational rehabilitation, and RTW support. Digital innovations, including AI-assisted risk assessment, telemedicine, and a LINE-based communication platform, were implemented to enhance care coordination and accessibility. Functional assessments and machine learning tools were also incorporated to support individualized rehabilitation planning.
Results: The integrated model improved care continuity facilitated earlier identification of occupational conditions, and enhanced coordination across healthcare, labor, insurance, and social welfare sectors. Functional independence, particularly mobility and community participation, proved valuable for guiding rehabilitation and RTW strategies. Digital communication tools further streamlined multidisciplinary collaboration and complex case management.
Conclusions: This program demonstrates a transition from hospital-centered care to a community-based, digitally enabled, and equity-oriented occupational health system. By integrating functional assessment, AI-supported decision-making, rural outreach, and cross-sector collaboration, the model addresses both medical and social determinants of RTW. The experience provides a scalable framework for reducing health inequalities and advancing sustainable occupational injury care.

Symposium

S11 Strategies and Converging Occupational Stressors (Affiliate Symposium by TEOMA)

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COMmunity-based Behavior and Attitude survey in Tuvalu (COMBAT): precision planetary health under climate change

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Tuvalu is a country facing triple threat of climate change, obesity pandemic and food insecurity. Agricultural workers are essential to the whole Tuvaluan society, as they sustain the resilience of food systems. However, the people are experiencing less arable land, and the increasing health burden under climate change. The works aim to develop tailored, culturally sensitive and evidence-based interventions that account for diverse sociodemographic and health contexts for agricultural workers in Tuvalu.

I will introduce Community-based Attitude and Behavior Survey in Tuvalu (COMBAT) in 2020, focusing on the international, multidisciplinary collaboration with multiple stakeholders, especially the ongoing works to control obesity and its related diseases under the context of climate change. Lastly, I will show the current enrollment status, demographic characteristics, ongoing analysis and follow-up plans for the COMBAT study population.

Then, findings from the COMBAT study will be reported. First, home gardening is associated with lower body mass index and reduced odds of obstructive sleep apnea in this resource-limited setting, suggesting that engagement in active agricultural works may confer certain health benefits among subsistence agricultural workers. Also, prenatal rainfall exposure was associated with a higher likelihood of obesity in adulthood, potentially reflecting climate-related impacts on food systems and early-life nutrition. Together, these studies underscore a Total Worker Health perspective in which occupational, environmental, and livelihood factors are deeply interconnected among subsistence agricultural workers in Tuvalu. Ongoing follow-up in COMBAT study aims to inform sustainable, community-driven interventions that support climate change adaptation and promote health equity among vulnerable working populations.

Overall, we conducted a community-based survey in collaboration with multiple stakeholders to advance health in Tuvalu. Also, we identified the environmental factors that may influence population health in this population. Together, these ongoing cohort studies provide context-specific evidence to advance population health among agricultural workers in Tuvalu.

Symposium

S11 Strategies and Converging Occupational Stressors (Affiliate Symposium by TEOMA)

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Psychological impact of natural disasters on frontline workers: evidence from the United States and Taiwan

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Background: Frontline workers, such as emergency medical technicians (EMTs) and healthcare workers (HCWs), play a crucial role during natural disasters; however, their mental health in these situations remains understudied.
Objectives: We aim to delineate changes in mental health among frontline workers following natural disasters. We investigated two cohorts: 1) Taiwanese EMTs who were involved in water-rescue operations following flooding events in Tainan in July 2025, and 2) U.S. HCWs from hospitals affected by Hurricane Helene in September 2024. Additionally, unaffected EMTs and HCWs from the same systems were recruited as reference groups.
Methods: In Taiwan, we utilized two waves of the Firefighters in Taiwan (FiT) cohort data (March–April vs. August–September 2025) to assess pre- and post-flood changes in mental health among EMTs, categorized by service region and disaster involvement. In the U.S., an online survey was conducted at 4, 7, and 13 months after Hurricane Helene, targeting HCWs at two affected hospitals and one non-affected control hospital within the same healthcare system. We employed the Beck Depression Inventory for Primary Care and Patient Health Questionnaire-2 to characterize mental health trajectories for the two cohorts, respectively.
Results: Among the FiT cohort, the findings indicate a dose-response relationship between the number of flood exposure events and pre- and post-flood changes in depressive symptoms (adjusted β= 0.38, 95% confidence interval [CI]: 0.02–0.73). Similarly, in the U.S. HCWs cohort, those who experienced dual exposure—both personal and workplace—showed significantly higher depression scores compared with the unexposed group. This was observed at both 4 months (adjusted β= 0.45, 95% CI: 0.18–0.73) and 7 months (adjusted β= 0.43, 95% CI: 0.06–0.80) after Hurricane Helene.
Conclusions: Natural disasters negatively affect the mental health of frontline workers, especially those involved in rescue missions or whose work and personal lives are impacted.

Symposium

S12 Occupational Health for Healthcare Workers in Singapore (Affiliate Symposium by Singapore College of Public Health & Occupational Physicians)

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Occupational health for healthcare workers in Singapore

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There is a saying among many respected corporate leaders that if you take care of your employees, they will take care of the clients. This belief holds true in the healthcare setting too. With an ageing population and hence an ageing workforce, compounded by the global shortage of healthcare workers, healthcare employers have become more attuned to the health and wellbeing needs of their staff. They are also prepared to do more to enhance these aspects.

In Singapore, the COVID-19 pandemic had highlighted the challenges and strenuous demands on healthcare workers as they provide care for their patients while making sure they didn't succumb to the infection themselves. There was a national outpouring of gratitude and support from all over for their sacrifice and commitment to the profession. Post-COVID, the Occ Med community have capitalized on the momentum to improve the provision of occupational health for our colleagues in various settings, ranging from the management of midlife female healthcare workers, assessment of fitness to work for aging workers, pre-shift stretching exercises for inpatient staff, to preventive health screening for healthcare workers.

Oral Presentation

O1 Occupational Medicine

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Taiwan experience discussion at the consistency and quality of workload-related cardiovascular and cerebrovascular diseases assessment reports for security guards

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Objectives: To evaluate the quality and consistency of official workload-triggered disease assessment reports for cerebrovascular and cardiovascular diseases (CVD) among security guards in Taiwan, using the national determination guidelines as the benchmark.

Methods: A standardized evaluation form was developed based on the national guidelines to assess 49 anonymized workload-triggered CVD reports issued for security guards between 2020 and 2022. Each report was independently reviewed by two experienced occupational medicine specialists. The quality of evidence regarding disease, exposure, temporality, literature consistency, and consideration of other causal factors was evaluated. The internal consistency of the evaluation form was assessed using Cronbach's Alpha.

Results: The evaluation form demonstrated excellent internal consistency (Cronbach's Alpha = 0.978). The quality of "Evidence of Disease" and "Temporality" was rated as excellent. The "Evidence of Exposure" was rated as good, but lacked objective documentation; objective work-hour records were present in only 51.5% of short-term and 75.8% of long-term overload cases. The "Consideration of Other Causal Factors" was rated as needing improvement, with only 53.1% of reports documenting lifestyle habits and significant omissions regarding the treatment status of comorbidities. Furthermore, 10.2% of the evaluations noted the use of outdated guidelines.

Conclusions: While workload-triggered disease reports for security guards are robust in diagnostic and temporal evidence, their quality is compromised by insufficient objective documentation of work exposure and inadequate assessment of non-occupational risk factors. Standardized protocols for collecting objective exposure data and enhanced training on comprehensive risk factor assessment are recommended to improve the validity of these crucial reports.

Keywords: Security guards; Workload-triggered diseases; Cerebrovascular diseases; Cardiovascular diseases; Quality assessment

Oral Presentation

O1 Occupational Medicine

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Alterations in cardiovascular biomarkers and gut microbiome associated with night shift work: insights from the Chinese Platform Workers Study

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Background: The expansion of the gig economy has been marked by an increase in platform workers, including ride-hailing drivers, who typically work non-standard schedules, with night shifts being common. Although night shift work is known to disrupt circadian rhythms and elevate cardiovascular risks, the interplay between early alterations in cardiovascular biomarkers and the gut microbiome remains unclear.
Objectives: The aim of this study was to investigate these associations in the platform worker groups.
Materials and Methods: We conducted a cross-sectional study including 66 night shift and 175 day shift ride-hailing drivers in Beijing, China. All participants underwent health examinations, provided blood tests for the assessment of four key cardiovascular biomarkers (hs-cTnI, ET-1, NT-pro-BNP, and FABP-3), and submitted fecal samples for gut microbiome profiling via 16S rDNA sequencing. Bioinformatics, linear regression, and mediation analyses were conducted to evaluate the associations between night shift work, biomarkers, and microbial taxa, with adjustments for key sociodemographic and lifestyle factors.
Results: Night shift drivers exhibited significantly higher levels of NT-pro-BNP (median 49.8 vs. 41.3 pg/ml, $p = 0.044$), an association that remained significant after adjustment for covariates ($\beta = 0.195$, $p = 0.004$). Twenty differentially abundant taxa were identified, four of which were significantly associated with hs-cTnI. No significant mediation effect was observed. This study found that night shift work in ride-hailing drivers was significantly associated with adverse cardiovascular biomarker profiles and distinct gut microbiome alterations. Correlation analysis further suggested that gut microbial changes were linked to the observed cardiovascular risk.
Conclusions: This study reported associations between night-shift work and alterations in early cardiovascular injury biomarkers as well as the gut microbiota, suggesting a potential link between gut microbiota and night-shift-related cardiovascular injury.

Keywords: Ride-hailing drivers; Night shift work; Cardiovascular biomarkers; Gut microbiome; Circadian disruption

Oral Presentation

O1 Occupational Medicine

Ann Occup Environ Med. 2026 Aug;38(Supplement):O-053
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Effectiveness of an integrated physical and psychosocial intervention on musculoskeletal disorders, burnout, and perceived organizational support among nurses: study protocol

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Introduction: Musculoskeletal disorders and burnout are highly prevalent among nurses and frequently occur synergistically because of sustained physical demands and psychosocial stressors in hospital environments. This interaction contributes to adverse outcomes, affecting nurses' well-being, workforce retention, and the quality and safety of patient care. Despite increasing recognition of this dual burden, integrated interventions addressing both ergonomic and psychosocial risk factors remain limited in the Malaysian healthcare context. This study aims to develop, validate, and evaluate an integrated physical and psychosocial intervention targeting musculoskeletal disorders, burnout, and perceived organizational support among nurses.

Materials and Methods: A quasi-experimental study with repeated measures will be conducted among nurses from two public tertiary hospitals in Malaysia. The intervention group will receive the integrated intervention program, while the control group will continue usual practice supplemented with informational materials. Participants will be selected using proportionate stratified random sampling. Outcomes will be assessed at baseline and follow-up using validated Malay-language instruments measuring musculoskeletal symptoms, burnout, and perceived organizational support. Data will be analysed using generalized estimating equations (GEE) to evaluate differences between groups over time.

Results: It is anticipated that the intervention group will demonstrate reductions in musculoskeletal symptoms and burnout levels, alongside improvements in perceived organizational support compared to the control group.

Conclusions: This study is expected to provide empirical evidence supporting an integrated approach to managing the combined effects of physical and psychosocial risk factors. The findings will inform occupational health strategies and contribute to sustainable workforce protection policies within Malaysian healthcare settings.

Keywords: Musculoskeletal disorders; Burnout; Nurses; Occupational health; Organizational support

Oral Presentation

O1 Occupational Medicine

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Occupational exposure to aflatoxins and its association with genotoxicity among flour mill workers

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Introduction: Mycotoxins are secondary metabolites mostly produced by *Aspergillus, Penicillium*, and *Fusarium* species of fungi. Aflatoxins are considered the most dangerous and potent carcinogens among all mycotoxins, attracting significant attention due to their harmful effects even at low concentrations. Aflatoxin-producing fungi proliferate rapidly on grains, seeds, nuts, and other foodstuffs, resulting in the contamination of approximately one-quarter of global agricultural commodities. Aflatoxin B1 has been categorised as a Group 1 carcinogen by the International Agency for Research on Cancer (IARC).

Rationale: Even though the most common route of entry of aflatoxin is ingestion, exposure to organic dust is a potential source of exposure to workers through inhalation and dermal contact. This puts them at additional risk compared to the general population, owing to the possibility of cumulative exposure through different routes. To the best of our knowledge, currently, there are no regulations governing the acceptable thresholds in the workplace, which serves as a source. Considering the magnitude of the issue and paucity of data regarding the occupational exposure to aflatoxins among workers and their health effects in the Indian scenario, the study was conducted with the following objectives.

Objectives: 1. To assess the serum Aflatoxin B1 levels among occupationally exposed and non-exposed flour mill workers from India. 2. To determine the level of Aflatoxin B1 in airborne dust in the working environment of those workers. 3. To assess the genotoxicity using the comet assay among exposed and unexposed workers.

Methods: An analytical cross-sectional study was conducted among 148 workers (70 exposed and 78 unexposed) employed in flour mill industries in Karnataka, India. Workers with probable occupational exposure to Aflatoxins were selected from the flour mill industries. Aflatoxin B1 levels were determined in the serum samples of workers, along with the determination of AFB1 in airborne dust samples collected from the working environment of the workers using the ELISA method. Genotoxicity among workers was assessed using the Comet Assay.

Results: The majority of the participants belonged to the less than 30-year age group and were male. Nearly 50% of the workers had work experience of more than 5 years. The serum aflatoxin levels were found to be significantly different between occupationally exposed and non-exposed workers in flour mills in Karnataka. The mean serum levels of Aflatoxin B1 among occupationally exposed and non-exposed workers were found to be 7.56±2.8 ng/ml and 5.89±2.28 ng/ml, respectively. (t= 3.83, p<0.001). The mean serum levels of aflatoxin adjusted for albumin were significantly different among exposed (2.58±1.20) and non-exposed workers (1.69±0.92) (t=4.958, p<0.000, p<0.001). The AFB1 levels in the dust samples were found to be higher in the working environment of exposed workers compared to non-exposed workers. Genotoxicity, as assessed by comet assay parameters (such as percentage of DNA in tail, tail moment and olive moment), was significantly higher among exposed workers (p<0.001).

Conclusions: The serum aflatoxin B1 levels were found to be higher in occupationally exposed workers compared to others. Considering the health implications of Aflatoxins, regular screening of workers is recommended. Regulatory guidelines on permissible levels of Aflatoxin in the workplace should be enforced to prevent occupational exposure to this Group 1 carcinogen.

Keywords: Aflatoxin; Occupational exposure; Workers; Genotoxicity

Oral Presentation

O1 Occupational Medicine

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Early detection of asymptomatic chronic simple silicosis through medical surveillance and pre-referral high-resolution computed tomography: a case series

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Chronic simple silicosis, caused by prolonged inhalation of crystalline silica, often remains asymptomatic in its early stages. Relying on subjective symptom reporting is insufficient for protecting workers from progressive pulmonary fibrosis. This case series highlights the critical role of medical surveillance and early imaging in detecting subclinical occupational lung disease. During a routine medical surveillance program conducted between June 25 and November 11, 2025, sixteen workers at a cement manufacturing plant were exposed to crystalline silica and respirable dust exceeding 50 percent of the permissible exposure limit. Six of the workers were found to have abnormal spirograms demonstrating a restrictive lung pattern. Despite most workers denying any respiratory symptoms, the occupational health physician in charge immediately initiated medical removal protection. Crucially, a high-resolution computed tomography scan was ordered prior to respiratory physician referral. The high-resolution computed tomography results provided immediate, objective evidence of pulmonary damage, revealing a fibrotic pattern in five out of the six workers. Notably, two of these workers exhibited the distinct radiological presentation of chronic simple silicosis. Securing the high-resolution computed tomography prior to specialist referral significantly expedited the diagnostic pathway and retrospectively validated the swift implementation of medical removal protection. Subclinical lung damage in silicosis frequently precedes the onset of symptoms, demonstrating a dangerous gap between subjective well-being and objective pulmonary fibrosis. Based on these key findings, it is recommended that routine spirometry be combined with early high-resolution computed tomography imaging, and immediate medical removal protection be utilized as indispensable tools for occupational health practitioners to prevent irreversible morbidity in asymptomatic workers.

Keywords: Asymptomatic chronic simple silicosis; Medical surveillance; High-resolution computed tomography; Medical removal protection; Occupational medicine

Oral Presentation

O1 Occupational Medicine

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Development of a non-combustible cherry-type particulate respirator filter

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Introduction and Objectives: Welding operations in the shipbuilding industry frequently generate high heat and weld spatter, posing a significant risk of filter damage in particulate respirators. The widely used cherry-type (open-face) particulate respirator filter is particularly vulnerable to weld spatter, as it is typically fabricated from polypropylene — a lightweight, electrostatically charged material with excellent fine particle filtration efficiency but a low flash point (approximately 260°C) and melting point (160–170°C). Filter damage under these conditions can compromise respiratory protection and contribute to the ongoing rise in pneumoconiosis cases among shipbuilding workers. This study aimed to develop a non-combustible cherry-type filter incorporating a carbon fiber protective cover and to evaluate its performance in comparison with conventional products.

Methods: Six commercially available cherry-type polypropylene filters (three Special Grade, three Grade 1) were compared against a newly developed filter with a carbon fiber protection cover over a polypropylene core. Vertical and overhead welding conditions were simulated by mounting a steel rod horizontally; a mannequin wearing each filter was positioned at 10, 20, and 45 cm below the weld point without a welding shield. Welding proceeded left to right at approximately 1 cm/s, after which the outer surface and inner filtration layer of each filter were visually inspected for damage. Energy dispersive X-ray spectroscopy (EDS) via field emission scanning electron microscopy (FE-SEM) was performed to assess the elemental composition of the carbon fiber material for potential hazardous substances. Dust collection efficiency and respiratory resistance (differential pressure) of the developed filter were measured per official certification standards (flow rate: 47.5 L/min; differential pressure at 30 and 95 L/min) and compared with five conventional cherry-type filters.

Results: Under vertical welding conditions, the six conventional polypropylene filters showed no direct perforation but exhibited repeated spatter impacts on their surfaces, raising concerns about thermal deformation and filtration degradation under prolonged exposure. Under overhead welding — a more demanding condition — all six conventional filters sustained thermal damage penetrating through both the outer surface and the inner filtration layer. By contrast, the newly developed carbon fiber-covered filter showed only minor surface discoloration (consistent with superficial carbonization) under both welding conditions, with no structural damage or thermal deformation detected in the inner filtration layer. EDS analysis of the carbon fiber cover revealed that carbon and oxygen constituted approximately 98% of the material's atomic composition, with the remaining 2% comprising trace solidified amounts of Na, Si, P, and Ca — all assessed as non-hazardous to human health. The developed filter achieved a mean dust collection efficiency of 99.6%, comparable to conventional Special Grade filters. Its mean differential pressure was 113 Pa, substantially lower than that of most conventional filters (range: 101–260 Pa), suggesting reduced breathing resistance during high-intensity work.

Discussion: The results demonstrate that a carbon fiber protective cover can effectively shield the polypropylene filter core from weld spatter while preserving — and in some respects improving — the filter's protective performance. The substantially

lower breathing resistance of the developed filter compared with several conventional products may offer practical advantages for workers performing strenuous tasks. Current safety certification standards for particulate respirators include a combustibility test in which the facepiece is passed once through a flame at (6 ± 0.5) cm/s, a protocol that does not adequately simulate sustained weld spatter exposure in real occupational settings. The present findings highlight three key regulatory gaps: (1) the certification standard addresses only brief flame exposure, not prolonged spatter contact; (2) open-face filter designs are inherently vulnerable when used in hot-work environments; and (3) actual filter damage cases in shipyard welders confirm that additional protective measures are warranted. Limitations of this study include the use of visual inspection as the sole damage assessment method and the absence of post-exposure filtration efficiency testing.

Conclusions: A cherry-type particulate respirator filter with a carbon fiber protective cover demonstrated superior resistance to weld spatter compared with six conventional polypropylene filters, without compromising dust collection efficiency, and with notably lower breathing resistance. This design offers a practical solution for respiratory protection in high-heat industrial environments such as shipbuilding. Future work should address wearing comfort, post-damage filtration performance testing, and the expansion of safety certification criteria to include sustained hot-work exposure scenarios.

Keywords: Particulate respirator; Cherry-type filter; Non-combustible material; Carbon fiber; Weld spatter; Personal protective equipment; Shipbuilding industry

Oral Presentation

O1 Occupational Medicine

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Industry-specific disparities in cardiovascular disease hospitalization rates and identification of at-risk subgroups in South Korea using all employed Korean workers' big data

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Introduction and Objectives: Industry-specific disparities in cardiovascular disease risk among Korean workers remain insufficiently characterized. This study aimed to quantify cardiovascular disease hospitalization rates across 32 industry sectors over 20 years, estimate standardized incidence ratios by industry and workplace size, and identify at-risk subgroups for prioritized occupational surveillance.

Methods: Using nationwide National Health Insurance Service claims data from 2004–2023 covering up to 17 million employed workers annually, we analyzed all employed Korean workers aged 25–64, excluding civil service, military, and private school pension enrollees. Cardiovascular disease hospitalization was defined as first inpatient admission with a primary diagnosis of ischemic heart disease (The International Classification of Diseases, 10th revision: I20–I25) or cerebrovascular disease (I60–I69). Age-standardized incidence rates were calculated across four 5-year periods using direct standardization to the 2015 Korean census population. Standardized incidence ratios were estimated using indirect standardization among 242,658 men and 64,986 women with stable industry classification in 2013–2014 who were followed through 2023. Analyses were stratified by sex and workplace size.

Results: Cardiovascular disease hospitalization rates were consistently higher in men than women across all industries. Among men, fishing recorded the highest age-standardized incidence rate in the most recent period (≈538 per 100,000) with a significant increasing trend over 20 years. Industries with standardized incidence ratios greater than 1.10 and with at least 100 observed events included land transportation, warehousing and support services, and fishing among men, and finance and insurance, electricity/gas/water supply, and land transportation among women. Further stratification by workplace size identified 13 high-risk strata in men and 8 in women, notably small construction worksites and multiple size categories within transportation and finance.

Discussion: Elevated cardiovascular disease risk in transportation and warehousing likely reflects shift work, irregular schedules, and sedentary behavior. The high burden in fishing may relate to physical demands and limited health screening access. The interaction between industry type and small workplace size highlights the role of organizational health resources. Hypertension data suggest that suboptimal management of a key modifiable risk factor contributes to excess hospitalization. Limitations include inability to adjust for individual occupational exposures and potential healthy worker survivor bias.

Conclusions: This nationwide analysis identifies land transportation, warehousing, fishing, finance, and small-scale construction as priority sectors for cardiovascular disease surveillance among Korean workers. Stratification by workplace size provides more granular risk characterization than industry classification alone, supporting targeted cardiovascular prevention policies.

Keywords: Cardiovascular diseases; Industry; Occupational surveillance; At-risk subgroups

Oral Presentation

O1 Occupational Medicine

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Occupational lung cancer risk among male shipyard workers in South Korea: a nationwide cohort study (2005–2020)

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Introduction and Objectives: Lung cancer accounts for the highest cancer-related mortality worldwide, with occupational exposures estimated to contribute approximately 10 to 15 percent of all cases. Welding fumes and occupational exposure as a painter are classified as established human carcinogens by the International Agency for Research on Cancer. Shipbuilding involves simultaneous exposure to welding fumes, isocyanates, organic solvents, and metal dust, yet large-scale cohort evidence from Asian shipyard workers remains limited. This study estimated lung cancer risk by occupational category among male Korean shipyard workers.

Methods: A retrospective cohort study was conducted using the Korean Employment Insurance Database linked to the Korea Central Cancer Registry (2005–2020). Male workers with at least one year of employment in the shipbuilding industry were included (248,280 workers). Occupational exposure was classified using an ever-exposed approach based on harmonised occupational job codes, whereby a worker was classified as exposed to a given category if they had at least one employment episode in that category during the study period. Pure administrative workers with no production job experience served as the reference group (33,354 workers). A five-year analytical lag was applied to account for the induction period of occupational lung carcinogenesis. Hazard ratios and 95% confidence intervals were estimated using binary Cox proportional hazards models adjusted for age. Sensitivity analyses examined alternative exposure classification methods, minimum employment duration thresholds, age stratification, and varying lag periods of 0, 5, and 10 years.

Results: During 1,745,283 person-years of follow-up, 552 incident lung cancer cases were identified. Compared with pure administrative workers, significantly elevated lung cancer risks were observed for painters (hazard ratio 1.72, 95% confidence interval 1.20 to 2.48), non-metal product operators (hazard ratio 1.64, 95% confidence interval 1.08 to 2.48), metal machine operators (hazard ratio 1.63, 95% confidence interval 1.04 to 2.54), welders (hazard ratio 1.61, 95% confidence interval 1.07 to 2.42), and general production workers (hazard ratio 1.53, 95% confidence interval 1.11 to 2.11). Sensitivity analyses using alternative exposure classification methods produced consistent results. Hazard ratios increased progressively with longer lag periods for welders (0-year lag: 1.28; 5-year lag: 1.61; 10-year lag: 2.84) and painters (0-year lag: 1.46; 5-year lag: 1.72; 10-year lag: 2.77), consistent with an occupational latency effect.

Discussion/Conclusions: Shipyard painters and welders in South Korea face significantly elevated lung cancer risks, with estimates broadly consistent with prior meta-analyses from Western cohorts. The progressive increase in hazard ratios with longer lag periods provides indirect evidence of an occupational latency effect, supporting a causal exposure-disease relationship. These findings highlight the need for strengthened respiratory carcinogen control measures in the shipyard industry and the importance of systematic occupational cancer surveillance. Future studies with longer follow-up and individual-level smoking data are needed to further characterise dose-response relationships.

Keywords: Lung cancer; Shipyard workers; Welding; Occupational epidemiology; Cohort study

Oral Presentation

O2 Fitness for Work

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Recreational ice hockey activities on synthetic ice panels may improve postural sway: a pilot study

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Background: Despite growing interest in balance training on unstable surfaces, evidence regarding the effects of recreational ice hockey activities performed on synthetic ice surfaces remains limited.
Objectives: To evaluate longitudinal changes in postural sway associated with recreational ice hockey performed on synthetic ice panels.
Materials and Methods: This retrospective observational pilot study analyzed routinely collected laboratory data from six healthy adults without prior ice sports experience. Participants engaged in recreational ice hockey activities on Glice® synthetic ice panels over an average follow-up of five weeks. Postural sway was assessed using a force platform under eyes-open (EO) and eyes-closed (EC) conditions. Total path length was the primary outcome, and the Romberg ratio (EC/EO) was calculated. Longitudinal associations with observation day were evaluated using linear mixed-effects models adjusted for age, sex, and body mass index. Sensitivity analyses examined exposure using session frequency and cumulative activity duration.
Results: Total path length decreased significantly over time under both EO and EC conditions, with larger effect sizes observed under EC conditions (adjusted β: EO, -0.49 vs EC, -1.18). Romberg ratios also declined significantly, indicating reduced visual dependence. Sensitivity analyses using alternative exposure metrics yielded consistent findings, supporting a dose–response relationship between activity exposure and improvements in postural stability.
Conclusions: Recreational ice hockey activities on synthetic ice panels were associated with improved postural stability, particularly under sensory-challenging conditions. Synthetic ice-based activities may represent a feasible and engaging balance enhancement approach suitable for indoor and workplace settings.

Keywords: Postural sway; Balance control; Synthetic ice; Recreational ice hockey

Oral Presentation

O2 Fitness for Work

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Invisible adulteration: persistent supraphysiological nitrite levels in observed urine drug testing

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Background: Urine drug testing (UDT) is extensively employed in workplace substance testing programs, with specimen validity testing (SVT) serving as a critical safeguard against tampering. Among SVT markers, nitrite is a well-established oxidizing adulterant capable of producing false-negative immunoassay results. While elevated urinary nitrite is typically indicative of exogenous interference, its persistence in directly observed collections is rarely reported and poses significant interpretative challenges.

Objectives: To characterize and critically evaluate two cases of persistently elevated urinary nitrite concentrations identified during UDT under both unobserved and directly observed collection conditions, and to discuss their implications for specimen integrity assessment and current testing protocols.

Methods: A retrospective case analysis was conducted on two individuals undergoing workplace UDT in 2025. All collections adhered to standard chain-of-custody procedures. Urine specimens were analyzed by an accredited laboratory using routine immunoassay screening with SVT parameters, including pH, specific gravity, creatinine, and quantitative nitrite measurement. Nitrite concentrations were determined via spectrophotometric analysis (SpectraMax platform). No deviations in accessioning, handling, or analytical processes were identified.

Results: In Case 1 (June 2025), an initial unobserved specimen was suspected to be adulterated due to out-of-range temperature. A subsequent directly observed specimen demonstrated pH 5.59, specific gravity 1.0050, creatinine 31 mg/dL, and nitrite concentration of 2930 μg/mL.

In Case 2 (November 2025), a directly observed specimen was requested by the employer, revealing pH 7.81, specific gravity 1.0044, creatinine 103 mg/dL, and nitrite 3424 μg/mL. A repeat collection in December 2025, collected by a nephrologist during clinical assessment to rule out possible causes of elevated nitrite, yielded pH 7.66, specific gravity 1.0283, creatinine 158 mg/dL, and persistently elevated nitrite at 3137 μg/mL.

All recorded nitrite concentrations substantially exceeded established physiological ranges and commonly accepted thresholds for endogenous production. Donors in both cases denied intentional adulteration.

Conclusions: The persistent detection of markedly elevated urinary nitrite concentrations—despite adherence to observed collection protocols and validated analytical processes—strongly suggests the presence of non-conventional or pre-analytical adulteration mechanisms that may circumvent standard detection safeguards. These findings expose a critical vulnerability in current UDT frameworks, wherein procedural rigor in specimen collection does not unequivocally guarantee sample integrity. Enhanced SVT strategies, including expanded oxidant profiling and advanced analytical techniques, are warranted. Furthermore, these cases underscore the need for continuous methodological evolution and stricter interpretative criteria to preserve the forensic defensibility and clinical reliability of UDT in occupational settings.

Keywords: Urine drug testing; Specimen validity testing; Nitrite adulteration; Observed collection; Occupational health; Analytical interference

Oral Presentation

O3 Occupational Health and Safety Legislation

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Occupational health & safety laws and decent work: improving regulatory practice to protect workers' health in Asia

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Occupational Health & Safety (OHS) legislation has evolved over the past half century from prescriptive factory ordinances to comprehensive performance-based work health & safety (WHS) laws based on risk management principles. However, the legacy of outdated, fragmented laws, under-resourced, ineffective regulatory practice that overlooks occupational health, and the exclusion of the most vulnerable workers from basic protective measures continue to plague the health of workforces and drain health care systems across Asia.

Despite economic, technological and social changes that have transformed workplaces and heralded the "Asian Century" with promised prosperity, for most of Asia's workers the United Nations sustainable development goal of Decent Work is way behind its 2030 targets. A concerted effort is needed to reform OHS legislation, for more proactive regulatory practice combining enforcement with advisory work and to build labour inspectorate capabilities, especially in occupational exposure prevention, to address these current inequities.

The author will share insights from 25 years' work as a specialist inspector at Australia's largest WHS regulator, SafeWork NSW. This includes leadership in proactive preventive intervention programs, investigation of occupational disease cases with landmark prosecutions and contribution to OHS legislation reform and review of national exposure standards and codes of practice. The critical three R's of improving OHS regulatory frameworks towards achieving decent work across the diverse workforces in Asia will be presented. Capacity building across OHS stakeholders to prevent occupational disease & illness will be discussed through a South Asian country case study.

Oral Presentation

O3 Occupational Health and Safety Legislation

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Toward productive aging: implementing age-friendly occupational health strategies for middle-aged and older workers

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Introduction: Population aging, driven by declining birth rates and increasing longevity, is reshaping the labour market. As the proportion of middle-aged and older workers grows, challenges related to occupational safety, health maintenance, and sustainable employability have intensified. Recognizing these shifts, *Taiwan Environmental and Occupational Association* and *Taiwan OSHA* developed the *Guidelines for Occupational Safety and Health of Middle-Aged and Older Workers*, drawing on international standards from WHO and advanced economies. These guidelines aim to enhance workplace adaptability and promote productive aging.

Materials and Methods: The framework was established through a review of global literature and multidisciplinary expert consultation. Key elements were synthesized from occupational medicine, ergonomics, etc. The structure includes six components: (1) hazard identification and risk assessment, (2) health and work ability evaluation, (3) workplace environmental improvements, (4) emergency preparedness, (5) education and training, and (6) ongoing performance and health monitoring.

Results: The developed framework emphasizes personalized assessment and preventive intervention. Integrating musculoskeletal, cardiovascular, and cognitive evaluations enabled targeted job redesign, ergonomic optimization, and risk mitigation. These implementations will lead to reductions in injury risk, improved comfort and performance, and greater employee satisfaction among aging workers.

Conclusions: The Guidelines represent a strategic shift toward proactive, inclusive, and sustainable workforce management. By integrating medical, ergonomic, and managerial perspectives, the framework supports aging workers in maintaining health, productivity, and engagement, advancing national goals of safe employment and lifelong work participation.

Keywords: Middle age; Older; Occupational safety; Occupational health; Guideline

Oral Presentation

O4 Occupational Health Policies

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Factors affecting nurse managers' turnover: a national cross-sectional study

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Background: Nurse manager turnover is a growing concern that undermines nursing workforce stability, quality of care, and organizational effectiveness. Although extensive research has examined turnover intention, few studies have investigated factors associated with actual turnover among nurse managers or the mediating role of job satisfaction in this relationship.
Objectives: This study aimed to determine factors associated with actual turnover among nurse managers and to examine the mediating role of job satisfaction in the associations between personal and work-related characteristics and turnover.
Materials and Methods: A cross-sectional secondary data analysis was conducted using the 2022 National Sample Survey of Registered Nurses (NSSRN) in the United States. The final sample included 2,075 nurse managers working in hospital settings. Turnover was measured by whether respondents had left their primary nursing position. Job satisfaction, burnout, weekly hours worked, and organizational characteristics were examined. Mediation analysis was performed using the Baron and Kenny approach with logistic regression models. Subgroup analyses were conducted for front-line managers and middle-to-senior managers.
Results: Of all nurse managers, 23.7% reported actual turnover. Job satisfaction was significantly associated with lower odds of turnover (OR=0.476, 95% CI=0.304–0.745) and partially mediated the associations between work-related characteristics and turnover. Working more than 40 hours per week (OR=4.672, 95% CI=1.673–13.047) and daily burnout in 2021 (OR=1.654, 95% CI=1.014–2.697) remained significantly associated with turnover after adjusting for job satisfaction. Subgroup analysis revealed that weekly hours worked and organizational quality improvement were significant for front-line managers, while burnout and education level were significant for middle-to-senior managers.
Conclusions: Job satisfaction mediated the association between nurse managers' work-related characteristics and actual turnover. Organizational policies and retention strategies should focus on enhancing job satisfaction, reducing excessive work hours, and preventing burnout, with differentiated approaches for front-line and middle-to-senior managers.

Keywords: Nurse managers; Turnover; Job satisfaction; Burnout; Mediating effects

Oral Presentation

O4 Occupational Health Policies

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Enhancing commuting safety: a cluster randomised controlled trial (CRCT) evaluation of Health Belief Model-based intervention on commuting safety behaviour among hospital healthcare workers

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Commuting accidents are increasing in Malaysia, particularly among healthcare workers (HCWs). These accidents occur while commuting between home and work, or during a work-related journey. They have significant consequences such as personal injuries, fatalities, missed workdays, higher compensation costs, and reduced healthcare service productivity. Commuting accidents contribute to the overall number of occupational accidents among HCWs. This study examines the effect of the Health Belief Model (HBM)-based intervention on commuting safety behaviours, knowledge and HBM constructs. A single-blind cluster randomized controlled trial was conducted among government hospital HCWs. The selected hospitals were randomly assigned to the intervention or control group. The intervention group received a one-full-day HBM-based intervention module. The validated Driver Behaviour Questionnaire (DBQ), knowledge and HBM constructs questionnaire were used to assess the effect of HBM-based intervention. The data was analysed using the SPSS 26.0 version. The response rate was 100%. The covariates at baseline were work routine, employment status, vehicle type, wearing a reflective jacket during riding, sleep quality and perceived benefit. The generalised estimating equation (GEE) adjusted with covariates shows significant increases in commuting safety behaviour among the intervention group at 3 months post-intervention (p-value=0.003) and knowledge at immediate post-intervention (p-value<0.001) and 3 months post-intervention (p-value<0.001). There were increases in perceived benefit scores of the intervention group at 3 months post-intervention (p-value=0.009), perceived barrier scores at immediate post-intervention (p-value=0.01) and at 3 months post-intervention (p-value=0.02) compared to the control group at baseline. The study shows the HBM-based intervention module was effective in improving commuting safety behaviour, knowledge, perceived benefit and perceived barrier. However, the perceived benefit was not sustained at 3 months post-intervention.

Keywords: Commuting accident; Healthcare workers; Health belief model; Occupational safety and health intervention; Hospital workers

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Prevalence and determinants of work-related musculoskeletal disorders across major industrial sectors in Malaysia: findings from a national occupational health surveillance programme

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Background: Work-related musculoskeletal disorders (WRMSDs) are a major contributor to occupational morbidity, leading to disability, reduced productivity, and substantial economic burden. Despite extensive global evidence, the population-level epidemiology of WRMSDs in many middle-income countries, including Malaysia, remains insufficiently characterised. National reporting and previous studies often rely on passive surveillance and sector-specific studies, contributing to under-recognition of the true burden. This study aimed to determine the prevalence and determinants of WRMSDs among workers in major industrial sectors in Malaysia using the first national occupational health surveillance data.

Methods: A cross-sectional analysis was conducted using secondary data from the Malaysian National Occupational Disease Prevention Programme (NODiP) Database 2025. A total of 32,691 eligible workers across six major industrial sectors were included. WRMSDs were defined using an integrated case definition combining self-reported symptoms from the Standardized Nordic Musculoskeletal Questionnaire (Tool 2A) with objective confirmation of high-risk ergonomic hazards through workplace assessments (Tool 2B). Sociodemographic, health, psychosocial, workplace, and organisational factors were analysed. Multiple logistic regression was performed to identify determinants of WRMSDs, with adjusted odds ratios (aORs) and 95% confidence intervals (CI).

Results: The prevalence of WRMSDs among Malaysian industrial workers was 7.5% (n = 2,447), with the highest prevalence observed in the manufacturing sector (8.75%) followed by mining & quarrying sector (6.68%) and Agriculture, Forestry and Fishery sector (2.59%). The most frequently affected body region was the shoulder (55.1%), followed by the lower back (52.4%) and neck (48.8%). In multivariable analysis, several factors remained significantly associated with WRMSDs. Female workers (aOR = 1.45, 95% CI: 1.30–1.61), secondary education (aOR = 4.44, 95% CI: 1.41–14.00) and tertiary education (aOR = 4.29, 95% CI: 1.36–13.56) were associated with increased odds. Health-related determinants include obesity (aOR = 1.47, 95% CI: 1.31–1.64), hypertension (aOR = 1.26, 95% CI: 1.10–1.45), psychiatric illness (aOR = 1.35, 95% CI: 1.03–1.77), and prior history of musculoskeletal or ergonomic disease (aOR = 5.13, 95% CI: 3.75–7.02). Workplace characteristics that increase WRMSD risk are working in closed environments (aOR = 1.80, 95% CI: 1.58–2.04), confined spaces (aOR = 1.17, 95% CI: 1.06–1.29), crowded workplaces (aOR = 1.48, 95% CI: 1.30–1.68) and longer employment duration (aOR = 1.14, 95% CI: 1.05–1.25). Psychosocial stress showed a dose–response relationship, with moderate job stress (aOR = 2.35, 95% CI: 2.15–2.58) and high job stress (aOR = 4.08, 95% CI: 3.40–4.90) strongly associated with WRMSDs. Interestingly, organisational variables such as absence of health hazard training (aOR = 0.74, 95% CI: 0.66–0.83) and workplace SOPs (aOR = 0.63, 95% CI: 0.44–0.90) appeared protective, likely reflecting reporting bias or reverse causality rather than true protection. Training and SOPs were measured only by their presence, not their quality or relevance.

Conclusions: Overall, WRMSDs among Malaysian industrial workers arise from a multifactorial interaction of individual vulnerability, cumulative exposure, psychosocial stress, and regulatory context, rather than isolated ergonomic hazards. These findings highlight the need to strengthen integration between surveillance, regulation, and prevention, and suggest that effective WRMSD strategies must extend beyond ergonomic redesign to include workload management, job rotation, and, importantly, mental health support.

Keywords: Prevalence; Determinants; WRMSDs; Major industries; Malaysia

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Kneading through the pain: a case study of multi-site upper limb disorders in an artisanal bakery production

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Background: Work-related musculoskeletal disorders (WRMSDs) remain a significant burden in the food production industry, where manual dexterity is often prioritised over ergonomic safety. This case study examines a 4-year artisanal bakery production worker presenting with a cumulative trauma disorder.
Case Presentation: The subject, a female bakery worker, presented with Left De Quervain's Tenosynovitis, Left Index Trigger Finger, and Bilateral Carpal Tunnel Syndrome (CTS). Her primary duty involves producing over 300 buns daily during 8-hour shifts. The workflow follows a high-repetition sequence: (1) creating a focal depression in dough using the left index finger, (2) scooping high-viscosity mocha and butter fillings—a task noted for high exertional force—and (3) performing a neat thumb-index pincer grip to seal the dough.
Ergonomic Assessment: Identified a triad of risk factors: repetitive motion, exertional force, and awkward postures. The "pocket-making" manoeuvre caused focal stress on the left finger, leading to Trigger Finger. The forceful scooping of resistant mocha increased interstitial pressure in the carpal tunnel (Bilateral CTS). Finally, the repetitive ulnar deviation and pinching required to seal the buns caused friction in the extensor tendons, resulting in De Quervain's Tenosynovitis.
Conclusion & Recommendations: This case highlights how low-load tasks, when performed at high volumes (more than 1,500 buns/week), evolve into chronic trauma. To prevent recurrence, a hierarchy of controls is proposed. Engineering controls include warming mocha filling to reduce viscosity and implementing automated dough-indentation tools. Administrative controls focus on a formal job rotation schedule to allow for tendon recovery and "microbreak" protocols for stretching. This study underscores the need for proactive ergonomic design in manual production to prevent career-ending cumulative trauma.

Keywords: Food industry; Ergonomically risk factors; Carpal tunnel syndrome; De Quervain; Trigger finger

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Occupational noise exposure and associated risk factor among vector control health workers in Terengganu state health department: a cross-sectional study

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Noise-related hearing disorders (NRHD) are a preventable occupational health problem that continues to affect workers across various sectors. In the healthcare sector, vector control health workers may also experience substantial noise exposure during fogging activities. A cross-sectional study was conducted to identify factors associated with hearing disorders among vector control health workers in Terengganu State Health Department, involving 206 workers from all eight district health offices. Data were collected using secondary data extracted from the Terengganu State Health Department records. By using the IBM Statistical Package for Social Science (SPSS) version 29, Chi square test, logistic regression and multivariate analysis were applied with *p*-value set at 0.05 with a 95% Confidence Interval (CI). The overall prevalence of hearing disorders was 54.9%, with a significantly higher occurrence in the high-risk group (50.4%) than in the low-risk group (49.6%) ($p < 0.05$). Smoking status was significantly associated with hearing disorders, with the odds ratio at 1.94 (95%, CI: 1.029-3.657, $p = 0.04$). Frequency of exposure to fogging activities per week was also significant with the odds ratio at 2.14 (95%, CI: 1.016 – 4.506, $p = 0.003$). Two out of 206 vector control health workers were reported to the Department of Occupational Safety and Health (DOSH) of having work-relatedness of NRHD in 2025. Findings highlight the need for proactive risk control and a structured noise assessment program to prevent further hearing disorders among vector control health workers.

Keywords: Occupational noise exposure; Hearing disorders; Smoking; Vector control health workers; Terengganu

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Real-time ergonomics: evaluating a wearable posture monitoring tool to reduce work-related musculoskeletal diseases in healthcare workers

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Introduction: Healthcare workers (HCWs) are frequently involved in tasks with repetitive handling and awkward postures, putting them at high risk of work-related musculoskeletal disorders (WRMSDs). Digital wearables enabling real-time identification of high-risk postures may be an effective educational tool to mitigate this leading cause of staff injuries and absence.
This is a pilot of a wearable sensory-based posture monitoring tool ("Backy") in a tertiary healthcare institution. Backy is designed to be strapped around the waist and provides haptic feedback to the user whenever an "at-risk" truncal posture is adopted. It collects posture-related data at the individual level, which can be used as an educational tool.
Objectives: The pilot aims to shift WRMSD prevention upstream to proactively correct at-risk postures in real time. The wearable sensor technology can be integrated as part of ergonomics training for HCWs to habitualise ergonomic work practices. Aggregated data can also inform future ergonomic interventions.
Materials and Methods: Backy will be piloted on HCWs in departments with high rates of WRMSDs (e.g. endoscopy, central sterile supplies unit and operating theatre). Qualitative user feedback on usability and perceived benefit will be collected via a self-administered questionnaire whilst quantitative data such as posture and movement, force-based back stress measurements and wear duration will be collected at the individual level. Pre- and post-pilot WRMSD incidence will be tracked on the institution's incident reporting system.
Results: Results including qualitative user feedback, quantitative data and WRMSD incidence will be reported after the end of the pilot (end of April 2026).
Conclusions: Digital wearables represent an innovative approach to addressing longstanding ergonomic hazards in high-risk healthcare settings by enabling real-time behaviour change and data-driven interventions. This pilot is expected to demonstrate strong acceptability and usability among HCWs and can potentially contribute to a reduction in WRMSD incidence.

Keywords: Work-related musculoskeletal disorders (WRMSDs); Wearable technology; Ergonomics; Posture monitoring; Healthcare

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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The impact of recent pesticide exposure on pulmonary function: a city-scale analysis of agricultural workers in Taiwan

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Introduction: Agricultural workers face a high risk of respiratory damage from chemical pesticide spraying. Due to their complex composition, pesticides can cause chronic lung impairment beyond immediate airway irritation. This cross-sectional study investigates the link between pesticide exposure over the past 30 days and lung function indicators, including FEV1, FVC, and the FEV1/FVC ratio. Additionally, it evaluates whether current respiratory protection (masks) effectively prevents these hazards in real-world settings.

Materials and Methods: A cross-sectional study was conducted among 691 agricultural workers in Kaohsiung, who were divided into an exposure group (N=390) and a non-exposure group (N=301) based on their pesticide history over the last 30 days. Data collection included age, chronic conditions (hypertension, diabetes), smoking habits, and mask usage. We used multiple linear regression models to evaluate the impact of pesticide exposure on lung function tests (FEV1, FVC, FEV1 PRE and FEV1/FVC).

Results: Univariate analysis showed a significantly higher female proportion in the exposure group (59.2%). Both FEV1 and FVC were significantly lower in this group ($p<0.05$). Multiple linear regression confirmed that pesticide exposure within 30 days was associated with a significant decrease in FEV1 ($\beta=-0.31$, $p<0.05$) and FVC ($\beta=-0.34$, $p<0.05$). Specifically, respiratory protection (masks) had no significant effect on lung function ($p>0.05$), while diabetes was positively correlated with the FEV1/FVC ratio ($\beta=1.76$, $p< 0.05$).

Conclusions: Recent pesticide exposure (within 30 days) is significantly associated with reduced FEV1 and FVC among agricultural workers. Current mask usage offers no significant lung function protection, likely due to inadequate protection levels. These findings highlight an urgent need to re-evaluate safety protocols to prevent occupational pulmonary impairment.

Keywords: Pesticide exposure; Pulmonary function test; Agricultural workers; Occupational health

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Hair as an indicator of occupational heavy metal exposure: preliminary findings from electronic waste workers in southern and central peninsular Malaysia

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Introduction: Electronic waste (e-waste) is one of the fastest-growing solid waste streams globally, with its generation growing five times faster than the rate of documented e-waste recycling. Due to its highly heterogeneous nature, e-waste consists of a complex mix of materials such as heavy metals, rare earth elements, plastics, glass, flame retardants, and other chemicals. These substances can potentially harm the environment and pose health risks to workers handling e-waste. The objective of this study is to assess the occupational heavy metal exposures in hair among e-waste workers in Southern and Central regions of Peninsular Malaysia.

Materials and Methods: This is a cross-sectional study involving collection of hair samples from 38 e-waste recovery facility workers (aged 18-52 years old) from July to October 2025. Samples were kept in zip-locked bags, subjected to acid digestion and analyzed for arsenic (As), cadmium (Cd), nickel (Ni), chromium (Cr) and mercury (Hg) using inductively coupled plasma mass spectrometry (ICP-MS).

Results: The mean age of the e-waste workers was 32 ± 8 years old; the majority were non-Malaysians (n=26; 68%) originating from Bangladesh (n=14; 54%), Nepal (n=8; 31%), Myanmar (n=3; 12%), and India (n=1; 3%). The workers had an average of 5 years working in the e-waste industry. Heavy metal concentrations in the hair of e-waste workers were observed to be highest in Cr (median 0.763 μg/g; IQR 1.534), followed by Hg (median 0.390 μg/g; IQR 0.451), As (0.308 μg/g; IQR 0.889) and Cd (median 0.039 μg/g; IQR 0.410). Moderate correlations ($p < 0.01$) were found between pairs such as Hg-Cr (r=0.4690) and Cd-As (r=0.677), which may serve as markers of exposure due to prolonged e-waste recycling activities.

Conclusions: Hair analysis is a non-invasive method and practical biomarker for assessing chronic heavy metal exposure, highlighting the need for improved occupational health surveillance and preventive measures among e-waste workers.

Keywords: Biomarker; E-waste; Recovery facilities; Trace elements

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Fatal alignment: a Swiss Cheese Model analysis of systemic failures in the Liang Mountain hypothermia incident

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High-endurance trekking in Southeast Asia, such as the 42 km "Trans Semaliang" route, presents multifaceted occupational and environmental health hazards. This case study examines a fatal hypothermia incident at the Liang Mountain summit to identify systemic failures within professional mountain guiding frameworks.

Data were synthesised from semi-structured interviews with the two primary mountain guides (MGs) involved. Findings were mapped onto the Swiss Cheese Model of Accident Causation to visualise the weakness trajectory across four critical layers: Organisation, Supervision, Conditions, and Unsafe Acts.

The analysis reveals a catastrophic alignment of systemic "holes." Organisational failures stemmed from the trip organiser's failure to provide porter support for a 36-hour compressed trek, inadequate hiker readiness screening, and insufficient pre-trekking instructions. Supervisory gaps included the failure to enforce regrouping norms, leading to a dangerous disconnect between hikers and a disproportionate MG-to-hiker ratio. Substandard conditions were characterised by the inappropriate and unsuitable hiker's attire; the hiker experienced extreme psychophysiological fatigue and leg injuries in the middle of a fragmented group dynamic under harsh environmental stress. Finally, a convergence of substandard practices and unsafe acts occurred when the organisational failure to provide a safety backup forced the MG 'sweeper' into an unplanned rescue role. This role conflict led to a critical tactical error: the guide left the hiker to seek help rather than adhering to 'secure and protect' protocols.

The fatality was the result of a multi-layered systemic collapse rather than an isolated human error. This study underscores the urgent necessity of integrated risk mitigation strategies, both pre-expedition and in-field, to professionalise the mountain guiding industry in Peninsular Malaysia. Critically, training must emphasise tactical decision-making, reinforcing the principle that a Mountain Guide is a safety facilitator, not an absolute rescuer, within high-risk trekking environments.

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Successful digit replantation following offshore traumatic amputation: the role of coordinated medevac and integrated medical response

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Traumatic digit amputations aboard offshore oil and gas installations are time-critical surgical emergencies compounded by geographical remoteness and complex medical evacuation (MEDEVAC) logistics. The quality of the pre-hospital response chain, from initial offshore management to definitive surgical care, is a direct determinant of replantation viability, yet remains poorly documented in occupational health literature. We present a case of a 66-year-old male barge master who sustained complete traumatic amputation of the right fifth finger and partial amputation of the right fourth finger at the proximal phalanx level, following rope entanglement during lifeboat operations at an offshore drilling location off the coast of Terengganu, Malaysia. The Topside Doctor was immediately notified and directed a structured offshore management protocol encompassing haemorrhage control, analgesia, antibiotic prophylaxis, cold ischaemia digit preservation, limb immobilisation, and proactive pre-referral to a specialist hand surgeon prior to platform departure. A coordinated multi-modal evacuation chain involving helicopter, ground ambulance, and commercial aviation delivered the patient to a tertiary hand surgery centre within nine hours of injury. Time from incident to operating theatre was eleven hours. Emergency hand surgery was successfully performed, and the patient was subsequently transferred to the High Dependency Unit for post-operative monitoring. This case demonstrates that immediate topside physician activation, structured occupational health emergency management, and seamless MEDEVAC coordination are not merely administrative. They are direct determinants of surgical outcome in remote offshore environments.

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Development and validation of occupational musculoskeletal disorder prevention module among food delivery personnel

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Introduction: Food delivery personnel are exposed to prolonged riding, awkward posture, repetitive upper-limb movement, load handling, and whole-body vibration, which increase the risk of occupational musculoskeletal disorders (MSDs). Despite growing local evidence on musculoskeletal burden and ergonomic risk in this occupational group, a structured preventive module tailored to food delivery personnel remains limited. This study aimed to develop and validate the module for MSD prevention among food delivery personnel using the ADDIE model.

Materials and Methods: This module development and validation study applied phases of the ADDIE instructional design model. Module content was informed by literature review, findings from a preliminary cross-sectional study, and expert input. During the design phase, structured discussions were held with a multidisciplinary development panel. The draft module was then subjected to content validation by six experts from public health, occupational health, ergonomics, and health education, followed by face validation among 10 food delivery riders from the target population. Content validity was assessed using content validity ratio (CVR), item-level content validity index (I-CVI), and scale-level content validity index by averaging method (S-CVI/Ave). Face validity was assessed using item-level face validity index (I-FVI) and scale-level face validity index by averaging method (S-FVI/Ave). Written feedback was used to refine the final module.

Results: All 13 content components met the predefined acceptance threshold. For content validity, CVR ranged from 0.67 to 1.00. The overall S-CVI/Ave was 0.91 for relevance and 0.87 for clarity. In face validation among 10 food delivery riders, the overall S-FVI/Ave was 0.94 for relevance and 0.92 for clarity. Comments from experts and participants led to minor refinement in wording, sequence, and presentation before finalization.

Conclusions: The PEER module demonstrated good formative validity and was acceptable to experts and target users. The module is suitable for subsequent implementation and effectiveness evaluation among food delivery riders.

Keywords: ADDIE model; Food delivery personnel; Occupational musculoskeletal disorders; Module development; Formative validation

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Systematic review and meta-analysis on the role of 8-hydroxy-2-deoxyguanosine as an oxidative DNA damage indicator in workers exposed to radiation

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Introduction: Occupational exposure to low-dose ionizing radiation is an important health concern. 8-Hydroxy-2'-deoxyguanosine (8-OHdG), a product of oxidative damage to guanine in DNA, reflects oxidative DNA damage and repair processes, making it a sensitive but non-specific biomarker that can be used for monitoring workers' exposure to radiation. This systematic review and meta-analysis aimed to synthesize available literature to determine the role of 8-OHdG as an oxidative stress parameter in determining occupational exposure to radiation.

Materials and Methods: A systematic search of PubMed, Scopus, and Embase was conducted until December 2025. We searched for studies comparing 8-OHdG concentrations in occupationally exposed workers against nonexposed workers, measuring the biomarker in blood or urine. The overall effect was calculated using the Standardized Mean Difference (SMD) with a random-effects model. Study quality was assessed using the modified Newcastle-Ottawa Scale (NOS), and the certainty of evidence was evaluated using the GRADE framework.

Results: A total of 11 studies were included in this review. Nine out of eleven included studies (81.8%) reported significantly higher 8-OHdG levels in the exposed groups. The pooled analysis demonstrated that 8-OHdG concentrations were significantly higher in occupationally exposed workers compared to the nonexposed group (SMD=2.17; 95% CI: 1.02, 3.31; P=0.0002). Significant elevations were consistently observed across subgroups for both blood (SMD=2.66; P=0.01) and urine (SMD = 1.74; P=0.03), as well as among healthcare workers (SMD=2.35; P=0.0007). However, heterogeneity was detected (I^2= 97%, P<0.00001), resulting in a determination of very low certainty of evidence. Quality was assessed as moderate in nine studies and low in two studies.

Conclusions: The findings support an association between occupational radiation exposure and increased 8-OHdG level, suggesting its potential use as a biological marker to detect oxidative damage among workers exposed to occupational radiation.

Keywords: Oxidative stress; Occupational exposure; Ionizing radiation; Biomarker

Oral Presentation

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Epidemiological burden of low back pain among dumper operators in Indian opencast mines

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ABSTRACT

Low back pain is a major but insufficiently recognised occupational health problem among mine equipment operators in low and middle-income countries. This study examined the prevalence and associated factors of self-reported low back pain (LBP) among dumper operators working in Indian opencast mines. A cross-sectional study was conducted among 304 dumper operators. Data on LBP during the previous 7 days and 12 months were collected using the Standard Nordic Questionnaire, while demographic, occupational, lifestyle, physical workload, and psychosocial characteristics were obtained through structured interviews. Statistical analysis was performed to identify factors associated with LBP.

The findings revealed a considerable burden of LBP in this occupational cohort. The 12-month prevalence of LBP was 36.8%. A substantial proportion of operators reported persistent symptoms, with 12.8% experiencing pain for more than 30 days and 7.6% reporting daily low back pain. High pain intensity was also common, with 32% of operators reporting moderate to severe pain. Multivariable analysis indicated that LBP was significantly associated with longer occupational exposure duration, a high physical workload, and adverse psychosocial work conditions. In contrast, factors such as body mass index, smoking, alcohol use, and physical activity showed limited or no significant contribution in the study population.

These findings establish LBP as a substantial occupational health burden among dumper operators in Indian opencast mines. The observed associations indicate that the problem is shaped not only by the physical demands of work but also by psychosocial stressors within the occupational environment. The study highlights the need for integrated preventive strategies that combine ergonomic interventions, workload management, and psychosocial risk reduction, while strengthening surveillance and early reporting of musculoskeletal disorders in mining populations.

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Overview of occupational accidents in the construction industry in Brazil: a comparative study (2023-2025)

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ABSTRACT

This study analyzes the dynamics of occupational accidents in the Brazilian construction industry between 2023 and 2025, utilizing data from the Brazilian Statistical Yearbook of Occupational Accidents (AEAT) and the Brazilian Digital Observatory for Health and Safety at Work (Smartlab). The sector remains one of the most critical in terms of Occupational Safety and Health (OSH), presenting a scenario of contrasts and persistent structural challenges. The 2025 indicators reveal an alarming reality: Brazil records one death due to occupational accidents every 3h 33min, with fatalities in construction concentrated in falls from height and cave-ins. Although typical workplace accidents outnumber commuting accidents, the Smartlab platform identifies a concerning trend of underreporting, evidenced by the high number of accident-related benefits granted without the formal issuance of an Occupational Accident Report. Furthermore, there is a 134% surge in leaves of absence due to mental disorders, driven by pressure for deadlines and excessive workloads. This panorama generates a billion-dollar economic cost in social security expenses and loss of productivity. In conclusion, the convergence of data demonstrates that normative and technological advancements are not sufficient to mitigate risks. An urgent paradigm shift is required: transitioning from reactive management focused solely on legal compliance to a proactive and preventive approach. This new culture must prioritize safety and the psychosocial well-being of workers as fundamental pillars for the operational and human sustainability of companies in the sector.

Keywords: Construction; Occupational accidents; Brazilian statistical yearbook of occupational accidents (AEAT); Smartlab

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Development and evaluation of the Oncoshield module for antineoplastic drugs handling practices among nurses in West Malaysia

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Introduction: Antineoplastic drugs are essential in cancer treatment but have posed significant occupational hazards to healthcare workers, particularly nurses involved in preparation, administration, and disposal. Many antineoplastic agents are classified as carcinogenic, mutagenic, and teratogenic, with repeated occupational exposure associated with reproductive toxicity and increased cancer risk. Despite established international safety guidelines, handling practices remain inconsistent in Malaysian hospitals due to knowledge gaps, insufficient training, and organisational barriers. This study aims to develop and evaluate the effectiveness of a structured educational intervention, the OncoShield Module, in improving safe handling practices and associated psychosocial determinants among nurses.

Materials and Methods: A cluster randomised controlled trial will be conducted among nurses from selected government hospitals providing chemotherapy services. Hospitals will be randomly assigned to intervention or control groups. The intervention group will receive the OncoShield Module, developed using the Sidek Module Development Model and guided by the Predictors of Hazardous Drug Precaution model. The module adopts a blended learning approach incorporating face-to-face training, skills-based sessions, and digital reinforcement. Data will be collected using a validated self-administered questionnaire at baseline, 1 month, and 3 months post-intervention. A Generalized Linear Mixed Model will be used to evaluate intervention effects while accounting for clustering and covariates.

Results: The intervention is expected to improve nurses' safe handling practices and enhance key psychosocial determinants, including knowledge, self-efficacy, perceived risk, perceived barriers, perceived conflict of interest, interpersonal influence, and organisational influence.

Conclusions: This study is expected to provide evidence on the effectiveness of a theory-based, blended learning intervention in improving occupational safety practices among oncology nurses. The findings may inform the development of standardised training strategies and support efforts to strengthen occupational health policies in Malaysian healthcare settings.

Keywords: Antineoplastic drugs; Cytotoxic drugs; Chemotherapy; Nurses; Occupational health

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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The hidden toll of efficiency: correlating extreme productivity (9.1 MPLH) with severe musculoskeletal disorders in healthcare food services

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Introduction: Healthcare food service operations require significant physical labor, including forceful exertion, awkward postures, and repetitive manual handling. Severe understaffing directly amplifies these occupational safety and health risks. Hospital Pendang, a 152-bed facility, currently operates with a critical food service staff-to-bed ratio of 1:38, the highest in the state of Kedah. This study aims to quantify the extreme work burden using the Meals per Labour Hour (MPLH) indicator and correlate these operational productivity demands with an Advanced Ergonomic Risk Assessment (ERA) to evaluate the physical toll on healthcare workers.

Materials and Methods: A quantitative operational and ergonomic audit was conducted in 2025 at the Dietetic and Food Service Department. Workload was measured by calculating the daily output of 509 meals managed by a maximum of 7 staff members per day using the MPLH formula, which was then benchmarked against the industry standard of 4.0 MPLH. An Advanced ERA was conducted in accordance with the Malaysian DOSH Guidelines on Ergonomics Risk Assessment at Workplace 2017. The ergonomic tools applied included the Rapid Upper Limb Assessment (RULA), Rapid Entire Body Assessment (REBA), and the Manual Handling Assessment Chart (MAC). Worker discomfort was evaluated utilizing the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) administered to 11 food service personnel.

Results: The operational audit revealed an extreme productivity rate of 9.1 MPLH, which is 128% (2.28 times) higher than the industry standard. This indicates a critical 56.3% manpower deficit within the department, forcing permanent staff to perform up to 6 hours of overtime daily to sustain operations. The Advanced ERA demonstrated significant ergonomic hazards exacerbated by this extreme workload: team lifting of raw materials weighing up to 40 kg yielded a MAC score of 12 (Action required in the near future) and a REBA score of 6 (Medium Risk). Furthermore, prolonged standing and awkward postures during cooking tasks resulted in a RULA score of 6 (Moderate Risk). The CMDQ survey confirmed widespread physical strain, with 10 out of 11 workers suffering from lower back pain, 9 experiencing shoulder pain, and 8 reporting upper back and feet pain. This chronic ergonomic strain culminated in 114 lost working days in 2025, driven by severe musculoskeletal injuries (slipped-discs) and the occupational exacerbation of pregnancy complications.

Conclusions: Operating at an excessive productivity level of 9.1 MPLH directly correlates with high ergonomic risk exposures, severe musculoskeletal disorders, and the exacerbation of underlying health conditions among hospital food service personnel. The reliance on extreme, continuous overtime to compensate for critical understaffing pushes workers beyond safe biomechanical limits. Immediate administrative interventions, specifically the creation of permanent posts, combined with ergonomic training and task rotation, are urgently required to mitigate these severe occupational hazards.

Keywords: Meals per labour hour (MPLH); Ergonomic risk assessment; Musculoskeletal disorders; Healthcare food service; Occupational safety and health

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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Cytotoxicity and mechanisms of NCM materials for lithium batteries in BEAS-2B cells

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Background: Nickel–cobalt–manganese (NCM) ternary materials are widely used as cathodes in lithium-ion batteries. Airborne NCM-containing particles generated during manufacturing and recycling may pose inhalation risks to occupational workers. This study evaluated the cytotoxicity of NCM materials in human bronchial epithelial BEAS-2B cells and investigated the underlying mechanisms.

Methods: Four representative NCM materials (NCM111, NCM523, NCM622, and NCM811) were evaluated using CCK-8 assays, biochemical analyses, and Western blotting to assess cytotoxicity and related pathways.

Results: All NCM variants induced concentration- and time-dependent cytotoxicity, with NCM111 and NCM523 exhibiting greater effects. Mechanistically, NCM exposure suppressed the PI3K/Akt/mTOR pathway. Oxidative stress was characterized by MDA ↑ and SOD activity ↓, accompanied by activation of the Nrf2 pathway and upregulation of HO-1 and NQO1. Additionally, apoptosis (Bcl-2 ↓, caspase-3 ↑) and autophagy (Beclin-1 ↑) were significantly induced.

Conclusions: NCM materials exert composition-dependent cytotoxicity in BEAS-2B cells via oxidative stress imbalance, inhibition of pro-survival signaling, and activation of apoptosis and autophagy. These findings highlight potential respiratory risks associated with occupational exposure and provide a mechanistic basis for risk assessment and safer material design.

Keywords: NCM ternary material; Occupational respiratory exposure; Cytotoxicity; Mechanisms

Oral Presentation

O5 Occupational Health and Safety in Specific Industries

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A new model of enforcement: organisational readiness for integration of security with safety and health responsibilities among security auxiliary personnel in Klang Valley, Malaysia

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Introduction: Noncompliance among workers with occupational safety and health (OSH) rules implemented at the workplace remains a persistent issue leading to near misses and accidents leading to injuries and ill-health in Malaysia. Leveraging the large workforce of security personnel presents an opportunity to integrate its functions with safety and health enforcement roles. Assessing readiness for change and its barriers will enable the development of a usable framework to provide the basic structure for its implementation.
Objectives: This study aims to assess the readiness of Malaysian Volunteer Corps Department (RELA) personnel for the integration of Security with Safety and Health functions, based on Weiner's Organizational Readiness for Change (ORC) theory.
Methods: A quantitative approach was employed using a structured questionnaire adapted from Weiner's Organizational Readiness for Change (ORC) theory to measure the key constructs of readiness. The sample consisted of 292 respondents selected through convenience sampling in the Klang Valley. Data were collected between December 2, 2025 and April 30, 2026, and analyzed using SPSS. Variables examined included sociodemographic characteristics, change valence, task knowledge, and resource availability.
Results: Descriptive findings indicate that overall readiness for integration is at a positive level (mean = 3.600.87). Change valence emerged as the strongest predictor of readiness, influencing both change commitment and change efficacy ($p < 0.001$). Task knowledge and resource availability were found to significantly influence change efficacy but did not significantly predict change commitment.±
Conclusions: The findings suggest that RELA personnel are generally prepared for the proposed integration. However, strengthening the perceived value of the integration is critical to enhancing readiness. These results provide useful evidence for policymakers, enforcement agencies, and researchers in supporting the implementation of integrated Security, Safety, and Health roles in Malaysia.

Keywords: Organisational change; Readiness for change; Integrations of security, safety and health; Malaysian volunteer corps department (RELA); Klang Valley

Oral Presentation

O6 Occupational Health and Safety in Informal Economies

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Hidden in the fields: hazard profile, health burden, and occupational risk among agricultural workers in rural Karnataka

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Introduction: Agricultural workers remain underserved in occupational health research despite facing complex multi-domain hazards. This study profiles physical, chemical, biological, and psychosocial hazards, health status, and occupational risk among farm workers in Mysuru district, Karnataka, supported by pesticide biomonitoring.

Materials and Methods: Cross-sectional study among 1,094 agricultural workers from three PHC areas, Mysuru (cluster sampling, 3 villages per PHC). Hazard exposure assessed by validated multi-domain instrument; psychological health by PHQ-9 and PSS-4; pesticide bioburden by serum/urine analysis (6 compounds); health status by comorbidity history and clinical vitals; occupational risk by likelihood-severity matrix (n=310). Chi-square, t-test, ANOVA, and Pearson correlation applied.

Results: Participants were predominantly male (65.5%), mean age 46.9±9.0 years. Physical: 71.9% worked in hot/extremely hot conditions; 85.8% had heat symptoms; 22.8% sustained falls. Risk matrix identified repetitive posture (HIGH: 14.2%), LBP (HIGH: 9.7%), and mud/manure contact (HIGH: 9.0%) as top hazards. Chemical: 73.9% used no PPE; 97.9% reported post-application symptoms; pesticide residues detected in 76.6% serum and 70.4% urine, ≥2 chemicals in 52%. Biological: All had mosquito exposure; 38.9% had post-dusty-work respiratory symptoms; wound infection (12.0%) was associated with poor handwashing (p=0.005). Health status: 34.7% had comorbidities — diabetes (64.7%) and hypertension (54.5%) among comorbid workers; 31.8% had measured hypertension (SBP ≥140 mmHg); 43.3% had elevated glucose (>140 mg/dL); workers with ≥2 serum chemicals had significantly higher hypertension (29.4% vs 8.1%, p<0.001). Psychosocial: 47.3% had moderate depression and 56.4% high stress, worse in females and labourers (p<0.001); PHQ-9 and PSS-4 strongly correlated (r=0.755, p<0.001).

Conclusions: Agricultural workers in rural Karnataka carry a severe multi-domain occupational burden. Pesticide bioburden, high hypertension and glucose prevalence, musculoskeletal risks, and psychosocial distress — especially among labourers and women — demand integrated occupational surveillance, chemical safety education, and PHC-based mental health support.

Keywords: Agricultural workers; Occupational hazards; Pesticide biomonitoring; Risk assessment; PHQ-9; PSS-4; Comorbidity; Karnataka; India

Oral Presentation

O6 Occupational Health and Safety in Informal Economies

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Occupational safety and health challenges in Indonesia's gig economy

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Introduction: The rapid growth of Indonesia's gig economy has created both economic opportunities and occupational safety and health (OSH) risks. Gig workers typically work prolonged hours with irregular schedules, face hazards specific to their work type, and remain largely unprotected under current labor regulations. This study aims to synthesize evidence on OSH issues among gig workers in Indonesia.

Materials and Methods: A narrative review was conducted using Google Scholar and PubMed to identify relevant articles published between 2015 and 2025 on OSH in Indonesia's gig economy. Studies in English or Bahasa Indonesia reporting physical, psychosocial, or systemic OSH issues were included, while opinion pieces and studies not relevant to Indonesian gig workers were excluded. Articles were screened based on titles/abstracts and full texts. The selected studies were synthesized narratively to identify key themes related to OSH issues.

Results: Most studies focus on ride-hailing drivers. Prolonged working hours, algorithmic control, and poor work-rest boundaries contribute to fatigue, musculoskeletal disorders, and traffic accident risk. Algorithmic control directs work by assigning orders and setting targets, pressuring drivers to work longer hours with minimal rest. Musculoskeletal disorders are highly prevalent (76.7–90%). Economic pressures, limited autonomy, and weak social support exacerbate psychosocial stress, while legal gaps and contractor classification limit access to safety training and social security. Evidence on other types of gig workers remains limited.

Conclusions: OSH challenges in Indonesia's gig economy are multifactorial. Evidence mainly focuses on ride-hailing drivers, leaving gaps for other gig occupations. Addressing these issues requires legal reform, targeted safety and fatigue training, ergonomic and mental health monitoring, and integration of gig workers into national social security schemes. Further studies are needed on OSH risks across diverse gig workers.

Keywords: Gig economy; Indonesia; Occupational safety and health; Platform work; Ride-hailing drivers

Oral Presentation

O7 Occupational Health and Safety among Migrant Workers

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Structural determinants of health among migrant workers in the Asia-Pacific: qualitative insights from Taiwanese workers in Vietnam

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Background: Over 30% of migrant workers worldwide are employed in low- and middle-income countries, yet occupational health research remains focused on high-income destinations.
Objectives: This study examined how structural determinants shape the health of Taiwanese migrant workers in Vietnam to address this evidence gap.
Materials and Methods: In-depth interviews were conducted with Taiwanese nationals employed across manufacturing and service sectors in Vietnam, recruited through purposive and snowball sampling via workplace and community networks. Data were thematically analysed using the Social Determinants of Health framework.
Results: We interviewed 28 workers (54% male; mean age 37.0 ± 9.2 years; mean duration in Vietnam 5.4 ± 3.4 years). Despite advantaged educational and managerial positions, participants reported substantial strain and routine overtime (mean 27 ± 16 hours/week). Mental health concerns were prominent, with many participants expressing psychological distress, and some disclosing suicide attempts or clinically diagnosed mental disorders (4 [14%]). Physical health complaints were also common (7 [25%]), alongside pre-existing chronic conditions and infectious diseases. Adverse determinants included long working hours, verbal abuse, employer-controlled housing, and transnational family separation. Participants also described barriers to medical care, notably limited health information and communication difficulties with providers, perceived to exacerbate chronic illness, including cancer, and generate spillover effects on transnational family members.
Conclusions: Reducing these risks requires coordinated occupational health and safety governance between labour-sending and labour-receiving governments, including stronger regulation of working hours and expanded access to language interpretation and culturally appropriate care for migrant workers.

Keywords: migrant workers; transnational families; Social Determinants of Health; Asia-Pacific; adverse working and living conditions; mental health

Oral Presentation

O7 Occupational Health and Safety among Migrant Workers

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Cardiometabolic health disparities among Vietnamese migrant and domestic metal workers in Taiwan: a 3-year retrospective cohort study

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Background: Migrant workers play a vital role in the manufacturing sector yet face distinct occupational and lifestyle challenges that may affect cardiometabolic health. However, evidence on chronic cardiometabolic risk among migrant industrial workers remains limited.

Methods: We conducted a retrospective longitudinal cohort study using routine annual health checkup data collected between 2022 and 2024 from a metal manufacturing factory in Taiwan. All active employees were entitled to annual health checkups performed by the same medical institution during the study period, as per the factory's policy. Among 566 production-line workers (191 Vietnamese migrant workers and 375 domestic workers), repeated measurements of metabolic indicators were analyzed. Mixed-effects linear and logistic regression models were applied to assess differences in continuous metabolic parameters and the odds of metabolic abnormalities, adjusting for age, sex, body mass index, smoking, alcohol consumption, and sleep duration.

Results: Compared with domestic workers, Vietnamese migrant workers had higher fasting blood glucose (β = 5.86 mg/dL), triglycerides (β = 57.68 mg/dL), pulse pressure (β = 2.78 mmHg), and waist-to-height ratio (β = 0.010), and lower high-density lipoprotein (HDL) cholesterol (β = –2.80 mg/dL) and diastolic blood pressure (β = –3.25 mmHg) over time (all $P < 0.05$). Migrant workers also had higher odds of metabolic syndrome (adjusted odds ratio [aOR] = 2.60, 95% confidence interval [CI]: 1.30–5.20), hypertriglyceridemia (aOR = 7.15, 95% CI: 2.98–17.19), hyperglycemia (aOR = 4.07, 95% CI: 2.21–7.48), suboptimal HDL cholesterol (aOR = 4.04, 95% CI: 1.64–9.97), and abnormal waist-to-height ratio (aOR = 4.13, 95% CI: 1.84–9.30). No significant differences were observed in systolic blood pressure or low-density lipoprotein cholesterol.

Conclusions: Vietnamese migrant workers in Taiwan's metal manufacturing sectors exhibited a less favorable metabolic risk profile than domestic workers during longitudinal follow-up, underscoring the importance of targeted metabolic risk monitoring and interventions in migrant populations.

Oral Presentation

O7 Occupational Health and Safety among Migrant Workers

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Workplace musculoskeletal disorders profiling among native and non-native subjects: a comparative study of university employees in Oman

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Background: Work-related musculoskeletal disorders (WMSDs) affect the muscles, tendons, ligaments, and nerves, leading to pain, discomfort, and decreased work efficiency. The growing prevalence of WMSDs in academic environments necessitates comprehensive research to address their causes and implement preventive strategies. This study aimed to compare WMSDs between native and non-native university teaching and administrative employees in Oman.

Methods: A cross-sectional study was conducted involving musculoskeletal examinations of 125 workers from different universities of Oman. Data on occupational and socio-demographic characteristics were collected using the Standardized Nordic Musculoskeletal Questionnaire (SNMQ). Chi-square (χ^2) was performed to assess significant differences between native and non-native university employees for progression of WMSDs, with statistical significance set at $p \leq 0.05$.

Results: The results indicated a statistically significant difference between non-native and native workers by body parts such as head, right shoulder, right elbow forearm, upper back, lower back, right hand wrist, right hip thigh buttock, right foot ankle, neck, left shoulder, left elbow forearm, left hand wrist, left knee, left foot ankle ($p \leq 0.05$). A Chi-square test of independence showed no significant difference between non-native and native workers for right knee and left thigh buttock ($p \leq 0.05$). An increased percentage of obesity class III was found among Omani employees (42.4%) as compared to non-Omani employees (35.2%). An increased percentage of weightlifting involved in the job among Omani employees (18.4%) was observed as compared to non-Omanis (8%). About 91% of the study population did not attend any awareness session about WMSDs, dominated by Omani employees ($p \leq 0.05$). Native workers reported a higher prevalence of WMSDs compared to non-native workers. These findings suggest that both individual risk factors (e.g., obesity) and occupational exposures (e.g., manual handling tasks), combined with insufficient awareness, contribute to the higher prevalence of WMSDs among native workers.

Conclusions: The findings of this study demonstrate a statistically significant association between worker nationality and the prevalence of work-related musculoskeletal disorders (WMSDs) across multiple body regions, with the exception of the right knee and left thigh/buttock, where no significant differences were observed. Overall, native (Omani) workers reported a higher prevalence of WMSDs compared to non-native workers. Additionally, the lack of participation in WMSD awareness programs and higher proportion of obesity (particularly Class III obesity) reported by the majority of the study population and more prevalent among native workers—highlight a critical gap in preventive education.

Keywords: Workplace musculoskeletal disorders; University employee; Ergonomics; Oman; Occupational health

Oral Presentation

O8 Human Performance and Safety in the Workplace

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A study on the knowledge of obstructive sleep apnoea (OSA), its risks, and work performance among healthcare workers in Universiti Malaysia Sarawak (UNIMAS)

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Background: Obstructive Sleep Apnoea (OSA) is a prevalent but frequently underdiagnosed condition. Among healthcare professionals, untreated OSA can impair concentration and decision-making, potentially increasing the risk of medical errors. Despite these severe occupational implications, research on OSA knowledge and prevalence specifically among healthcare workers in East Malaysia remains limited.
Objectives: This study aimed to assess OSA knowledge levels, identify prevalence and risk factors, and explore the relationship between OSA risk and self-reported work performance among healthcare workers at Universiti Malaysia Sarawak (UNIMAS).
Materials and Methods: A cross-sectional study was conducted involving 92 healthcare workers. Participants completed a self-administered questionnaire incorporating the Berlin Questionnaire for OSA risk, the OSAKA Questionnaire for knowledge, and Koopmans' Individual Work Performance Questionnaire. High-risk individuals underwent flexible nasopharyngolaryngoscopy and home-based sleep studies. Descriptive statistics, ANOVA, and chi-square tests were used for analysis, with $p < 0.05$ indicating significance.
Results: Overall, 38.0% (n=35) were categorized as high-risk for OSA, with 14.2% (n=13) definitively diagnosed via sleep studies. Male gender ($p < 0.001$) and obesity ($p < 0.001$) were significantly associated with increased OSA risk. While 69.6% demonstrated good knowledge, significant disparities existed across professional groups ($p < 0.001$), with doctors scoring highest and educational gaps identified in nursing and medical assistant cohorts. No significant association was observed between OSA risk and self-reported work performance ($p = 0.399$).
Conclusions: The study highlights a significant burden of undiagnosed OSA among healthcare workers, driven primarily by obesity and gender. Targeted educational interventions for nursing and allied health staff, alongside workplace screening and wellness programs, are recommended to enhance early detection and support occupational health.

Keywords: Obstructive sleep apnoea; Risk factors; Healthcare worker; Work performance; Health knowledge

Oral Presentation

O8 Human Performance and Safety in the Workplace

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Menopausal symptoms and job performance among women in higher learning institutions in Sarawak: a sequential explanatory mixed methods study

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Introduction: Menopause is an increasingly important workplace and public health issue, as many women experience the menopausal transition during their working years. Menopausal symptoms may influence women's functioning at work and job performance, yet evidence in Malaysia remains limited. This study aimed to examine the association between menopausal symptoms and job performance among working women in higher learning institutions in Sarawak, and to explain in greater depth how women's experiences and workplace factors shape this relationship.

Materials and Methods: A sequential explanatory mixed-methods design was employed. A cross-sectional survey was conducted among 600 women aged 40–60 years using a pretested and validated self-administered questionnaire, with data analysed using SPSS version 29, followed by in-depth interviews with seven participants using a semi-structured guide. Qualitative data were analysed using thematic analysis to explain the quantitative findings.

Results: A high prevalence of menopausal symptoms was observed (88.7%), with bladder problems (83.5%), anxiety (81.7%), and joint or muscular discomfort (81.3%) being the most frequently reported. Nearly half of the respondents (46.5%) demonstrated poor job performance. Factors significantly associated with job performance included educational attainment (AOR = 0.55, 95% CI: 0.34–0.89, $p = 0.016$), supervisor age (AOR = 2.31, 95% CI: 1.31–4.10, $p = 0.004$), supervisor gender (AOR = 1.65, 95% CI: 1.13–2.39, $p = 0.008$), coping strategies (AOR = 1.10, 95% CI: 1.05–1.16, $p < 0.001$), and menopausal symptom score (AOR = 0.97, 95% CI: 0.95–0.98, $p < 0.001$). Thematic analysis generated five key themes: menopausal symptoms reducing job performance, coping strategies supporting performance, and the influence of supervisor age, supervisor gender, and educational attainment.

Conclusions: Menopausal symptoms are highly prevalent and significantly associated with job performance. These findings highlight menopause as an important occupational health issue and underscore the urgent need for workplace policies, supportive leadership, and targeted interventions to enable women to maintain productivity and remain fully engaged in the workforce.

Keywords: Menopause; Menopausal symptoms; Job performance; Working women; Malaysia

Oral Presentation

O8 Human Performance and Safety in the Workplace

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Predictive modeling of nurses' fatigued commuting: a repeated-measures simulator study

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Background: Healthcare systems rely on nurses, yet grueling night shifts fuel a hidden occupational epidemic of perilous commuting accidents. Traditional behavioral research relies heavily on subjective surveys, masking the true severity of impairment. This study safely and objectively models the hazardous reality of post-shift commutes.
Objectives: To objectively quantify fatigue-induced behavioral impairment and determine the predictive model of unsafe commuting by evaluating comprehensive human factors utilizing a high-fidelity simulator.
Materials and Methods: A repeated-measures simulator study safely tested 30 hospital nurses across three conditions: rested baseline, immediately post-night shift, and post-recovery sleep. Participants navigated 20-minute simulated commutes while five tactical metrics were continuously extracted. Generalised Linear Mixed Models (GLMM) evaluated these objective metrics against independent variables including daily demands, recovery factors, physiological markers (average heart rate), and persistent work fatigue.
Results: Night-shift exhaustion drastically compromised safety. Post-shift nurses suffered massive spikes in simulated collisions ($H = 52.53$, $p < 0.001$), drove significantly faster ($H = 21.88$, $p < 0.001$) and showed highly erratic steering ($H = 26.96$, $p < 0.001$). The GLMM revealed persistent work fatigue consistently degraded performance (e.g., predicting higher collisions: $\beta = 0.018$, $p = 0.001$) across all metrics. Elevated physiological stress (heart rate) significantly predicted both increased speeding ($\beta = 0.060$, $p = 0.005$) and collisions ($\beta = 0.011$, $p = 0.007$). Conversely, psychological work detachment served as a crucial protective predictor, significantly reducing erratic speed variability ($\beta = -0.042$, $p = 0.001$) and collisions ($\beta = -0.017$, $p = 0.001$). Crucially, the speed variability model was the absolute best-fit predictor, yielding the lowest information criterion metrics (AIC = 1786.26; BIC = 1790.80; -2log likelihood = 1784.25).
Conclusions: High-fidelity simulators expose the undeniable dangers of post-shift fatigue. By comprehensively modeling psychosocial and physiological variables, these robust predictive models provide the empirical leverage needed to overhaul occupational health policies and implement targeted workplace safety interventions.

Keywords: Predictive modeling; High-fidelity simulator; Generalized linear mixed models (GLMM); Work fatigue; Unsafe commuting

Oral Presentation

O8 Human Performance and Safety in the Workplace

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Translation and validation of Malay version of the Individual Work Performance Questionnaire among ageing nurses in Kelantan

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Introduction: The Individual Work Performance Questionnaire (IWPQ) is a widely recognized tool for assessing work performance across various domains. With an increasing number of ageing nurses in Malaysia, it is crucial to evaluate their work performance using a culturally relevant instrument. However, a validated Malay version of the IWPQ has not yet been established. This study aims to translate and validate the Malay version of the IWPQ for ageing nurses in Kelantan to ensure its contextual appropriateness and measurement accuracy.

Materials and Methods: A cross-sectional validation study was conducted. The original IWPQ was translated into Malay through a forward and backward translation process, followed by contextual adaptation. Content validity was assessed by ten clinical experts, while face validity was evaluated by thirty ageing nurses. The final Malay version was administered to a sample of 240 nurses aged 40 and above selected via stratified random sampling. Construct validity was analyzed using confirmatory factor analysis (CFA), and internal consistency was measured using Raykov's rho.

Results: The content validity index (S-CVI/Ave) and face validity index (S-FVI/Ave) demonstrated high scores, indicating strong conceptual alignment. CFA supported the three-factor model representing Task Performance, Contextual Performance, and Counter Work Behaviour, with good model fit (CFI = 0.941, TLI = 0.932, RMSEA = 0.081, SRMR = 0.048, and χ^2/df = 2.56). Item loadings ranged from 0.51 to 0.83, confirming adequate representation of the constructs. The scale exhibited strong internal reliability (Raykov's rho ranged from 0.78 to 0.91). Participants reported average scores of 4.46 (SD = 0.57) for Task Performance, 4.06 (SD = 0.67) for Contextual Performance, and 1.27 (SD = 0.43) for Counter Work Behaviour, reflecting their perceptions of work performance.

Conclusions: The Malay version of the Individual Work Performance Questionnaire is a valid and reliable instrument for assessing work performance among ageing nurses in Kelantan. Its clinical application can aid healthcare professionals in identifying areas for improvement, ultimately enhancing job performance and satisfaction among senior health care workers.

Keywords: Ageing workforce; Psychometric validation; Work performance and productivity

Oral Presentation

O8 Human Performance and Safety in the Workplace

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Health impact of short-term exposure to printer-emitted particles in healthy young adults

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Introduction: Given the increasing demand for printing in daily life and the fact that printers release numerous particles that contaminate indoor environments, greater attention should be paid to the potential health risks of printer-emitted particles (PEPs) to humans. This study aimed to investigate whether short-term exposure to PEPs induces changes in lung and cardiovascular function, trigger inflammatory responses, or cause genetic damage in healthy young volunteers.

Materials and Methods: Twenty participants were enrolled in a two-phase cross-over study. PEPs exposure levels, blood pressure, heart rate variability (HRV) parameters, blood indices, and micronucleus assay data were collected and analyzed using linear mixed-effects models.

Results: Both particle mass concentration (PMC) and particle number concentration (PNC) of PEPs were closely associated with printing workload. The majority of PEPs were smaller than 900 nm, with 47.99% measuring less than 200 nm and 14.21% at the nanoscale. Short-term exposure to PEPs induced small airway impairment in healthy young adults. Elevated PMC10/PMC1 ratios were linked to reduced lung function and increased blood potassium levels. Additionally, PEPs exposure induced an acute elevation in blood pressure. Among heart rate variability (HRV) parameters, the strongest effect associated with PMC and PNC was observed at a lag time of 30 minutes. High-level PEPs exposure increased serum levels of eotaxin and TNF-α, indicating systemic inflammation. However, no significant changes were detected in urinary 8-OH-dG or micronucleus frequency in peripheral blood lymphocytes.

Conclusions: Short-term exposure to PEPs may pose significant health risks through adverse cardiopulmonary effects. These findings highlight the potential health risks associated with regular laser printer use and warrant greater attention to indoor air quality and occupational safety measures.

Keywords: Printers; Indoor particles; Health risk; Occupational risk; Cardiopulmonary effects

Oral Presentation

O8 Human Performance and Safety in the Workplace

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Fatigue management in maritime workers: a survey study and systematic literature review

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Introduction: Work fatigue is one of the major problems commonly experienced by maritime workers due to long working hours, shift work systems, sleep disturbances, and environmental factors onboard ships. This condition may affect workers' health, occupational safety, and job performance while working at sea. This study aimed to describe the level of fatigue among maritime workers and identify the contributing factors.
Methods: This study employed a quantitative descriptive design using a survey approach through questionnaires distributed to 167 maritime workers from various ship types and occupational positions. The collected data included respondent characteristics, work systems, working duration, sleeping hours, symptoms of physical and mental fatigue, and the influence of the work environment on fatigue.
Results: The findings showed that most respondents worked in shift systems and had average working hours of 9-12 hours per day with sleeping durations ranging from 5-8 hours per day. The most frequently reported complaints included yawning, drowsiness, whole-body fatigue, headaches, back pain, and difficulty concentrating. Environmental factors such as engine noise, ship vibrations, adverse weather conditions, and high workloads also contributed to fatigue. Most respondents stated that fatigue affected occupational safety and work performance onboard. In addition, the majority of respondents agreed on the necessity of implementing fatigue management programs in the maritime work environment.
Conclusions: Work fatigue among maritime workers is influenced by long working hours, shift work systems, rest quality, and environmental conditions onboard ships. Fatigue can negatively affect workers' health, safety, and productivity. Therefore, the implementation of fatigue management programs, effective work-hour arrangements, and improved rest quality are essential to reduce the risk of workplace accidents and enhance maritime occupational safety.

Keywords: Fatigue; Maritime workers; Occupational safety; Work fatigue; Occupational health

Oral Presentation

O9 Health Promotion at Work

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Association between psychosocial safety climate and adherence to recommendations for medical visits following statutory periodic health checkups among Japanese workers: a cross-sectional study

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Introduction: Adherence to medical visit recommendations following statutory periodic health checkups contributes to early detection and timely treatment of diseases. Previous studies have suggested that organizational factors, such as job demands and job resources, are associated with adherence to medical visit recommendations. Psychosocial Safety Climate (PSC) has been identified as an upstream organizational factor that shapes job demands and job resources. This study aimed to examine the association between PSC and adherence to recommendations for medical visits following statutory periodic health checkups.

Methods: This cross-sectional study was conducted in December 2024. Among the 22,360 participants who had undergone statutory periodic health checkups within the past two years, 6,111 who had received medical visit recommendations were analyzed.

The explanatory variable was PSC quartiles based on PSC-4J (Q1: lowest to Q4: highest), and the outcome variable was whether the individual visited a medical institution. We performed multivariable logistic regression analysis adjusted for confounding variables and calculated the odds ratios (95% CI).

Results: The group that visited medical institutions consisted of 4,978 individuals (81.4%). The odds ratios for visiting a medical institution, with the Q1 group as the reference, were 1.53 (1.32–1.79) for the Q2 group, 1.78 (1.39–2.28) for the Q3 group, and 2.02 (1.67–2.46) for the Q4 group. After additional adjustment for job demands and job resources, the associations remained significant, with odds ratios of 1.38 (1.14–1.66) for Q2, 1.61 (1.20–2.18) for Q3, and 1.60 (1.25–2.03) for Q4, compared with Q1.

Conclusions: High PSC was significantly associated with greater adherence to medical visit recommendations among Japanese workers. Improving PSC in the workplace may be an effective organizational strategy to encourage appropriate health-seeking behavior and support early detection.

Keywords: Psychosocial safety climate; Medical visit adherence; Health checkups

Oral Presentation

O9 Health Promotion at Work

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High strain, low engagement: psychosocial stress limits participation in workplace health programmes among public primary care staff in Malaysia

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Introduction: Primary care providers face substantial occupational pressures that may worsen lifestyle behaviours and increase cardiovascular disease risks. This study aimed to determine whether psychosocial job strain influences lifestyle behaviours and participation in workplace health programmes (WHP) in Malaysian public primary care.

Materials and Methods: A cross-sectional study was conducted among 1045 public primary care staff. Psychosocial job strain was assessed using the Malay Job Content Questionnaire (M-JCQ), with respondents classified into quadrants based on median splits of psychological demands and decision latitude. Analyses were limited to the high-strain (n = 174) and low-strain (n = 369) groups (analytical N = 543). Dietary practice and physical activity were measured using the WHO STEPS protocol and Global Physical Activity Questionnaire (GPAQ), respectively, while WHP engagement was defined as the total time spent in programmes over the past six months. Group differences were analysed using the Chi-square test and Mann-Whitney U test.

Results: Within the analysed groups, 72.0% met the WHO-recommended physical activity threshold (≥600 MET-minutes/week), yet 87.8% reported inadequate fruit and/or vegetable intake (<5 servings/day). Lifestyle behaviours did not differ significantly by job strain status ($p > 0.05$). In contrast, high-strain personnel demonstrated significantly shorter participation durations in the stress management programme compared to low-strain counterparts (mean 57.14 vs 79.32 minutes; $p = 0.017$).

Conclusions: Psychosocial job strain appears to act as a structural barrier to engagement in WHP, rather than influencing individual lifestyle behaviours directly. The high prevalence of poor dietary practices among staff suggests a need for environmental strategies, such as structured meal breaks and small-scale initiatives like staff-led produce gardens. Interventions that rely solely on voluntary participation may inadvertently exclude those most at risk. Organisational strategies, such as protected time, workload redistribution, and flexible programme delivery, are essential to ensure equitable access and effectiveness of workplace health interventions.

Keywords: Occupational stress; Health promotion; Health personnel; Health behaviours; Primary health care; Workplace

Oral Presentation

O9 Health Promotion at Work

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PETRONAS wellness programme: MESTIfit4health

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Introduction: Globally, non-communicable diseases (NCDs), mental health conditions, and fatigue-related risks represent leading contributors to workforce morbidity, reduced productivity, and occupational incidents. Workforce health data from the World Health Organization and Malaysia's National Health and Morbidity Survey indicate rising prevalence of obesity, cardiometabolic risk factors, psychological distress, and inadequate sleep among working adults. Within this context, a large geographically dispersed workforce faced three key challenges: increasing lifestyle-related NCD risk, psychosocial stressors affecting mental wellbeing, and fatigue-related safety risks. PETRONAS' MESTIfit4health, launched in 2017, was developed as a comprehensive workplace health intervention to address these priorities.

Methods: MESTIfit4health is a multi-year, organisation-wide programme structured around five pillars—Move Right, Eat Right, Sleep Right, Think Right, and Individual Right—integrating lifestyle modification, occupational health risk management, mental health capacity-building, and preventive care. Interventions were delivered using digital platforms, leadership engagement, peer ambassador networks, and targeted programmes for high-risk groups. Programme performance was monitored using participation data, health screening uptake, safety indicators, and wellbeing metrics.

Results: Since implementation, indicators suggest stabilisation of new mental health conditions and attenuation of rising obesity trends. Preventive health screening utilisation reached 60% among eligible employees. Fatigue management interventions were associated with zero fatigue-related major incidents. Nutrition governance achieved sustained elimination of food poisoning incidents linked to in-house catering. Psychological wellbeing initiatives trained 973 peer ambassadors and reached over 3,000 employees with resilience interventions.

Discussion: Findings demonstrate that integrated, data-driven workplace health strategies aligned with prevailing NCD and occupational risk profiles can improve safety outcomes, engagement, and preventive health behaviours across diverse workforce settings.

Conclusions: MESTIfit4Health is a long-term, data-driven, and technology-enabled programme integrating occupational health, lifestyle interventions, and mental well-being. By addressing physical, psychological, and emotional risks, the programme promotes a culture of workforce fitness and resilience through leadership advocacy, strategic partnerships, and measurable continuous improvements.

Keywords: Workplace health promotion; Occupational risk management and psychosocial workplace hazards

Oral Presentation

O9 Health Promotion at Work

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Stage 1 development of the Workplace Health Promotion Index through expert panel discussions

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Introduction: Workplace health promotion is essential for worker well-being and organizational productivity in Indonesia. However, there is no standardized tool that can be used across workplaces with different sizes and capacities to measure health promotion implementation. The Workplace Health Promotion Index was developed to address this gap by translating international workplace health promotion principles into a practical local measurement tool. This study aimed to develop the initial index structure through expert panel discussions and refine its indicators, scoring system and implementation approach.

Materials and Methods: Stage-1 development used focus group discussions with an expert panel of 15 members, consisting of occupational medicine specialists, occupational health practitioners from formal industries and health promotion experts. The panel reviewed the initial index framework through a web-based form prepared by the authors. Based on the collected responses, the panel refined the indicators, operational definitions, scoring anchors and supporting evidence requirements through iterative consensus-based discussion. Two implementation pathways were also examined to improve the applicability of the index across different workplace contexts.

Results: Fifteen expert panelists reviewed the initial Workplace Health Promotion Index through web-based form responses and group discussions, and agreed on four core indicators: Input, Process, Output and Outcome, each comprising three subdomains with clearly defined constructs. A scoring rubric from 0 to 3 was developed for each item using behavioral and documentary anchors. Two implementation pathways were defined, namely company-led health promotion and provider-led health promotion, and both retained the same scoring logic and weighting scheme to ensure comparability while maintaining flexibility. The panel generally accepted the framework but repeatedly refined it to improve clarity, feasibility and documentation. In the Input domain, revisions focused on distinguishing commitment, financing and human resources more clearly, including explicit evidence of policies, budget allocation and dedicated personnel. In the Process domain, panelists supported training, methods and partnership but requested clearer definitions of one-way and two-way methods and more practical evidence examples. In the Output and Outcome domains, the panel emphasized clearer benchmarks, stronger documentation, pre- and post-assessment for knowledge and more objective measurement of behavior change over time. A weighted scoring formula was developed, and the overall score was interpreted using four levels: Low, Moderate, High and Very High.

Conclusions: Stage-1 expert panel discussions produced a refined Workplace Health Promotion Index with clearer indicators, operational definitions, scoring anchors and evidence requirements that are more suitable for diverse workplace settings in Indonesia. The dual implementation pathways and weighted scoring system improved the flexibility and practical relevance of the index while preserving comparability across settings. Further validity testing is needed to confirm its content validity, reliability and broader applicability before wider implementation.

Keywords: Health promotion; Occupational health; Workplace; Workplace health promotion index

Oral Presentation

O10 Mental Health at Work

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Beyond the PPE: how social support buffers fear and psychological distress among district healthcare workers

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Background: Healthcare workers (HCWs) are disproportionately exposed to the physical and psychological burdens of the COVID-19 pandemic. While clinical protocols prioritize infection control, understanding the exacerbating and protective mechanisms underlying mental health is equally critical. Identifying how perceived personal risk, specific fears, and informal psychosocial support independently predict psychological distress is essential for recognizing vulnerable subgroups and targeting psychological first aid in occupational settings.

Objectives: To determine the prevalence of psychological distress, and the baseline levels of fear of COVID-19, perceived risk of infection, and perceived psychosocial support among HCWs in a district health setting, as well as to identify the significant predictors of depression, anxiety, and stress.

Materials and Methods: A cross-sectional study was conducted among 128 HCWs in healthcare facilities under the Alor Gajah District Health Office, Malaysia. Data were collected via an online questionnaire incorporating the Malay versions of the 21-item Depression, Anxiety, and Stress Scale (DASS-21), the Multidimensional Scale of Perceived Social Support (MSPSS), the COVID-19 Own Risk Appraisal Scale (CORAS), and the Fear of COVID-19 Scale (FCV-19S-M). Due to data skewness, Spearman's rank correlation (ρ) was utilized to evaluate bivariate relationships. Multiple linear regression (MLR) models were executed using continuous scores to ascertain independent predictors of psychological distress, controlling for demographic characteristics and occupational exposure.

Results: The sample comprised predominantly females, 104 (81.3%), with a mean age of 35.2 years (SD = 6.59). Based on DASS-21 severity classifications, 17 (13.3%) HCWs exhibited mild to moderate anxiety and 13 (10.2%) severe to extremely severe anxiety; 21 (16.4%) experienced mild to moderate depression and 4 (3.1%) severe to extremely severe depression; and 8 (6.3%) reported mild to moderate stress with 5 (3.9%) at severe to extremely severe levels. Spearman correlation analyses revealed that perceived social support was significantly inversely correlated with depression (ρ= -0.37), anxiety (ρ= -0.30), and stress (ρ= -0.37). Conversely, fear of COVID-19 correlated positively with depression (ρ= 0.27), anxiety (ρ= 0.30), and stress (ρ= 0.33). In the MLR models, perceived social support emerged as the strongest independent protective predictor, significantly reducing depression (β = -3.32, $p < 0.001$), anxiety (β = -2.42, $p < 0.001$), and stress (β = -3.51, $p < 0.001$). Fear of COVID-19 significantly predicted higher depression (β = 0.21, $p = 0.010$), anxiety (β = 0.39, $p < 0.001$), and stress (β = 0.27, $p = 0.005$). Perceived risk of infection independently predicted higher depression (β = 0.33, $p = 0.002$) and stress (β = 0.30, $p = 0.015$). Demographic variables and direct COVID-19 management involvement did not significantly predict distress.

Conclusions: While the majority of district HCWs maintained normal psychological profiles, a significant proportion experienced pandemic-induced elevated anxiety and depression. Perceived personal psychosocial support (from family, friends, and significant others) consistently acted as a robust buffer against all domains of psychological distress, whereas heightened fear and perceived risk directly amplified psychological morbidity. From an occupational health perspective, these findings highlight the necessity of protecting HCWs' access to their personal support networks during crisis deployments, and prioritizing institutional psychological support (such as MHPSS programs) for those lacking informal safety nets.

Keywords: COVID-19; Psychological distress; Social support; Occupational health; Health personnel

Oral Presentation

O10 Mental Health at Work

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Prevalence and factors associated with technostress among the staff of selected university in Sarawak

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Introduction: Technostress, defined as the stress experienced due to excessive exposure and adaptation to information and communication technologies (ICT), has become an increasing concern among university staff, affecting their productivity, well-being, and work-life balance. Sarawak is particularly susceptible due to its evolving digital landscape, diverse workforce, and infrastructural challenges, notably in internet connectivity and access to technical support.
Objectives: This study aimed to determine the prevalence of technostress among university staff in Sarawak and to identify the factors associated with its occurrence.
Methods: A cross-sectional quantitative study was conducted from October 2024 to August 2025, employing a simple random sampling method across various faculties and departments. A total of 384 respondents aged 18 and above participated via self-administered questionnaires. The instrument assessed sociodemographic characteristics, five technostress creator domains (techno-overload, techno-invasion, techno-complexity, techno-insecurity, techno-uncertainty), digital literacy (technical, cognitive, and social-emotional), and ergonomic practices.
Results: The prevalence of moderate technostress was high (69.8%), with severe technostress recorded in 14.6% of staff. Techno-uncertainty scored the highest mean ($M=64.05$, $SD=14.83$), while techno-insecurity had the lowest ($M=50.16$, $SD=15.70$). Pearson correlation analysis revealed all technostress domains were positively interrelated, with the strongest correlations between techno-insecurity and techno-complexity ($r=0.631$, $p<.01$), and techno-invasion and techno-overload ($r=0.602$, $p<.01$). Likewise, technical, cognitive, and social-emotional digital literacy domains were all significantly positively correlated. Hierarchical multiple regression identified higher educational attainment (particularly a doctorate degree), adequate ergonomic practice, and good internet connectivity as significant protective factors against overall technostress. Social-emotional digital literacy was especially important in reducing techno-invasion.
Conclusions: Technostress is prevalent among university staff in Sarawak and is intricately linked to ergonomic conditions, digital literacy, and socio-demographic factors. Interventions should therefore focus on enhancing ergonomic support, digital skills training, and improving institutional infrastructure, particularly in internet provision. Continued research should explore causal relationships and effective long-term mitigation strategies tailored to institutional and regional contexts.

Keywords: Technostress; Digital literacy; Ergonomics; University staff; Sarawak

Oral Presentation

O10 Mental Health at Work

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Work-to-family enrichment, work control, vigor and safety behaviours among Chinese employees

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Introduction: This study aimed to investigate whether vigour would mediate the effects of work-to-family enrichment on safety behaviours among Chinese employees. The moderating effects of work control on the relationships between work-to-family enrichment and vigour were also examined. Previous findings have demonstrated that work-to-family interference, the negative side of work-family balance, would impair psychological well-being, and hence this might decrease safety behaviours of employees. However, few studies have focused on whether work-to-family enrichment, the positive side of work-family balance, can improve employees' well-being, which in turn further enhances their safety behaviours. This study attempted to provide additional information in order to fill this research gap.

Materials and Methods: A self-administered questionnaire survey was adopted for data collection, and 725 Chinese employees working in different occupations were recruited to complete the questionnaires covering work-to-family enrichment, work control, vigour (physical, emotional and cognitive), and safety behaviours (compliance and participation). Cronbach's alpha coefficient was used to assess the reliability of the measures, and correlational analysis was conducted to investigate direct relationships between variables. Furthermore, structural equation modelling (SEM) was used to examine the proposed moderated-mediational model of this study.

Results: Results showed that vigour (physical, emotional and cognitive) mediated the effects of work-to-family enrichment on safety behaviours (compliance and participation). In addition, work control was found to moderate the effects of work-to-family enrichment on vigour (cognitive).

Conclusions: The results illustrated that work-to-family enrichment not only could improve employees' vigour, but also enhance their safety behaviours. Furthermore, work control could also play an important role during the process. For practical implications, the organisation and managerial staff should implement appropriate interventions to assist employees in integrating both work and non-work duties. This may enable them to have more energy for performing safety behaviours. Hence, work accidents can be eliminated.

Keywords: Chinese employees; Safety behaviours; Vigour; Work control; Work-to-family enrichment

Oral Presentation

O10 Mental Health at Work

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Occupational and psychosocial determinants of depression among seafarers: evidence from India and a multi-country South-East Asian extension

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Background: Seafarers represent a high-risk occupational group exposed to prolonged isolation, extended working hours, and constrained living environments, all of which contribute to adverse mental health outcomes. Despite the critical role of maritime workers in global supply chains, there remains limited region-specific evidence on occupational mental health in South-East Asia. This study aims to examine the determinants of depression among seafarers in India and extend the analytical framework to a proposed multi-country South-East Asian context to inform occupational health policy and interventions.

Methods: A cross-sectional analytical study was conducted among 105 seafarers employed by an international shipping company in Mumbai, India, following institutional ethics approval. Participants were recruited using time-bound convenience sampling. Data were collected using validated instruments: the Beck Depression Inventory (BDI) and the Work-Related Quality of Life (WRQoL) scale. Statistical analysis was performed using Jamovi (version 2.0). Associations were assessed using Chi-square tests, and multivariable logistic regression was conducted to identify independent predictors of depression. Building on these findings, the study proposes a comparative multi-country extension across key South-East Asian maritime populations using a harmonised methodological framework.

Results: Participants were predominantly male (98.1%), with 56.2 percent aged 18 to 35 years and 80% married. Mild mood disturbance was highly prevalent (90.5%), while 8.6% had scores indicating depression. Higher work-related quality of life was significantly associated with regular physical activity and higher monthly income. Depression was significantly associated with perceived isolation (p=0.031) and work-related quality of life (p=0.012).

In multivariable logistic regression, working 10 or more hours per day was independently associated with higher odds of depression compared with working fewer than 10 hours daily (adjusted odds ratio [AOR] 1.83; 95% confidence interval [CI]: 1.07–3.14). Compared with seafarers who reported experiencing isolation, those who did not report isolation had significantly lower odds of depression (AOR 0.046; 95% CI: 0.003–0.73), confirming perceived isolation as an important psychosocial risk factor. Average or low work-related quality of life was also associated with higher odds of depression compared with higher work-related quality of life (AOR 1.23; 95% CI: 1.04–1.44). These findings demonstrate the combined influence of occupational workload, psychosocial isolation, and quality of working life on seafarers' mental health.

Conclusions: This study demonstrates a substantial burden of early mental health disturbances among seafarers and identifies modifiable occupational and psychosocial risk factors. The findings underscore the need for integrated occupational mental health strategies, including routine screening, onboard psychosocial support, regulation of working hours, and strengthening work-related quality of life. The proposed South-East Asian extension will generate comparative regional evidence to inform maritime health policies, workforce protection frameworks, and scalable interventions aligned with global occupational health priorities.

Keywords: Depression; Isolation; Seafarers; Sustainable development goals; Work-related quality of life

Oral Presentation

O10 Mental Health at Work

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Organisational culture and job satisfaction among university academicians

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Introduction: Organizational culture and job satisfaction are critical determinants of academic productivity and mental health, yet research remains limited within the Malaysian higher education sector. This study investigated the sociodemographic, workplace, and cultural factors that influence job satisfaction among university academicians.

Materials and Methods: A cross-sectional study was conducted among 290 academicians at a university in Selangor. Using multi-stage proportionate stratified random sampling, data were collected over a year using the Organizational Culture Index and the Minnesota Satisfaction Questionnaire. Statistical analysis using SPSS version 30 included descriptive statistics, independent t-tests, analysis of variance, Pearson correlation and multiple linear regression.

Results: Most academicians reported moderate (54.4%) to high (45.6%) job satisfaction. The dominant organisational culture was bureaucratic (M = 32.42, SD = 3.91), followed by innovative (M = 28.37, SD = 4.77) and supportive (M = 27.32, SD = 5.56). The multiple linear regression model was significant (F (19, 263) = 32.62, $p < 0.001$), explaining 70.2% of the variance (R^2 = 0.702). Those who agreed (beta = 7.47, $p < 0.001$) and strongly agreed (beta = 9.00, $p < 0.001$) on promotional opportunities, and high remuneration (beta = 4.25, $p = 0.025$) significantly predicted higher job satisfaction. Supportive (beta = 1.10, $p < 0.001$), bureaucratic (beta = 0.45, $p < 0.001$), and innovative (beta = 0.33, $p = 0.025$) cultures were all significant positive predictors of job satisfaction.

Conclusions: Organizational culture and workplace rewards, namely promotional opportunities and high remuneration, were stronger predictors of job satisfaction. University administrators should prioritize supportive cultural environments, transparent promotion pathways, and competitive remuneration to improve academic well-being and professional productivity.

Keywords: Job satisfaction; Organisational culture; Bureaucratic culture; Supportive culture; Innovative culture

Oral Presentation

O10 Mental Health at Work

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Effects of an organizational intervention on workplace loneliness: a before-and-after study in Japan

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Background: Workplace loneliness has emerged as an important occupational health issue. Organizational interventions that promote dialogue and connectedness may help reduce loneliness in the workplace.
Objectives: This study aimed to examine changes in workplace loneliness before and after an organizational intervention targeting loneliness in two Japanese workplaces.
Materials and Methods: A before-and-after study was conducted in two workplaces. A total of 61 and 44 employees, respectively, completed surveys at baseline and follow-up. In each workplace, 10 employees were selected to participate in the intervention. The intervention consisted of two 1.5-hour workshops held approximately one month apart between October and November 2025. The workshops were designed using Appreciative Inquiry and workplace environment improvement approaches. Facilitators conducted the sessions with an emphasis on dialogue and connectedness. Outcomes included loneliness, work engagement, social capital, supervisor support, and coworker support. Changes among participants with baseline loneliness scores above the mean were also examined.
Results: In one workplace, overall loneliness did not change significantly; however, among participants with baseline loneliness scores above the mean, loneliness decreased significantly from 8.71 to 6.57 (p=0.0022). In the same workplace, supervisor support improved significantly from 6.63 to 7.31 (p=0.0023), and coworker support improved from 6.29 to 6.88 (p=0.0077). No significant changes were observed in work engagement or social capital. In the other workplace, no statistically significant changes were observed, although loneliness showed a declining trend.
Conclusions: The findings suggest that an organizational intervention targeting workplace loneliness may reduce loneliness among workers with higher baseline loneliness. Improvements in workplace social support may represent an important secondary benefit of this approach.

Keywords: Workplace loneliness; Social isolation; Organizational intervention; Social support; Occupational mental health

Oral Presentation

O10 Mental Health at Work

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Conscious and engaged leadership to support managers' mental health and strengthen psychosocial risk prevention: initial findings from a Canadian intervention study

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Background: Service-sector organizations in many countries operate in contexts of sustained turbulence marked by labour shortages, intensified demands, and organizational change. Managers are at the forefront of these pressures, yet their mental health remains a critical blind spot in occupational health and safety (OHS) strategies, particularly regarding psychosocial risks. Given their central role in shaping working conditions, supporting managers may represent a key lever for improving both their own wellbeing and that of employees.
Objectives: This study aims to develop and evaluate a web-based program to support managers' mental health by strengthening conscious and engaged leadership practices, with the broader goal of preventing psychosocial risks in the workplace.
Materials and Methods: Grounded in Acceptance and Commitment Therapy (ACT), psychosocial risk literature, and authentic leadership research, the program was co-developed through a participatory process involving managers and specialists. It is currently being implemented among over 100 managers in a health services department. The evaluation follows a mixed-methods design informed by the RE-AIM framework. Longitudinal quantitative data are collected to assess program reach and uptake, as well as changes in managers' mental health, alongside psychosocial risk-related variables and employees' perceptions of leadership practices.
Results: Findings from the participatory phase highlight managers' needs for flexible and context-sensitive approaches, as well as the importance of addressing workload, work–life balance, and emotional regulation. These insights directly informed the program's content and structure. We will also present initial findings on feasibility and uptake, along with longitudinal analyses of changes in managers' mental health and psychosocial risk-related variables, as well as employee perceptions of leadership practices.
Conclusion: This study contributes to a better understanding of conscious and engaged leadership as an OHS-relevant approach to supporting managers' mental health and strengthening psychosocial risk prevention, and informs the development of scalable interventions for healthier work environments.

Keywords: Mental health; Managers; Psychosocial risks; Leadership; Web-based-intervention

Oral Presentation

O10 Mental Health at Work

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Practical and transferable return-to-work strategies in mental health: lessons from Japan's clinical and occupational practice

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Introduction: Mental health-related sick leave is increasing globally, yet many Asian countries lack long-term income support systems comparable to Japan. Even in well-supported systems, prolonged absence often leads to deconditioning and an increased risk of relapse after return-to-work (RTW). Premature RTW based solely on symptom improvement is a common cause of recurrence. Therefore, practical and transferable RTW strategies are required beyond institutional differences.
Materials and Methods: Based on clinical and occupational health practice across more than 20 companies (including IT, manufacturing, and service industries), three core RTW strategies were developed. First, daily activity monitoring using structured logs to objectively assess sleep-wake rhythms and daytime functioning. Second, a "Monday–Friday" work simulation requiring individuals to maintain a consistent weekday routine before RTW. Third, phased RTW programs involving gradual reintegration through reduced working hours and workload, in collaboration with employers.
Results: These approaches enable objective evaluation of recovery, improve communication between clinicians and employers, and reduce premature RTW decisions. In routine practice, they contribute to more stable and sustainable RTW by ensuring sufficient functional recovery prior to full reintegration.
Conclusions: Although social security systems differ across countries, structured behavioral assessment and stepwise workload adjustment are universally applicable. This framework transforms sick leave into an active preparation period and provides practical, transferable strategies for occupational health professionals across diverse settings.

Keywords: Return-to-work; Mental health; Occupational health; Sick leave; Rehabilitation

Oral Presentation

O10 Mental Health at Work

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Depressive and anxiety symptoms among Vietnamese migrant caregivers in Taiwan's long-term care facilities: prevalence, associated factors, and the role of social support

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Background: Taiwan's long-term care (LTC) system relies heavily on migrant labor, with Vietnamese caregivers comprising 60.5% of the care-facility workforce. Qualitative studies suggest that migrant caregivers face substantial stressors, including heavy workloads, language barriers, and limited social support. However, quantitative evidence remains limited and findings have been mixed. This study estimated the prevalence of depressive and anxiety symptoms among Vietnamese caregivers and examined associated factors and the moderating role of social support.

Methods: This cross-sectional study of 282 Vietnamese caregivers working in LTC settings measured depression (Center for Epidemiologic Studies Depression Scale (CES-D)) and anxiety (Generalized Anxiety Disorder 7-item scale (GAD-7)) symptoms. Multivariable logistic regression was used to identify factors associated with depressive and anxiety symptoms. Interaction terms for perceived social support (Multidimensional Scale of Perceived Social Support (MSPSS)) with age and duration of stay in Taiwan were included.

Results: Depressive symptoms (CES-D ≥16) were reported by 32.3% of participants, and 43.3% reported anxiety symptoms (GAD-7 ≥5). Longer duration of stay (years) in Taiwan was associated with lower odds of both depressive symptoms (adjusted odds ratio [AOR] = 0.78, 95% confidence interval [CI]: 0.69–0.88) and anxiety symptoms (AOR = 0.84, 95% CI: 0.77–0.92). Higher number of patients per shift was associated with increased odds of both depressive symptoms (AOR = 1.11, 95% CI: 1.01–1.21) and anxiety symptoms (AOR = 1.10, 95% CI: 1.02–1.18). Greater satisfaction with living environment and higher social support were associated with lower odds of both outcomes. No significant interactions were found for social support.

Conclusions: Our findings suggest that migrant caregivers' mental health is an important workforce and policy issue in Taiwan's LTC system. Multi-level interventions should address working conditions, living environments, and social support in order to protect caregiver well-being and sustain the LTC workforce.

Keywords: Migrant caregivers; Depression; Anxiety; Social support; Long-term care

Oral Presentation

O10 Mental Health at Work

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Barriers to rehabilitation: how job demand and control shape sleep quality in workers with occupational injuries

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Background: While traditional occupational rehabilitation often focuses on physical recovery, restorative sleep is equally important for tissue repair and psychological resilience. Clinically, post-injury sleep disturbances are often overlooked, yet they can worsen pain, prolong distress, and act as a major barrier to a successful return-to-work (RTW).
Objectives: This study aimed to identify the main predictors of early post-injury sleep disturbances, focusing on injury types and the Job Demand-Control model, to guide clinical care and evidence-based RTW strategies.
Methods: This cross-sectional study included workers hospitalized for occupational injuries or diagnosed at Kaohsiung Municipal Siaogang Hospital's occupational medicine clinic. Data including demographics, injury characteristics, and psychosocial factors were collected. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI; score >5 indicating sleep disturbance). Multiple logistic regression was used to identify independent predictors while adjusting for confounders.
Results: Among 120 injured workers (87.0% inpatients), 30.0% experienced sleep disturbances. After adjusting for confounders, results showed that commuting injuries (aOR = 4.48, p = 0.04), higher education (aOR = 3.91, $p = 0.03$), high job demand (aOR = 2.02, $p = 0.04$), and older age (aOR = 1.07, $p = 0.02$) were significant risk factors. Conversely, high job control was a strong protective factor, reducing the risk of sleep disturbance by over 75% (aOR = 0.230, $p = 0.011$).
Conclusions: This study shows early post-injury sleep disturbance is a common clinical challenge heavily influenced by psychosocial work factors. By identifying high-risk groups, particularly those sustaining commuting accidents or traumatic brain injuries (TBI), medical teams can proactively provide targeted sleep management. Since high job control is linked to broader workplace support, occupational health professionals should collaborate with employers. Advocating for workplace accommodations and enhanced job autonomy during the RTW transition is a vital strategy to buffer trauma and facilitate successful rehabilitation.

Keywords: Occupational injury; Sleep disturbance; Pittsburgh sleep quality index (PSQI); Job demand-control model

Oral Presentation

O10 Mental Health at Work

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Facilitating mental health literacy for workplaces: when can that be done?

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Introduction: Mental health (MH) at work is a key factor in driving safer, healthier, and more sustainable workplaces. However, low MH literacy could lead to stigma about MH issues and prevent those in need from seeking early intervention to promote MH at work. This study aims to explore MH literacy and confidence to offer support to colleagues when people who completed the mental health first aid (MHFA) training encounter MH challenges. These skills are essential to promote MH at workplaces.
Materials and Methods: MHFA training was delivered by MHFA licensed instructors to university students and industry workers. The 2-day training included interactive activities that showcased scenarios on managing MH issues and crises to enable the trainees' MH literacy, and collaborative peer discussions on providing assistance to manage MH issues more confidently. Trainees completed a quiz on their MH literacy and confidence level. Descriptive analyses were summarised.
Results: Students (n=30) and workers (n=74) completed the training and subsequently, the survey (n=24, n = 31, respectively). Among the trainees, 100% of the students and 86% of the workers scored an adequate level of MH literacy. Additionally, 95% of the students were confident in offering MH support and information to their colleagues whilst 100% of the workers were confident in doing so. Both cohorts enjoyed the training, felt it was helpful and would recommend the training to their colleagues.
Conclusions: MHFA training in either the university or workplace settings can enhance MH literacy and confidence to promote MH at workplaces. Commencing MHFA training earlier before students enter the workforce could be an efficient way to better enhance MH literacy whilst they grow confidence to help their colleagues. Occupational health practitioners could advocate for MH training to be included as part of a training curriculum to facilitate occupational health and promote MH at workplaces.

Keywords: Mental health first aid; Stigma; Mental health literacy; Confidence; Mental health challenges

Oral Presentation

O10 Mental Health at Work

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Process evaluation of a participatory online workplace improvement program for preventing mental health problems

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Introduction: This study assessed the implementation of a participatory online workplace improvement (POWI) program for primary prevention of mental health problems.
Methods: The POWI program was conducted in five workplaces across three industries (information and communications, retail, and long-term care). It included an online action checklist, group discussions, development and implementation of action plans, and improvement reports. The facilitators in each workplace underwent a 2-h training session, with the researchers providing external support. The process evaluation was conducted via documentation and interviews with workplace facilitators.
Results: All workplaces completed the POWI program without dropout. Although the online system allowed workplace assessment and documentation of improvement activities, its use depended on workplace IT environments and users' familiarity with digital tools. The program's multifactor structure also necessitated continuous assistance for workplace facilitators. Autonomous implementation based solely on web-based instructions was difficult because of the additional support required for understanding the system and coordinating workplace consensus. The external supporters played key roles in facilitating progress, providing reminders, and coordinating between online processes and on-site activities. Variability in participation and progress was observed across workplaces. The presence of internal occupational health personnel facilitated smoother implementation. Overall, the program encouraged workplace dialogue and helped identify feasible improvements.
Conclusions: The POWI program can be implemented in small-scale workplaces. Process evaluation highlights the importance of external support, role clarification, and integration of online tools with workplace practices for effective implementation.

Keywords: Process evaluation; Participatory workplace improvement; Web-based intervention; Primary prevention; Mental health

Oral Presentation

O10 Mental Health at Work

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Stress, anxiety and depression among part-time and full time postgraduate UKM students: a comparative cross-sectional study

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A crucial factor influencing pupils' academic achievement is mental health issues. Stress, depression, and anxiety are the most common mental health disorders, and a concerning incidence was seen among postgraduate students. In order to better understand the prevalence of stress, depression, and anxiety among part-time and full-time postgraduate students at UKM Bangi and Cheras Teaching Hospital, this study explored these variables. 441 postgraduate students in all were enlisted using a straightforward random sampling procedure. In order to determine the prevalence of stress, the level of depression and anxiety, and the sources of stress, interviews with all of the chosen students were conducted using the Depression Anxiety Stress Scale-21 (DASS-21) and the Postgraduate Stressors Questionnaire (PSQ). In this study, 52.4% of the participants who were recruited participated in postgraduate studies part-time, while the remaining 47.6% enrolled full-time. The T-test was used to compare the most common study mode with other sociodemographic factors, and statistical analysis showed that people who are either married (p-value = 0.005) or older than 40 years old are more likely to enrol in part-time postgraduate study. Additionally, the results of the chi-square test (p-value = 0.852) indicated that there is no correlation between the style of study and the prevalence of stress, sadness, or anxiety. Additionally, PSQ results showed that academic-related stressors, with a mean of 2.19 ± 1.14, were the main stressor domains among the selected postgraduate students in relation to the mode of study. The top stressor among the 28 identified in the PSQ was "time demands and deadlines to meet" for full-time postgraduate students, while "tests/examinations" was the top stressor for part-time postgraduate students. Additionally, a statistically significant relationship between gender and married status and anxiety level was revealed by logistic regression. In short, this study found no correlation between mode of study and the prevalence of stress, depression, and anxiety among postgraduate students at UKM, Bangi, and the teaching hospital, Cheras.

Oral Presentation

O10 Mental Health at Work

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Integrating clinical medicine and occupational psychology: a cross-sectional analysis of psychosocial hazards and wellness intervention impact in a heavy metal foundry

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Introduction: Psychosocial hazards are important determinants of occupational health, particularly in high-risk industrial settings. Mental ill health among workers contributes to reduced productivity, increased risk of occupational accidents, and impaired functional capacity during the most productive years of life. Evidence on the effectiveness of workplace mental health interventions in heavy industrial settings remains limited. This study assessed the prevalence of stress, anxiety, and depression among foundry workers and evaluated the impact of workplace wellness programs.

Materials and Methods: A cross-sectional analytical study was conducted among 100 randomly selected employees in a steel casting plant in South India. Psychological status was assessed using the Perceived Stress Scale (PSS-10) and Depression Anxiety Stress Scales (DASS-21). Data were analyzed using SPSS v26. Chi-square test, independent t-test, and multiple linear regression were used to assess associations between wellness program participation and mental health outcomes. Statistical significance was set at $p < 0.05$.

Results: Moderate-to-high stress was observed in 55% of workers, while anxiety and depression were present in 61% and 46%, respectively. A significantly lower proportion of moderate-to-high stress was observed among wellness program participants compared to non-participants ($\chi^2 = 6.84$, $p = 0.009$).

Mean stress, anxiety, and depression scores were significantly lower among wellness program participants compared to non-participants ($p < 0.001$).

On multiple linear regression analysis, wellness program participation was independently associated with lower stress ($\beta = -0.42$, $p < 0.001$), anxiety ($\beta = -0.38$, $p < 0.001$), and depression ($\beta = -0.35$, $p < 0.001$), after adjusting for age, work experience, and job category.

Conclusions: A high burden of psychosocial morbidity exists among foundry workers. Workplace wellness programs demonstrate a significant and independent protective effect on mental health outcomes. Integration of psychosocial risk management into routine occupational health services is recommended to improve worker well-being and productivity.

Keywords: Psychosocial hazards; Steel foundry; Industrial mental health; Workplace wellness; PSS-10; DASS-21

Oral Presentation

O10 Mental Health at Work

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Stress coping strategies and influencing factors among junior doctors in Kelantan, Malaysia

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Junior doctors frequently face high levels of work-related stress due to long working hours, heavy workload, and demanding clinical responsibilities, which may adversely affect their psychological well-being and coping behaviours. This study aimed to determine the primary coping strategies employed by junior doctors in Kelantan and to identify factors influencing these coping strategies. A cross-sectional study was conducted among 379 junior doctors working in government hospitals and health clinics in Kelantan using a self-administered questionnaire. The questionnaires assessed psychological distress, perceived social support, job satisfaction, and coping strategies using validated instruments. Problem-focused coping was the most employed coping strategy (mean = 2.72, SD = 0.67), followed by emotion-focused coping (mean = 2.47, SD = 0.55), while avoidant coping was the least utilised (mean = 1.81, SD = 0.49). Psychological distress was positively associated with avoidant coping (r = 0.37, $p < 0.001$) and emotion-focused coping (r = 0.15, p = 0.004), but negatively associated with problem-focused coping (r = –0.16, $p = 0.002$). Perceived social support showed a significant positive association with problem-focused coping (r = 0.33, $p < 0.001$) and a negative association with avoidant coping (r = –0.24, $p < 0.001$). Job satisfaction demonstrated a positive correlation with problem-focused coping (r = 0.23, $p < 0.001$) and a negative correlation with avoidant coping (r = –0.22, $p < 0.001$). However, no significant association was observed with emotion-focused coping ($p = 0.871$). Multiple linear regression analysis identified perceived social support as the strongest predictor of problem-focused coping ($p < 0.001$). In addition, psychological distress emerged as a significant predictor of both emotion-focused coping ($p < 0.001$) and avoidant coping ($p < 0.001$), while perceived social support was also a significant predictor of avoidant coping ($p = 0.004$). These findings highlight the importance of psychological distress and social support in shaping coping strategies among junior doctors, with implications for targeted workplace and mental health interventions to promote adaptive coping and reduce maladaptive coping strategies.

Keywords: Coping strategies; Psychological distress; Social support; Job satisfaction; Junior doctors

Oral Presentation

O10 Mental Health at Work

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Hofstede's cultural dimensions and occupational stress among oil palm plantation workers in Melaka: a comparative analysis between host and migrant workers

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Malaysia's oil palm plantation sector relies heavily on foreign labour (77% of the workforce), yet a knowledge gap persists regarding how national cultural dimensions influence occupational stress among this multicultural workforce. This study aims to identify the relationships between six Hofstede cultural dimensions and occupational stress among oil palm plantation workers, and to compare host workers with migrant workers.

A cross-sectional design was applied to 256 oil palm plantation workers in Melaka, selected through stratified random sampling, comprising four groups: Malaysia (n=104), Indonesia (n=65), India (n=52), and South Asian (Bangladesh, Nepal, Sri Lanka; n=35). The Value Survey Module (VSM 2013) measured cultural dimensions, while the Work Stress Screener (WoSS-13) measured occupational stress through two sub-scales: work situation (WOSS A) and emotional strain (WOSS B). Analyses included independent samples t-tests, ANOVA, Pearson correlations, multiple linear regression, Cronbach's alpha, and factor analysis.

Results showed that Malaysian host workers experienced significantly higher emotional strain (M=2.89) than migrant workers (M=1.86), t(254)=3.51, $p<.001$, Cohen's d=0.45, despite similar levels of work situation stress ($p=.286$). Indulgence (IVR) emerged as the strongest protective factor ($\beta=-.263$, $p<.001$), while Long-Term Orientation (LTO) acted as a risk factor ($\beta=+.172$, $p=.008$). National group membership added predictive power beyond cultural dimensions, with Indonesian workers showing significantly lower overall stress (B=-2.62, $p=.002$). The WOSS instrument demonstrated good reliability ($\alpha=.875$ and .777).

This study challenges the assumption that migrant workers are more stressed, instead highlighting the need to focus mental health interventions on local workers. The findings support a 'cultural intelligence' approach in occupational health management that recognises the cultural diversity of plantation workforces.

Keywords: Hofstede's cultural dimensions; Occupational stress; Oil palm plantation workers; Migrant workers; Occupational medicine

Oral Presentation

O10 Mental Health at Work

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Can fast pulse survey reliably assess workplace mental health? A cross-sectional study

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Introduction and Objective: Mental health in the workplace has emerged as a critical determinant of employee productivity, retention, and overall organizational performance. Psychological distress, if left unaddressed, can escalate into severe clinical conditions, adversely impacting both employees and employers. Often, standardized subjective tools are used to assess employees' mental wellbeing. The present study aimed to evaluate the prevalence and severity of depression, anxiety and stress among employees in an organization through a fast pulse cross-sectional survey. The study further compared responses between employees who disclosed their identities and those who opted for anonymity, with the objective of assessing potential reporting bias and identifying effective intervention strategies.

Methods: 536 employees voluntarily participated in an online workplace mental health survey using the DASS-21 questionnaire for a month. Of these, 269 participants disclosed their identities, while 267 opted for anonymity, ensuring confidentiality throughout the process. Data was analysed using Jamovi through reliability and validity checks, linear correlation, independent t-tests and regression analysis across the three subscales (depression, anxiety and stress). Interventions were suggested based on the severity levels observed in the DASS-21 scores and included yoga, meditation, emotional wellbeing programs, spiritual wellness initiatives, psychological counselling and therapeutic referral where required. Additionally, employees were guided towards ongoing Employee Assistance Program (EAP) services for long-term support.

Results: Preliminary reliability analysis confirmed the internal consistency of the DASS-21 subscales across both groups. Correlation analysis revealed moderate positive associations (0.5 to 0.69) among depression, anxiety and stress scores. Independent t-test comparisons between the identity disclosed and anonymous groups indicated no statistically significant differences in mean subscale scores, suggesting minimal reporting bias due to disclosure status. Regression analysis demonstrated that elevated stress (p<0.001, OR= 1.12) and anxiety scores (p=0.012, OR= 1.08) were predictive of higher levels of depression, reinforcing the interrelated nature of psychological distress. The overall distribution of severity levels indicated that while the majority of employees fell within normal to mild categories, a substantial proportion demonstrated moderate to severe symptoms warranting targeted intervention.

Discussion/Conclusions: The findings suggest that the DASS-21 is a reliable and valid tool for rapid workplace mental health assessment. The absence of significant differences between disclosed and anonymous groups highlights the credibility of the survey, even in settings where identity disclosure might be a concern. The results underscore the need for proactive interventions within an organizational setting. Integrative approaches can foster resilience and reduce psychological distress. The availability of EAP services provides sustainable support. The study is limited by its reliance on self-reported data and voluntary participation, which may have restricted sample diversity. To preserve confidentiality, only limited variables were collected, reducing the scope of subgroup analysis. Despite limitations, the study demonstrates that DASS-21 provides a simple, validated, and efficient framework for assessing workplace mental health, enabling organizations to identify employees at risk and tailor interventions effectively.

Keywords: DASS21; Mental health; Survey; Anonymous; Identity disclosure

Oral Presentation

O11 Psychological Safety at Work

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Embedding psychosocial risk management through safety culture and felt leadership

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Introduction: Psychosocial risks are rapidly emerging as a critical frontier in occupational safety and health, driven by digitalisation, evolving work arrangements, increasing performance pressures, and changing workforce expectations. Despite growing awareness, many organisations remain trapped in compliance-driven approaches that fail to address the human experience of work. Safety culture initiatives often focus on systems and policies while overlooking the role of leadership behaviours in shaping employee perceptions of psychological safety. This paper explores how psychosocial risk management can be strengthened through the integration of safety culture principles and felt leadership to move organisations from procedural compliance to lived safety experiences.

Materials and Methods: This conceptual practice-based paper synthesises current psychosocial risk management frameworks, safety culture models, and leadership behaviour research, combined with field observations from organisational training and safety culture interventions. The module design applies a three-stage approach: (1) mapping common psychosocial hazards including workload imbalance, low autonomy, workplace conflict, and digital stressors, (2) applying felt leadership concepts to identify leadership micro-behaviours that influence trust and reporting culture, and (3) introducing practical psychosocial risk assessment tools focusing on simple, high-impact interventions.

Results: Findings indicate that organisations often misdiagnose psychosocial risks as individual resilience issues. Gaps were observed between management safety intentions and employee safety experiences, particularly in communication quality, response to concerns, and visible leadership care. Introducing simple leadership practices such as visible listening behaviours and timely responses to concerns demonstrated strong potential to improve trust and psychological safety climate. Practical assessment tools also enabled faster identification of psychosocial pain points and prioritisation of achievable control measures.

Conclusions: Effective psychosocial risk management requires a shift from policy-centric approaches to human-centred leadership practices. Embedding felt leadership within safety culture strategies provides a practical pathway for organisations to operationalise psychological safety and strengthen risk prevention. Organisations that prioritise leadership behaviours alongside systems are better positioned to build resilient, high-trust workplaces.

Keywords: Psychosocial risk; Safety culture; Felt leadership; Psychological safety; Leadership behaviour; Risk prevention; Occupational health

Oral Presentation

O11 Psychological Safety at Work

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Code grey incidents in public health care: a serial case report on workplace violence and system response in Johor Bahru District, 2025

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Introduction: Workplace violence remains a significant occupational hazard in healthcare, affecting staff safety, psychological well-being, and service delivery. The Malaysian Ministry of Health has established guidelines for the prevention and management, including activation of Code Grey as an emergency response to violent situations. This case series describes the pattern of Code Grey incidents and system responses in public health facilities within Johor Bahru District.

Methods: A retrospective case series was conducted using violence surveillance data from public health facilities under the Johor Bahru District Health Office for 2025. Descriptive analysis identified incident characteristics, types of violence, locations, and response measures.

Results: Six Code Grey incidents were reported across five health clinics and one district health office unit. Incidents occurred in consultation or treatment rooms (n=3), pharmacy counter (n=1), community settings (n=1), and via messaging application (n=1). Most cases involved healthcare workers and patients, with one involving a relative. Verbal aggression predominated, with one case involving physical violence and no injuries. All incidents were managed through Code Grey activation, supervisor notification and de-escalation. Police reports were lodged in all cases. Post-incident management included psychological support with counselling referrals and administrative measures such as staff rotation where necessary. Preventive strategies included staff training and integration of Code Grey flowcharts into facility-specific Emergency Response Plans.

Discussion: Communication gaps were a key contributing factor, particularly unmet expectations and misinterpretation of information. Clear signage and early identification of high-risk interactions can prevent escalation. Collaboration with Royal Malaysia Police should be strengthened to ensure appropriate legal action under the Minor Offences (Act 1955) or Penal Code (Act 574). Consistent reporting, proper documentation and legal follow-up can strengthen deterrence and emphasize the seriousness of workplace violence. These measures support compliance with the Occupational Safety and Health Act 1994 (Act 514) in ensuring a safe working environment.

Oral Presentation

O11 Psychological Safety at Work

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Bridging psychosocial safety gaps in first responders: a mindfulness-based trauma prevention model aligned with national risk management frameworks in Malaysia

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Introduction: First responders are exposed to repeated traumatic events that increase the risk of psychological distress, impaired cognitive performance, and operational errors. Despite national frameworks recognising psychosocial risk management, implementation within emergency services remains limited.
Objectives: This study evaluates a pilot intervention and quantifies system gaps to inform a scalable model for trauma prevention and recovery.
Methods: A mixed-methods evaluation was conducted involving ninety operational firefighters in Kuala Lumpur. The intervention included mindfulness-based mental skills training, peer support, and structured psychological debriefing. Outcome indicators included perceived practicality, integration into operational routines, and system-level gap identification across key domains of psychosocial risk management.
Results: The findings demonstrated high feasibility, with 100% of participants rating the intervention as practical and 89% reporting feasible integration into daily operations. However, substantial system gaps were identified: over 70% of personnel lacked access to structured trauma recovery protocols, approximately 66% were reluctant to report psychological distress due to stigma, and no standardised immediate response support following critical incidents was consistently implemented. In addition, no formal longitudinal monitoring systems were in place to track psychological outcomes. These gaps indicate a misalignment between policy-level frameworks and operational practice.
Discussion: In response, a four-layer model is proposed, integrating preventive mental skills training, immediate post-incident support, structured recovery pathways, and reintegration processes supported by peer networks and digital monitoring systems. This model addresses both individual and organisational determinants of psychosocial safety.
Conclusions: The findings suggest that embedding structured trauma prevention and recovery into occupational safety systems can enhance resilience, reduce risk of operational error, and improve long-term workforce sustainability among first responders.

Keywords: Psychosocial risk; First responders; Mindfulness; Occupational mental health; Trauma prevention

Oral Presentation

O12 Non-Communicable Disease and Work

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Blood pressure trajectories among male industrial workers over 11 years: an application of occupational health surveillance data

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China's Occupational Health Surveillance system is a legal framework designed for the early detection of work-related health issues. It mandates that employers organize and fund medical examinations (pre-employment, periodic, post-employment, emergency) for at-risk workers. Over time, this system has accumulated a substantial amount of longitudinal health data on the examined workers. This study aimed to analyze the age-related and temporal trends of blood pressure among male workers based on such long-term occupational health examination data, and to explore the transition pattern of blood pressure status for early identification and prevention of hypertension. This population-based study analyzed 1,273,142 occupational health examination records collected between 2013 and 2023 from male workers in Shanghai's industrial companies. Each participant contributed a maximum of one examination record per year. A subset of 4,972 individuals with at least 8 annual records was used for sequence analysis. The systolic blood pressure (SBP) and diastolic blood pressure (DBP) and their trends were described by descriptive statistics, generalized additive model and sequence analysis; the effect of available life habits was examined with the mixed effects models. Both SBP and DBP increased with age, e.g., 123 mmHg and 80 mmHg at 35-40 years old and 131 mmHg and 83 mmHg at 59 years old, with systolic blood pressure rising more. The incidence of prehypertension followed an inverted U-shaped pattern, ranging from 55% to 60%, with the peak occurring at age 40. The prevalence of hypertension increased with age, being below 5% at age 18 and reaching 30% by age 60. Sequence analysis revealed the progression pattern of blood pressure, with middle age being a critical period of rapid transition. This 11-year longitudinal data analysis showed temporal improvements in hypertension prevalence over this period. The prehypertension stage represents a critical window for early prevention and workplace-based intervention.

Oral Presentation

O12 Non-Communicable Disease and Work

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From silica to solvents: occupational and environmental risk factors for salivary gland cancer

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Background/Objectives: Occupational and environmental risk factors for salivary gland cancer (SGC) are largely underrecognized. To address this gap, this systematic review aims to characterize the relationship between employment in specific industries or occupations and risk of SGC, as well as exposure to key occupational and environmental hazards.
Materials and Methods: Studies published up to September 2023 were collected from three electronic databases and systematically screened. The Health Assessment Workplace Collaborative (HAWC) program was used to tag studies based on pre-established inclusion and exclusion criteria. Twenty-four eligible studies were critically analyzed to extract key study characteristics and findings, including effect estimates and 95% confidence intervals. Studies were evaluated for the influence of key biases. To identify priority sectors and hazards for intervention, effect direction plots were created to analyze the number and quality of studies reporting elevated rates of SGC across industry, occupation, and exposure groups.
Results: Twenty-four articles were included for analysis. Exposure misclassification and confounding bias were common concerns across studies. The analysis identified the strongest associations with SGC within industry and occupation groups, including cleaning services, material handling, food services, rubber/plastic production, engineering, and construction/painting. Exposures with the strongest relationship to SGC included silica dust, cement dust, chlorinated solvents, formaldehyde, and white spirits.
Conclusions: Several occupational exposures were associated with an elevated risk of SGC, whereas evidence for environmental factors remains limited. Additional research involving larger cohorts with quantitative exposure data is needed to further establish relationships between occupational and environmental exposures and often-overlooked rare cancers like SGC.

Keywords: Salivary gland; Occupational exposure; Environmental exposure; Occupational carcinogens; Silica dust

Oral Presentation

O13 Communicable Disease and Work

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Development and implementation of PPE educational materials during the COVID-19 pandemic: lessons for occupational infection prevention

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Background: During the COVID-19 pandemic, appropriate use of personal protective equipment (PPE) became essential for protecting healthcare workers. However, standardized and practical educational materials integrating evidence and field needs were limited.
Objectives: To describe the development process, content, and practical use of PPE educational materials, and to discuss their implications for occupational infection prevention.
Materials and Methods: An updated educational resource, Basic Knowledge and Catalogue of PPE (2022 edition), was developed by a professional academic society. The development process included (1) review of international and domestic guidelines and standards (e.g., N95/DS2 respirators), (2) expert consensus, and (3) incorporation of frontline needs. The structure and content of the materials were descriptively analysed.
Results: The resource consisted of two parts: a basic knowledge section and a catalogue. It systematically covered PPE types, including eye protection, surgical masks, N95 respirators, powered air-purifying respirators (PAPR), gowns, and gloves. Visual illustrations and Q&A formats enhanced usability. The materials also addressed fit testing, PPE use under resource constraints, and occupational health perspectives. The materials were downloaded and used in approximately 1,500 healthcare facilities in Japan, and applied in about 20 certified infection control nurse training courses. Clear visual illustrations contributed to improved knowledge scores and supported better understanding of PPE use in practice.
Conclusions: This initiative demonstrates that integrating evidence, international standards, and practical needs can produce effective educational tools during a public health emergency. Widely accessible and well-structured PPE training materials may strengthen occupational infection prevention capacity and preparedness for future pandemics.

Keywords: Personal protective equipment (PPE); COVID-19; Occupational infection prevention; Healthcare workers; Education and training

Oral Presentation

O13 Communicable Disease and Work

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Immunization for protection and improving worker productivity

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Indonesia is currently benefiting from a demographic dividend, marked by a large proportion of its population being of working age. Nevertheless, it still faces a double burden of disease, with communicable diseases remaining highly prevalent while non-communicable diseases are rapidly increasing. The immunization program plays a crucial role in reducing morbidity and mortality of communicable diseases. It protects workers from vaccine-preventable diseases and contributes significantly to maintaining and enhancing workforce productivity. In occupational settings, infectious diseases can lead to absenteeism and presenteeism, reduced performance, and increased healthcare costs, ultimately affecting organizational efficiency.

The Indonesian Occupational Medicine Association (IOMA) has developed the guideline "*Immunization for Protection and Improving Worker Productivity*." The objective of this guideline is to provide a reference for stakeholders in occupational health to facilitate the implementation of worker vaccination programs in companies, workplaces, institutions, and healthcare facilities. The IOMA recommendations provide comprehensive guidance on the selection of appropriate vaccines for workers based on occupational roles and the associated risk of transmission from biological exposures, including blood-borne, airborne, fecal-oral, vector-borne and zoonotic pathways, geographic location and individual respiratory vulnerability.

The implementation of workplace immunization programs requires the completion of several stages, including securing support and collaboration from both management and workers, conducting vaccination campaigns, and establishing partnerships with relevant stakeholders. It also involves the designation of a workplace vaccination program coordinator, provision of appropriate vaccination facilities, and adherence to proper vaccine storage and handling procedures. Furthermore, it includes the procurement of supplies, provision of training for personnel, implementation of vaccination protocols, and ongoing monitoring and evaluation of the program.

Integrating immunization initiatives with occupational health policies demonstrates a proactive approach to employee well-being and long-term productivity. Immunization is a cost-effective and impactful intervention that supports both worker protection and productivity. Strengthening workplace immunization programs should be prioritized as part of broader efforts to promote sustainable and resilient workforce health.

Keywords: Immunization; Protection; Worker productivity

Oral Presentation

O14 Industrial Hygiene Practice

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Beyond WBGT: a climate-responsive physiologically grounded framework for field heat-strain decision support in occupational settings

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Background: Occupational heat exposure is an increasing challenge under climate extremes, particularly in environments involving personal protective equipment (PPE), restricted airflow, radiant heat, and high metabolic workloads. Environmental heat stress indices, especially wet-bulb globe temperature (WBGT), remain central to screening and regulatory guidance but may not reliably reflect physiological heat strain when cooling capacity is constrained.
Objectives: To present a physiologically grounded, field-oriented decision-support framework that complements environmental heat stress screening by integrating human cooling capacity into operational heat-risk interpretation.
Methods: Drawing upon rational heat-balance principles and review of established indices including WBGT, Thermal Work Limit (TWL), and Predicted Heat Strain (PHS), a structured framework—Heat Assessment and Response Tool (HART)—was developed. The framework integrates baseline WBGT, exposure adjustments reflecting real-world constraints, and a Heat-Strain Profile (HSP) anchored to cooling adequacy. The model is designed for practical field implementation using standard measurements without requiring advanced physiological instrumentation.
Results: The integrated framework provides an interpretive layer clarifying situations in which environmental values appear acceptable yet physiological strain risk is elevated due to impaired evaporative cooling or high metabolic demand. Conversely, it helps avoid unnecessary work cessation when cooling capacity remains adequate. The approach supports graduated supervisory responses including task modification, work–rest scheduling, enhanced hydration enforcement, and escalation when safety margins narrow.
Conclusions: In hot–humid and high-radiant occupational environments increasingly influenced by climate change, heat-risk management requires interpretation beyond environmental thresholds alone. By bridging environmental measurement and human cooling capacity, HART offers a pragmatic pathway for improving field decision-making and prevention of heat-related illness while maintaining alignment with established occupational hygiene practice.

Keywords: Occupational heat stress; Heat strain; WBGT; Heat balance; Industrial hygiene

Oral Presentation

O14 Industrial Hygiene Practice

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Assessment of occupational noise exposure among airline ground handlers in Malaysia: contributions from aircraft operations and ground support equipment

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Occupational noise exposure remains a significant health hazard in the aviation industry, particularly among airline ground handlers operating in high-intensity noise environments. This study aims to evaluate noise levels generated by aircraft operations and ground support equipment (GSE), and to determine their contribution to personal noise exposure among ground handling personnel in Malaysia.

Noise monitoring was conducted using calibrated personal noise dosimeters and sound level meters across selected operational activities, including aircraft arrival, turnaround, and departure. Personal sampling was carried out over full work shifts (8-hour time-weighted average), with measurements collected from multiple job categories such as baggage handlers, headsetmen, and pushback operators. All instruments were calibrated before and after monitoring in accordance with standard industrial hygiene practices. Personal Noise Exposure Levels (NEL) were calculated based on equivalent continuous sound levels (LAeq) and normalised to an 8-hour exposure period (Lex,8h).

The findings indicate that aircraft engines generate peak noise levels exceeding 120 dB(A), while GSE, including baggage tugs, belt loaders, and auxiliary power units, produce continuous noise levels ranging from 85 to 100 dB(A). A significant proportion of monitored workers were found to exceed the permissible exposure limit of 85 dB(A), with the highest exposures observed among personnel directly involved in aircraft turnaround operations. Variations in exposure levels were also identified across job categories, reflecting differences in task duration and proximity to noise sources.

The study highlights the cumulative impact of multiple noise sources on overall exposure and underscores the need for comprehensive control measures. Recommended interventions include engineering controls such as noise reduction at source and physical barriers, administrative controls including task rotation and improved standard operating procedures (SOPs), and the consistent use of appropriate personal hearing protection (PHP). In addition, targeted training and implementation of a Hearing Conservation Program (HCP) are essential to mitigate long-term risks of noise-induced hearing loss (NIHL).

This study provides critical insights into occupational noise exposure in the aviation sector and supports the development of more effective risk management strategies to safeguard ground handling personnel.

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Objective markers of physical and cognitive fatigue associated with unsafe behaviour among scaffolders: evidence from a quasi-experimental study

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Background: The burden of scaffolding-related accidents has been growing. Individual attributes like unsafe behaviour and fatigue have been identified as key precursors. However, knowledge on the relationship between fatigue manifestations and unsafe behaviour remains limited, which is critical for developing effective accident prevention protocols.
Objectives: This study aimed to examine the relationship between unsafe behaviour and manifestations of physical and cognitive fatigue during scaffold erection tasks among scaffolders.
Materials and Methods: A total of 86 scaffolders were recruited into a quasi-experiment with a one-group pre-post design. Fatigue manifestation was measured objectively at pre- and post-exposure to the scaffolding task, employing an assessment protocol comprising seven tests. Two fatigue dimensions were evaluated: physical fatigue (musculoskeletal capacity assessed via hand grip strength, prone plank, trunk flexor endurance, and trunk lateral endurance test; postural stability via one leg standing test; joint flexibility via sit and reach test), and cognitive fatigue (assessed via simple reaction time test). During the simulated scaffold erection task at the post-exposure state, unsafe behaviour was rated based on non-compliance with validated standard safety protocols, which was a 48-item checklist developed in an earlier phase. Sociodemographic factors and Pittsburgh Sleep Quality Index (PSQI) scores were also included as independent variables.
Results: Correlation analyses revealed significant associations (p<0.001) between unsafe behaviour and dominant-hand grip strength (r=-0.57), one-leg standing duration with eyes closed (r=-0.69), prone plank duration (r=-0.56), trunk flexor endurance duration (r=-0.61), and reaction time (r=-0.47), at the post-exposure state where fatigue had manifested. Multiple linear regression analysis identified reaction time, one-leg standing duration with eyes closed, trunk flexor endurance duration, and PSQI score as significant predictors of unsafe behaviour.
Conclusions: These findings provide valuable insights for developing scaffolding safety protocols aimed at accident prevention. They can assist industry managers and regulatory authorities in guiding workers' safe behaviour through targeted fatigue mitigation strategies.

Keywords: Scaffolders; Physical fatigue; Cognitive fatigue; Unsafe behaviour; Occupational safety; Quasi-experimental study

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Workplace VOC exposure affected metabolic perturbations of chemical workers: a holiday-based crossover study with self-control

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Various chemicals are used or produced in the fine chemical factory and volatile organic compounds (VOCs) are common workplace pollutants, but evidence on short-term metabolic effects of complex VOCs remains limited. We conducted a holiday-based crossover study to investigate metabolomic responses associated with occupational exposure to complex VOC mixtures and to identify candidate exposure biomarkers. Ambient air samples were collected at various worksites in this factory with SUMMA canisters and analyzed by gas chromatography–mass spectrometry (GC–MS) under an untargeted exposomic approach to profile workplace VOC mixtures. Urine samples of 21 participating workers were collected at three time points: end-of-workweek post-shift (T1), pre-shift after 7-day leave (T2), and end-of-workweek post-shift (T3). In total, 71 VOCs were detected in workplace air, mainly aromatic hydrocarbons, ethanol, and halogenated solvents, consistent with the chemical raw materials used in production. Eight compounds were observed in all three worksites, forming a stable co-exposure profile. Of 3,431 urinary metabolites detected by untargeted metabolomics, time-series clustering revealed 488 metabolites that showed a characteristic pattern of decreasing from T1 to T2 and recovering at T3. Pathway enrichment analyses of differential metabolites between T1–T2 and T2–T3 identified 13 overlapping pathways, primarily related to energy metabolism, lipid metabolism, and amino acid metabolism. These findings demonstrated that transient changes of VOC exposure in the workplace elicit measurable and pathway-level metabolic disturbances in humans.

Keywords: Volatile organic compounds (VOCs); Metabolomics; Crossover design; Chemical workers; Biomarkers

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Occupational exposure to heavy metals in workplace air of e-waste recycling facilities: a preliminary risk assessment

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Introduction: The rapid global digital transformation has profoundly altered consumer behaviour, contributing to the increase in electronic waste (e-waste), including in Malaysia. This growth has driven the expansion of e-waste recycling operations, which are increasingly recognized as significant sources of environmental pollution and occupational health risks. Therefore, this study aimed to determine heavy metal concentrations in the air at e-waste recycling facilities and to assess the associated health risks among workers.

Materials and Methods: Workplace air samples were collected using a filter-based pump from two recycling facilities in Selangor (S1 and S3) and one recycling facility in Melaka (S2). Concentrations of chromium (Cr), cobalt (Co), nickel (Ni), selenium (Se), and beryllium (Be) were determined using inductively coupled plasma mass spectrometry (ICP-MS). Health risks were evaluated using the Average Daily Dose (ADD), which estimates the daily inhalation exposure of workers to air contaminants over time.

Results: The findings showed that mean concentrations (ng/m^3) ranged from 4.81–390.63 for Cr, 0.52–5.50 for Co, 105.09–813.65 for Ni, 0.76–1.77 for Se, and 0.15–0.62 for Be. Ni was the dominant metal in S1 and S2, while Cr predominated in S3, indicating site-specific exposure profiles. The calculated ADD values showed that Ni dominated inhalation exposure across all sites, contributing 98.6% (S1), 96.1% (S2), and 20.7% (S3) of total ADD. In contrast, Cr was the primary contributor in S3 (77.0%). Other metals (Co, Se, and Be) contributed less than 2% across all sites.

Conclusions: Overall, Ni and Cr were the primary contributors to exposure, with marked variation observed across the sites. These findings indicate notable occupational exposure to hazardous metals in e-waste recycling environments and highlight the need for further investigation into exposure pathways and body burden, as well as the implementation of effective control measures to protect worker health.

Keywords: E-waste; Workplace; Air pollution; Trace elements; Risk assessment

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Exposure duration and latency as key determinants of mesothelioma risk: patterns across populations in a global meta-analysis

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Introduction: Mesothelioma remains a major occupational health concern due to its long latency and poor prognosis. However, how exposure duration and time since first exposure influence risk across occupational settings is not well characterized. This study aimed to evaluate the roles of exposure duration and latency in shaping mesothelioma risk across occupational subgroups.

Materials and Methods: We conducted a global systematic review and meta-analysis of studies published up to January 2026 across five databases. Eligible studies included occupational or environmental asbestos-exposed populations reporting exposure duration, latency, and mesothelioma outcomes. Random-effects models were used to estimate pooled risks, and subgroup analyses were performed by exposure duration, latency, fiber type, and population characteristics.

Results: Ninety-two studies (2.22 million individuals) were included. Mesothelioma risk increased with both longer exposure duration and latency. Among workers, exposure ≥22 years was associated with higher risk than <22 years (relative risk [RR] = 6.02, 95% confidence interval [CI]: 4.37–8.29 vs. RR = 3.50, 95% CI: 2.55–4.80), while latency ≥40 years was associated with increased risk (RR = 4.02, 95% CI: 2.96–5.46 vs. RR = 2.10, 95% CI: 1.58–2.79). These gradients were consistent across subgroups, including fiber types and geographic settings. Stronger associations were observed for non-pleural mesothelioma and among females, with higher risks also seen in more recent exposure periods.

Conclusions: Exposure duration and latency are key time-related determinants of mesothelioma risk across occupational populations. These findings provide quantitative evidence to inform risk stratification, guide long-term surveillance, and support occupational health policy in asbestos-exposed populations.

Keywords: Mesothelioma; Asbestos exposure; Occupational health; Exposure duration; Latency; Meta-analysis

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Construction of a musculoskeletal job-exposure matrix in Korea

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Introduction: Musculoskeletal disorders (MSDs) are a major occupational health issue in Korea; however, a standardized job-exposure matrix (JEM) has not been established. This study aimed to develop an MSD-specific JEM using data from the Korean Working Conditions Survey (KWCS) to evaluate exposure time proportion by job category and body segment.
Materials and Methods: Data from the 2nd to 6th KWCS (2006–2020), covering 210,500 workers, were analyzed. The jobs of the subjects were reclassified based on the unit groups of the 7th Korean Standard Classification of Occupations (KSCO). Exposure time proportion for key MSD risk factors—repetitive movements, awkward postures, heavy lifting, and prolonged standing—was categorized as high, moderate, or low based on self-reported responses. Validity was assessed through expert review and statistical analysis, including Cohen's kappa coefficients and logistic regression.
Results: Duration-based exposure to musculoskeletal (MS) risk factors was estimated for each occupation. The JEM classified exposure time proportion for three body regions: upper extremities and neck, lower back, and lower extremities. Expert review showed high agreement for the upper extremities and neck and for the lower back (kappa > 0.8), whereas agreement was lower for the lower extremities. Logistic regression analysis showed dose–response relationships between body region-specific exposure intensities derived from the JEM and musculoskeletal symptoms in the neck, upper extremities, and lower back.
Conclusions: This study developed Korea's first MS-specific JEM, providing a standardized framework for occupational MSD risk assessment. The JEM demonstrated strong validity for most body regions and can be a valuable tool for research, workplace risk evaluation, and policy development. Further refinements incorporating detailed job classifications and ergonomic factors are recommended to enhance its applicability.

Keywords: Exposure assessment; Job classification; Risk assessment; Ergonomic risk factors; Exposure-response relation-ship; Workplace risk evaluation

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Reversible standard threshold shift among vector control workers: insights from audiometric surveillance and noise risk assessment

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Introduction: Occupational noise exposure is a recognized hazard in vector control activities, particularly during fogging operations. Standard Threshold Shift (STS) serves as an early indicator of noise-induced hearing loss and reflects the effectiveness of hearing conservation programmes (HCP).

Materials and Methods: A cross-sectional medical surveillance of 25 vector control workers involved in fogging activities was conducted in 2023. Baseline audiometry was performed using a certified mobile audiometric service. Workers identified with STS were temporarily removed from work and scheduled for repeat audiometry after three months. Noise Risk Assessment (NRA) was conducted in compliance with the Occupational Safety and Health (Noise Exposure) Regulations 2019 to evaluate area and personal noise exposure levels.

Results: Three workers initially identified with STS had bilateral STS with apparent hearing impairment (n=2) and bilateral STS without established hearing loss (n=1). Although initial average hearing thresholds at 0.5, 1, 2, and 3 kHz exceeded 25 dB, the normalization on follow-up indicated these changes were transient and consistent with temporary threshold shifts rather than permanent hearing loss. NRA revealed that fogging employees were exposed to noise levels exceeding the Excessive Noise Level (ENL) of 82 dB(A) and Daily Noise Exposure Limit (DNEL) of 85 dB(A) for 8 hours, while remaining below the Maximum Sound Pressure Level (MSPL) of 115 dB(A) and Peak Sound Pressure Level (PSPL) of 140 dB(C). Operational challenges included personal protective equipment (PPE) compliance, outbreak-related workforce constraints, and logistical issues in repeat testing.

Conclusions: This study highlights the occurrence of reversible STS among vector control workers and underscores the importance of timely surveillance, follow-up, and control measures. Early detection and intervention can prevent progression to permanent hearing loss, emphasizing the need to strengthen HCP and address compliance challenges.

Keywords: Standard threshold shift; Reversible standard threshold shift; Occupational noise; Vector control workers; Hearing conservation

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Risk factors associated with heat related illness among cultivated agriculturists in Thailand

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Introduction and Objective: This cross-sectional study investigated factors associated with occupational heat-related sun exposure causing adverse health outcomes, heat stress, and illnesses among plantation farmers.
Materials and Methods: A total of 451 cultivated agriculturists from the Northeast region of Thailand were selected as part of a larger study involving four provinces in Northeast Thailand. Data collection was conducted across two seasons (December 2020–January 2021 and December 2021–April 2022) using questionnaires and measurements of heat with a Wet Bulb Globe Thermometer (WBGT), humidity, and air velocity. Factors significantly associated with high risk of heat-related illness were analyzed by multiple logistic regression analysis to present adjusted Odds Ratios (ORadj) and 95% confidence intervals (95% CI) at p-value <0.05.
Results: Most participants were sugarcane farmers, aged between 41–50 years, educated to primary school level, and working 4–8 hours per day. The average (range) WBGT was 31.63°C (26.60–33.90°C), which represents a moderate heat exposure level compared to Thai labor regulations. Air velocity ranged from 0.25–6.79 m/s, and relative humidity ranged from 31.60%–80.00%. Most cultivated agriculturists were at a high health risk level (38.58%), requiring thorough investigation and risk reduction, followed by medium risk (26.16%). Factors associated with high health risk were: farming area greater than 16,000 square meters (ORadj=1.78, 95% CI: 1.11–2.86), heat exposure exceeding 3 hours per day (ORadj=2.32, 95% CI: 1.04–5.17), high relative humidity (ORadj=0.48, 95% CI: 0.29–0.81), exposure to reflective surface areas (ORadj=2.95, 95% CI: 1.86–4.68), never having received training about heat stress (ORadj=6.32, 95% CI: 1.84–21.65), and rapidly drinking large amounts of water (ORadj=3.22, 95% CI: 1.77–5.87).
Conclusions: Cultivated agriculturists at high risk of heat-related illness must be made aware of preventive measures to reduce risk, including avoiding work during the hottest times of the day and minimizing exposure to reflective surface areas. Training should be provided to change their practices, including increasing break times during work under the sun.

Keywords: Cultivated agriculturist; WBGT; Risk assessment; Heat-related illness

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Development and application of the latex-free risk assessment (LFRA) framework for workplace environments: institutional risk mapping and mitigation strategies

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Introduction: Healthcare personnel and patients continue to be at risk of exposure to airborne latex proteins, particularly in high-use clinical environments, despite widespread adoption of powder-free and synthetic glove alternatives. A standardized hospital-wide risk assessment framework that maps areas with the highest potential for latex allergen exposure is lacking. This study aims to develop and implement a structured Latex-Free Risk Assessment (LFRA) framework to evaluate occupational latex exposure within diverse hospital departments and guide targeted mitigation strategies.

Materials and Methods: Risk assessment was conducted across seven clinical departments of a tertiary hospital using a Risk Priority Number (RPN) derived from severity, likelihood, and detectability parameters of the latex allergen. Environmental conditions, product inventory, ventilation systems, and administrative controls were evaluated using a standardized checklist.

Results: High-risk units, such as the operating theater (RPN 125) and labor room (RPN 80), accounted for 64%–100% of total RPN scores, associated with frequent glove usage and shared ventilation systems. Intermediate-risk areas, including intensive care units and the emergency department (RPN 60 each, 48%), also demonstrated notable exposure potential. Lower-risk outpatient and ward-based settings recorded RPNs of 15-30 (≤24%), reflecting more consistent latex substitution practices. Key gaps included inadequate segregation and substitution of latex products, limited designation of 'latex-safe' zones, and insufficient engineering controls.

Conclusions: The LFRA findings informed the development of a structured latex-safe transition plan, encompassing engineering controls, product substitution, administrative measures, and modifications to work practices. The LFRA framework facilitated the prioritization of high-risk areas and the alignment of interventions with identified exposure pathways.

Keywords: Latex-safe risk assessment; Latex allergy; Occupational exposure; Hospital safety; Risk assessment model; Institutional strategies

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Assessment of occupational noise exposure among intensive care unit personnel

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Introduction: Intensive Care Units (ICUs) are acoustically complex settings in which constant monitoring, alarms, and clinical activity produce persistent noise. Although occupational noise laws focus on cumulative exposure, these measurements may underestimate the functional and psychological significance of transitory high-intensity noise encountered by ICU personnel.
Objectives: This study sought to describe personal noise exposure, perceived noise disturbance, and psychological effects among nurses and doctors in an ICU, as well as to compare these exposures to the Malaysian occupational noise standard.
Materials and Methods: Cross-sectional research was undertaken at a tertiary hospital in Kuantan, Pahang, with 65 ICU staff (47 nurses and 18 doctors). Personal noise exposure was monitored using calibrated dosimeters, which recorded LEX.8h, LASmax, LCpeak, and DoseTc. Participants filled out the Noise Perception in ICU questionnaire, the ICOP checklist for excessive noise, and the Hospital Anxiety and Depression Scale (HADS). Descriptive statistical methods were employed to analyse the data, with findings expressed as mean and median values.
Results: Most assessed noise exposure parameters were within the Noise Exposure Limit established by the Occupational Safety and Health (Noise Exposure) Regulations 2019, although isolated exceedances of peak and maximum levels were identified. Nurses had higher mean cumulative exposure (LEX,8h = 65.2 ± 6.3 dB(A)) compared to doctors (63.5 ± 7.5 dB(A)). Maximum (LASmax) and peak (LCpeak) sound pressure levels were generally within recommended limits; however, isolated exceedances were observed, including LASmax values of 115.1 dB(A) and 116 dB(A) in a doctor and a nurse, respectively, and an LCpeak of 144.5 dB(C) recorded in a doctor. Despite overall compliance with regulatory thresholds, intermittent high-intensity noise events were evident. Medical equipment alarms were identified as the primary source of noise disturbance. Although most participants perceived ICU noise levels as moderate, some reported communication difficulties and reduced concentration.
Conclusions: Although occupational noise exposure levels were within regulatory limits, the presence of transient high-intensity noise highlights a potential under-recognized occupational hazard that was marked by clinically relevant impulsive noise that imposed functional and perceptual costs. These findings underscore the importance of noise management techniques tailored to the ICU, in addition to cumulative exposure indicators.

Keywords: Intensive care unit (ICU); Healthcare workers; Occupational noise; Noise exposure

Oral Presentation

O15 Occupational Health and Safety Risk Assessment

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Making safety technology work: a framework for assessing the effectiveness of emerging technologies in industrial safety

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Introduction: Work-related deaths and injuries continue to impose a significant global burden, with approximately 2.9 million fatalities annually and hundreds of millions of non-fatal injuries. Despite rapid advances in emerging technologies, their adoption for improving occupational safety and health (OSH) remains limited. A key barrier is the lack of clear, comparable evidence on the effectiveness of different safety technology solutions, particularly in relation to their impact on hazards, likelihood of occurrence, and severity of consequences.

Materials and Methods: This study develops a practitioner-oriented analytical framework to assess the effectiveness of safety technologies. The framework integrates the Hierarchy of Controls with three core elements of industrial safety risk (hazards, likelihood, and severity), and classifies technologies into four categories: Prevention, Precaution, Prediction, and Protection (the "4Ps"). The approach is informed by literature review, existing classification systems, and engagement with an international community of industrial safety practitioners.

Results: The framework enables systematic comparison of diverse safety technology solutions by linking technology types to their primary mechanisms of risk reduction. Prevention technologies, which directly eliminate or reduce hazards, are identified as the most effective, while Protection measures primarily mitigate consequences. Application of the framework to a case study of over 19,000 patented technologies addressing fall-from-height risks demonstrates its utility in classifying solutions and identifying trends, including a shift from traditional mechanical systems towards digitally enabled monitoring and predictive tools.

Conclusions: The proposed framework provides an actionable tool to support more informed decision-making in the adoption of safety technologies. By improving the visibility of expected safety outcomes and enabling structured comparison across solutions, it helps bridge the gap between technological innovation and practical implementation. This contributes to advancing proactive, data-driven approaches to industrial safety and supports practitioners, policymakers, and technology providers in prioritising effective interventions.

Keywords: Industrial safety; Safety technology; Occupational health; Emerging technologies; Risk management; Hierarchy of controls

Oral Presentation

O16 Safety in the Workplace

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Application of the nominal group technique in identifying themes and domains for a safe and healthy hospital index in public hospitals

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Introduction: Hospitals are complex and high-risk environments where failures in patient, staff, and environmental safety can lead to serious harm. However, existing safety frameworks are often fragmented and not well adapted to the context of public hospitals in Malaysia. Therefore, this study aims to systematically identify and prioritise key themes and domains to support the development of a comprehensive and context-specific Safe and Healthy Hospital Index.

Methods: A structured Nominal Group Technique (NGT) was conducted with purposively selected multidisciplinary experts, including hospital administrators, quality officers and occupational safety and health practitioners. Participants had extensive experience in hospital operations and safety governance. The NGT followed four phases: silent idea generation, round-robin sharing, clarification and consolidation, and independent ranking. Prioritised themes were mapped against established frameworks and current evidence to derive locally relevant domains. This approach emphasised methodological rigour, stakeholder inclusivity and contextual adaptability.

Results: A total of 12 themes were identified and prioritised. Key themes included Governance & Leadership, Training & Competency, Policy & Procedures, Safety culture, Human Resource management, Risk management, Environmental safety, Teamwork, Security, Staff well-being, Surveillance and Feedback for improvements. These were synthesised into six domains: Organisation and Management, Human Resource Development and Management, Policies and Procedures, Facilities and Equipment, Safety and Performance Improvement Activities and Special Requirements. The findings highlight an innovative integration of traditionally siloed safety domains into a cohesive, systems-based framework, enhancing its relevance for comprehensive safety management and practical application in healthcare settings.

Conclusions: NGT facilitated robust expert consensus, producing domains grounded in real-world practice and aligned with contemporary safety priorities. The resulting framework is innovative in its integration, directly applicable across diverse public hospital settings and scalable for nationwide implementation and benchmarking.

Keywords: Safe and healthy hospital index; Nominal group technique; Hospital safety; Occupational health; Patient safety; Safety culture

Oral Presentation

O16 Safety in the Workplace

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Strengthening hospital accreditation performance: evidence from non-conformity findings during MSQH surveys in Malaysian public hospitals

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Introduction and Objective: Hospital accreditation, defined as a self-assessment and external peer review process, is essential for evaluating performance against established standards and ensuring continuous improvement in healthcare quality. In Malaysia, the Ministry of Health (MOH) has implemented an accreditation program since 1993, utilizing standards set by the Malaysian Society for Quality in Health (MSQH) to ensure safe and high-quality care. Despite these efforts, certain service areas consistently underperform. This study aims to identify the specific service standards most frequently contributing to low ratings (ratings of 1 and 2) during MSQH surveys in MOH hospitals, explore the underlying challenges leading to non-compliance, and suggest improvements to address these gaps.

Methods: This retrospective study analysed secondary data from MSQH accreditation reports of 70 MOH hospitals assessed between 2020 and 2024 using the fifth and sixth editions of the standards. The sample included 34 primary hospitals, 21 tertiary hospitals, and 15 secondary hospitals. Service standards receiving a rating of 2 or less (indicating less than 59% compliance) were identified from survey summaries, and contributing factors were categorized based on surveyor findings and comments.

Results: Out of 145 MOH hospitals, 48.27% underwent surveys during the study period. Three service standards consistently recorded the highest frequency of underperformance: Standard 2 (Environmental and Safety Services) with 17 low ratings, followed by Standard 3 (Facility and Biomedical Equipment Management and Safety) and Standard 19 (Central Sterilising Supply Services), both with 14 low ratings. Primary concerns for Standard 2 included untrained or unregistered security personnel and inadequate fire safety. Standard 3 was hindered by poor asset management, missing as-built drawings, and inadequate ventilation monitoring. Standard 19 non-conformances were primarily driven by poor zoning (lack of separation between sterile and contaminated areas), non-functioning autoclaves, and inadequate environmental controls.

Conclusions: The findings indicate that significant weaknesses exist in safety, infrastructure, and equipment maintenance rather than clinical care alone. Applying the 4M (Manpower, Methods, Machines, Materials) and POLC (Planning, Organising, Leading, Controlling) frameworks reveals systemic issues such as competency gaps, poor documentation, and the continued use of equipment beyond economical repair. Weaknesses in leadership and internal monitoring further exacerbate these gaps. To strengthen accreditation performance, a coordinated strategy involving MOH headquarters and hospital administration is necessary. This must include ongoing competency-based training, enhanced investment in building infrastructure, and more robust asset replacement planning to ensure the delivery of safe healthcare services.

Keywords: Hospital accreditation; MSQH standards; Ministry of health Malaysia; Non-conformity findings; Patient safety and quality

Oral Presentation

O17 Digital Transformation and Work

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Utilisation of telemedicine among offshore healthcare workers and its influencing factors

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Introduction: Telemedicine has become an essential tool for providing healthcare to offshore workers. Despite its advancements, there is still a lack of understanding about its optimal use and the factors affecting it among healthcare providers in offshore settings. This study aimed to determine the level of telemedicine utilisation among offshore healthcare workers and its associated factors in Malaysia.

Methods: In this cross-sectional study, online questionnaires were distributed to healthcare workers involved in offshore medical services. The questionnaire included sociodemographic information and the validated Malay version of the Telemedicine Acceptance Model (TAM) Questionnaire. A total of 73 offshore healthcare workers were recruited from an Oil and Gas workers association and freelance offshore medics using universal sampling. Data analysis involved descriptive statistics as well as simple and multiple logistic regression.

Results: A total of 65.8% of offshore healthcare workers reported using telemedicine in their practice. Multiple logistic regression analysis indicated that Chinese and Indian workers were significantly more likely to use telemedicine compared with Malay workers, with adjusted odds ratios of 32.11 ($p = 0.045$) and 33.51 ($p = 0.037$), respectively. Workers with a good attitude toward telemedicine had 11.84 times higher odds of utilisation ($p = 0.004$), while those with high behavioural intention were 25.80 times more likely to use telemedicine compared with their counterparts with low behavioural intention ($p < 0.001$).

Conclusions: A majority of offshore healthcare workers utilise telemedicine, with Chinese and Indian ethnicity, good attitude, and high behavioural intention significantly predicting its utilisation.

Keywords: Telemedicine; Utilisation; Offshore; Healthcare; Behaviour

Oral Presentation

O17 Digital Transformation and Work

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An examination of the current status of PHR utilization in the field of occupational health and factors promoting and hindering its adoption

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Objectives: Personal Health Records (PHR) allow individuals to manage and share their health, medical, and care data. While Japanese companies have been legally required to conduct health exams since 1972, data management has traditionally been paper-based. This study aims to clarify the current status of digital PHR utilization in occupational health and identify the factors promoting or hindering its adoption.

Methods: A cross-sectional online survey was conducted via Cross Marketing Inc., targeting 200 certified industrial physicians who perform occupational medical activities at least once a month and utilize PHRs. The survey evaluated demographics, actual usage, benefits, promoting factors, barriers, and future needs.

Results: The survey revealed that 81.5% of respondents utilize PHRs with a full understanding of the system. Key applications include reviewing health checkup results, tracking lifestyle data, and performing work eligibility assessments.

Benefits and Barriers:

- Benefits: Quick and accurate access to health data, improved precision in health guidance, enhanced employee health awareness, and increased operational efficiency.
- Barriers: Poor UI/UX, high implementation costs, privacy concerns, and insufficient integration with existing systems—particularly challenging for small to medium-sized workplaces.

Future Requirements: Respondents emphasized the need for standardized data platforms, strengthened security, and better education for employers. Notably, 83.5% expressed a desire to further promote PHR use, highlighting interests in AI-based risk analysis and government support.

Conclusions: PHRs significantly improve the quality of occupational health activities. To ensure widespread adoption, it is essential to focus on enhancing system usability, standardizing data integration, and providing educational support for non-users.

Oral Presentation

O17 Digital Transformation and Work

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e-Health system - digital transformation that drives occupational health and wellness agenda

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Introduction: Large organizations face persistent challenges in managing workforce health risks, including fragmented data, paper-based processes, confidentiality concerns, and limited employee engagement. To address these gaps, PETRONAS implemented a comprehensive digital transformation through the e-Health System. This initiative aimed to modernize occupational health management by integrating standardized health assessments, advanced analytics, and employee self-service capabilities, while simultaneously promoting personal ownership of health and wellbeing.

Materials and Methods: The PETRONAS e-Health System is a customized Software-as-a-Service (SaaS) platform developed between 2014 and 2016 and continuously enhanced through 2025. The system supports end-to-end health assessment management, including Fitness-to-Work, Medical Surveillance, Preventive Health Screening, Substance Misuse Testing and vaccination records management. It serves approximately 40,000 employees across 34 facilities and selected international operations. Core users include occupational health and human resource enablers, medical examiners, and employees. The system was designed based on seven key principles, i.e., Systematic, streamlined, simplified, synergistic, secure, sustainable, and cost-effective and integrated with human resources and relevant HSE systems. Comprehensive stakeholder engagement and structured change management supported system adoption.

Results: The e-Health System processes over 15,000 health assessments annually and significantly improved operational efficiency. Health assessment turnaround time was reduced from three weeks to three days, achieving up to 85% process efficiency. Annual cost savings of approximately RM 1.8 million were realized through consolidating multiple health assessments and clinic visits for each employee, alongside RM 154,000 in reduced administrative workload and a 92% reduction in paper-related costs. Real-time dashboards and analytics enhanced compliance monitoring, data security, and targeted health interventions.

Conclusions: Implementation of the PETRONAS e-Health System demonstrates that digital health platforms can effectively transform occupational health management at scale. By combining secure data analytics, process automation, and employee empowerment, the system delivers measurable efficiency, cost savings, and risk reduction while fostering a culture of health ownership. This approach provides a scalable and sustainable model for future advancements in occupational health, including predictive analytics and artificial intelligence enabled interventions.

Oral Presentation

O18 Climate Change and Work

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COMmunity-based behavior and attitude survey in Tuvalu (COMBAT): precision planetary health under climate change

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Tuvalu is a country facing a triple threat of climate change, an obesity pandemic and food insecurity. Agricultural workers are essential to the whole Tuvaluan society and their human-being, as they sustain the resilience of food systems. However, the people are experiencing a decline in arable land size, and the health needs of Tuvaluan people remain under-studied and inadequately addressed. My research and practice focus on reducing health disparities arising from environmental and occupational exposures among agricultural workers, particularly among populations with higher susceptibility to climate change. The work aims to develop tailored, culturally sensitive and evidence-based interventions that account for diverse sociodemographic and health contexts for agricultural workers in Tuvalu.

In the first part of the presentation, I will present the initiation of the Community based Attitude and Behavior Survey in Tuvalu (COMBAT) in 2020. I will mention the aims of the study and the main pillars of the study. Also, I will discuss the international, multidisciplinary collaboration with multiple stakeholders, especially the ongoing works to control obesity and its related diseases in the context of climate change. Lastly, I will show the current enrollment status, demographic characteristics, ongoing analysis and follow up plans for the COMBAT study population.

In the second part of the presentation, I will present findings from the COMBAT study population since its initiation. Our findings suggest that home gardening is associated with lower body mass index and reduced odds of obstructive sleep apnea in this resource-limited setting. These findings suggest that engagement in active agricultural work may confer certain health benefits among subsistence agricultural workers. Additionally, prenatal rainfall exposure was associated with a higher likelihood of obesity in adulthood, potentially reflecting climate-related impacts on food systems and early-life nutrition. Together, these studies underscore a Total Worker Health perspective in which occupational, environmental, and livelihood factors are deeply interconnected among subsistence agricultural workers in Tuvalu. Ongoing longitudinal follow-up within the COMBAT study aims to inform sustainable, community-driven interventions that support climate change adaptation and promote health equity among vulnerable working populations.

Overall, we conducted a community-based survey in collaboration with multiple stakeholders to advance health in Tuvalu. Active engagement in agricultural work was associated with potential health benefits among subsistence agricultural workers in Tuvalu. Also, we identified the environmental factors that may influence population health in this population. Together, these ongoing cohort studies provide context-specific evidence to advance population health among agricultural workers in Tuvalu.

Keywords: Climate change; Planetary health; Agriculture; Cohort

Oral Presentation

O18 Climate Change and Work

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Climate-responsive and risk-ready: institutionalizing work environment monitoring in a regional Philippine apex hospital

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Background: Climate change is intensifying heat exposure, humidity, and air quality variability in the Southwestern Philippines. Hospitals, particularly those with open ward designs common in tropical public facilities, face increased environmental stress that affects both healthcare workers and admitted patients. Rising temperatures and fluctuating ventilation conditions heighten risks of heat stress, impaired indoor air quality, and infection vulnerability. To address these climate-driven challenges, a 500-bed regional apex hospital institutionalized a structured Work Environment Monitoring (WEM) program to strengthen adaptive risk management.

Objectives: To assess the effectiveness of institutionalized WEM in identifying climate-related environmental hazards and enhancing occupational and patient safety resilience.

Materials and Methods: A descriptive program evaluation (2023–2025) was conducted across high-risk hospital units, including operating rooms, laboratories, radiology, engineering services, and open and enclosed wards. Environmental parameters monitored included heat index, temperature variability, indoor air quality (CO_2, particulate matter), noise levels, illumination, and ventilation performance using calibrated instruments. Measurements were benchmarked against Philippine Occupational Safety and Health Standards and international guidelines. Corrective measures followed the hierarchy of controls. Pre- and post-intervention indicators included compliance audits, heat-related symptom reports, and workplace complaints.

Results: Monitoring revealed climate-amplified heat stress in enclosed workspaces and open wards, where natural ventilation proved inadequate during extreme heat events, affecting both staff and patients. Ventilation inefficiencies compromised indoor air quality, and episodic noise exposure persisted in technical areas. Engineering modifications, administrative controls, and environmental adjustments improved thermal comfort, airflow efficiency, compliance metrics, and reduced heat-related symptoms and staff complaints. Strengthened ward ventilation also supported infection prevention amid climate-sensitive disease risks.

Conclusions: Institutionalizing WEM provides a practical, climate-adaptive strategy for safeguarding healthcare workers and patients. Embedding environmental surveillance within hospital governance enhances occupational protection, patient safety, and health system resilience in climate-vulnerable tropical settings.

Keywords: Climate change; Occupational exposure; Environmental monitoring; Air pollution; Indoor; Heat stress disorders

Oral Presentation

O18 Climate Change and Work

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Assessing of the impact of heatwaves and extreme temperatures on the health and well-being of primary school students in Selangor

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Heatwaves and extreme temperatures can pose a threat to human health and well-being. School students are among the vulnerable groups due to their exposure to high temperatures. This may result in significant health issues for them, and interfere with their academic performance and physical activities. This study aims to: (i) measure temperature and heat stress in school areas affected by heatwaves and extreme temperatures; (ii) assess the relationship between the exposure and awareness levels of primary school students regarding heatwaves and the impact on their health and well-being; and (iii) propose adaptation strategies to cultivate awareness of heatwave and extreme temperature hazards among primary school students, while establishing preventive steps via awareness campaigns. The study utilizes secondary data from the Malaysian Meteorological Department to identify schools affected by heatwaves and extreme temperatures, followed by onsite measurements of temperature and heat stress at selected schools to determine students' exposure levels and assess heatwave conditions. Questionnaires were distributed to collect information on the impact of heatwaves on student health and well-being. Interview sessions were also conducted with school staff. Data were analyzed using descriptive statistics, Chi-square tests, and Spearman's rho correlation at a significance level of 0.05. The analysis indicates that the level of awareness requires attention (with a coefficient value of $p < 0.05$) to ensure children are better prepared for heatwaves and high temperatures, compared to exposure. Therefore, proactive measures, such as interventions in disseminating information to students and teachers regarding the symptoms and negative impacts of heatwaves and extreme temperatures through health campaigns, are highly necessary. This study is expected to provide vital information to enable responsible parties to plan control and prevention measures to protect school students. This research aligns with the Sustainable Development Goals (SDG) and supports the national focus on developing *Bandar Idaman* as healthy cities for Malaysians.

Keywords: Adaptation strategies; Environmental health; Extreme temperatures; Heatwaves; Public health; School children

Oral Presentation

O18 Climate Change and Work

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From exposure to prevention: integrating heat stress monitoring to mitigate cardiovascular events among workers in occupational setting

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Introduction: Climate change has amplified the frequency and severity of heat exposure for workers in occupational settings, particularly in tropical and high-risk industries. Heat stress is highly recognized as a significant contributor to cardiovascular strain, triggering acute events such as myocardial infarction, arrhythmias, and sudden cardiac death among workers. Despite growing awareness, preventive strategies remain insufficiently implemented. This study explores the role of heat stress monitoring as a proactive approach to mitigate cardiovascular events in the workplace.

Methods: A mixed-methods approach was applied, combining a review of recent literature (2021–2025) with field observations from high-heat occupational environments in the Oil and Gas Industry. Data on environmental heat exposure (e.g., Wet Bulb Globe Temperature), physiological parameters (heart rate, hydration status), and incident reports of cardiovascular events were synthesized. Monitoring practices and intervention frameworks were analyzed to evaluate their effectiveness in risk reduction.

Results: Evidence indicates a clear association between elevated heat exposure and increased cardiovascular events among workers. Real-time heat stress monitoring, particularly when integrated with physiological surveillance, enables early identification of high-risk conditions and individuals. Implementation of heat alert systems, work-rest cycles, hydration protocols, and acclimatization programs significantly reduced the incidence of heat-related cardiovascular events. However, gaps remain in standardization, worker compliance, and integration into occupational health systems.

Conclusions: Heat stress monitoring represents a critical and actionable strategy for preventing cardiovascular events in the context of climate change. Integrating environmental and physiological monitoring into occupational health programs can enhance early detection and timely intervention. Strengthening policies, improving worker education, and leveraging digital health technologies are essential to safeguard worker cardiovascular health in a warming world.

Keywords: Climate change; Heat stress; Cardiovascular events; Heat-stress monitoring

Oral Presentation

O18 Climate Change and Work

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Beat the heat: adaptive mitigation strategies for building climate resilience among outdoor workers in Kota Kinabalu, Sabah, Malaysia

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Introduction: Escalating global temperatures have intensified occupational heat-related health risks. This study evaluates the efficacy of the Heat-Awareness-Educational-and-Informative Tool (HAEIT) in reducing symptomatic morbidity and physiological heat strain among municipal outdoor workers.

Materials and Methods: A mixed-method study was conducted with 394 participants, incorporating both structured and open-ended questionnaires. Environmental stressors were quantified using iButton temperature loggers and Wet Bulb Globe Temperature (WBGT) heat-stress trackers. Physiological strain was longitudinally assessed via continuous heart rate monitoring using smartwatches. The intervention phase integrated the Heat-Awareness Educational and Informative Tool (HAEIT), with the strategic distribution of personalized heat-reduction kits (water bottle, handheld fan, cooling towel, and a heat-symptoms monitoring booklet). A follow-up assessment was conducted three months post-intervention. Statistical analysis was performed using SPSS v.28, employing RM-ANOVA, McNemar's tests, and paired t-tests to evaluate longitudinal outcomes and validate the study's hypotheses.

Results: Mean daily WBGT (31.2±0.4°C) consistently exceeded the recommended threshold limit range (26.0°C–30.5°C), confirming high-risk exposure to heat stress. Post-intervention, the prevalence of heat strain significantly declined from 34.0% to 13.5% (p<0.001). Significant reductions (p<0.001) were observed across all clinical symptoms, including headaches, dizziness, fatigue, muscle pain, heat rash, and reduced concentration. Post-intervention, participants exhibited significant behavioural modification, characterized by optimized hydration kinetics, increased frequency of recovery breaks, and the systematic adoption of heat-mitigation protocols. Qualitative feedback indicated a profound enhancement in heat-health literacy and self-efficacy. Additionally, the heat-reduction kits were validated by participants as practical and effective instruments for real-time heat-stress management.

Conclusions: This preliminary study demonstrates that the integration of HAEIT alongside modular heat-reduction kits provides a robust framework for occupational health optimization. The findings underscore the potential of these interventions as sustainable, cost-effective, and scalable solutions for mitigating thermal-related morbidity in outdoor workplace environments.

Keywords: Heat awareness, educational and informative tool; Heat-reduction-kit; Heat-related symptoms; Heat strain; Municipal workers

Oral Presentation

O18 Climate Change and Work

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Evaluating healthcare facility vulnerability and preparedness to heatwaves: evidence from the central region of Malaysia

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Introduction: Climate-related hazards, particularly heatwaves, are increasing in frequency and intensity, posing growing challenges to healthcare systems. Healthcare facilities are expected to remain functional during extreme heat events, yet evidence on facility-level vulnerability remains limited. This study aimed to assess the vulnerability of healthcare facilities to heatwaves using a structured assessment framework.

Methods: A cross-sectional study was conducted among 53 public healthcare facilities in the Central region of Peninsular Malaysia. Participants included personnel from District Health Offices, clinical representatives, and engineers. A climate vulnerability assessment tool was used to evaluate three domains: exposure, sensitivity, and adaptive capacity. Exposure captured local climate conditions and heatwave occurrence, while sensitivity reflected facility characteristics indicating susceptibility to heat-related impacts. Adaptive capacity assessed preparedness across four components: health workforce, water, sanitation, hygiene and waste management (WASH), energy systems, and infrastructure. A composite heatwave vulnerability index was calculated to classify facilities into low, moderate, high, and very high vulnerability categories. Spearman correlation was used to examine the association between domains and overall vulnerability.

Results: Overall, heatwave vulnerability across healthcare facilities was predominantly moderate (VI range: 0.28 – 0.53), with three facilities approaching high vulnerability (VI ≥ 0.5). Exposure levels were relatively uniform, with slightly higher values observed in urban areas (index range: 0.25 – 0.57), owing to a higher frequency of heatwaves and higher average temperatures. Sensitivity level was generally high (index range: 0.29 – 0.82), reflecting workforce constraints, ageing infrastructure, and operational strain. Most facilities demonstrated moderate to high adaptive capacity, particularly in health workforce and WASH (median indices: 0.91 and 0.90). However, energy systems (median index: 0.80) and infrastructure (median index: 0.61) showed lower preparedness. Correlation analysis showed that exposure had a strong positive association with overall vulnerability ($r = 0.859$), while sensitivity demonstrated a moderate association.

Discussion: Despite baseline preparedness, residual vulnerability persists due to gaps in operational capacity and system reliability. High sensitivity, combined with lower adaptive capacity in infrastructure and energy systems, highlights the need to strengthen facility resilience to ensure safe working conditions and sustained service delivery during increasing heat stress.

Keywords: Climate change; Health facilities; Disaster preparedness, heatwaves

Oral Presentation

O18 Climate Change and Work

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Performance evaluation of a novel membrane-encapsulated evaporative cooling device for heat stress and fever management in a hot and humid climate

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Introduction and Objectives: Heat stress in occupational environments and the clinical management of fever both represent critical physiological challenges requiring effective, rapid, and sustained thermal regulation. Traditional cooling textiles and garments often rely on temporary, damp fabrics that lack sustained efficacy, cause user discomfort due to wetness, and rapidly lose their cooling potential in environments with high atmospheric moisture. To address these substantial limitations, a novel evaporative cooling device was developed featuring a unique sealed, refillable liquid reservoir integrated with a semipermeable membrane. This innovative design harnesses both fluid and thermodynamics to allow water vapor to escape and draw heat away from the body with free-moving liquid while keeping the bulk liquid securely contained, thereby providing a continuous, dry-touch cooling experience. The primary objective of this study was to rigorously evaluate the cooling efficacy and stability of this newly developed prototype under the local hot and humid climate of Malaysia, assessing its viability for both industrial workers and clinical patients.

Methods: A functional prototype of the membrane-encapsulated evaporative cooling device was subjected to field testing in an outdoor setting characterized by high ambient temperatures and severe humidity, which are conditions that typically impede natural evaporation. The device was applied to targeted body areas known for rapid heat exchange, such as the forehead and neck regions. Surface temperatures were continuously monitored and recorded using thermal sensors over an extended period. These measurements were taken both with and without the application of the cooling device to establish a clear baseline and determine the net cooling effect.

Results: The field testing revealed a highly consistent and significant reduction in localized surface temperatures upon application of the device. Despite the restrictive and heavily saturated atmospheric conditions, the prototype successfully achieved and maintained a steady surface temperature drop of four degrees Celsius compared to the control conditions. Furthermore, the semipermeable membrane effectively facilitated continuous vapor release without any liquid leakage, ensuring the contact surface remained entirely dry throughout the testing duration. Discussion and

Conclusions: The novel semipermeable evaporative cooling device demonstrated exceptionally reliable performance, effectively lowering surface temperatures by four degrees Celsius even in the presence of challenging high humidity. By utilizing a securely sealed reservoir mechanism combined with vapor-permeable technology, the device successfully overcomes the fundamental limitations of traditional wet textiles, preventing skin maceration and user discomfort. These compelling findings suggest that the device is a highly viable and superior intervention for mitigating occupational heat stress among workers in tropical climates. Furthermore, its dry-touch and sustained cooling properties make it a highly promising non-pharmacological tool for the management of fever in clinical and domestic settings. Further extensive studies are strongly recommended to quantitatively assess clinical efficacy for febrile patients, evaluate long-term user comfort, and test structural durability across various rigorous industrial applications.

Keywords: Evaporative cooling; Semipermeable membrane; Heat stress; Fever management; Occupational health

Oral Presentation

O18 Climate Change and Work

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Occupational health and safety risks arising from natural hazards and extreme weather events: implications for organizational resilience

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Introduction and Objectives: Natural hazards and extreme weather events are occurring with increasing frequency and intensity, generating significant risks for occupational health and safety across a wide range of industries and regions. Beyond their direct effects on workers' health and safety, these events create severe impacts on organizational operations and resilience. This paper aims to examine emerging evidence on occupational health and safety risks arising from natural hazards and extreme weather events and to explore their implications for organizational preparedness and risk management.

Methods: A targeted review of scientific literature and authoritative institutional guidance published in the last decade was undertaken, focusing on the analysis of the potential negative impacts of natural hazards and extreme weather events on OH&S within organizations across various sectors and regions, to derive insightful recommendations.

Results: Findings revealed a complex interplay between natural hazards and extreme weather events (climate-related) and negative OH&S impacts on organizations. The increased frequency and intensity of heatwaves, cold snaps, droughts, flooding and fires pose heightened risks to workers' health and safety. Key identified areas of concern encompass heat stress, vector-borne disease outbreaks, food and water insecurity, air pollution, UV radiation, psychological distress among workers; injuries and death from extreme weather events and climate mitigation activities, as well as worker displacement. Reduced access to healthcare further compounds these issues. The findings also demonstrate that natural hazards and extreme weather events can trigger cascading risks affecting workforce availability, site safety, emergency response capacity and overall organizational resilience.

Discussion and Conclusions: Managing occupational health and safety risks arising from natural hazards and extreme weather events requires a proactive and structured approach integrated within organizational management systems. Strengthening preparedness, risk assessment, emergency response and recovery capacities is essential to protect workers and to enhance organizational resilience in an increasingly hazard-prone operating environment.

Keywords: Occupational health; Natural hazards; Extreme weather events; Worker safety; Organizational resilience

Oral Presentation

O18 Climate Change and Work

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Development of an artificial intelligence model for assessing the association between occupational lung disease and workplace environment: focusing on chronic obstructive pulmonary disease

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Introduction and Objectives: Determining whether occupational lung diseases such as chronic obstructive pulmonary disease qualify as work-related diseases under the industrial accident compensation insurance framework requires comprehensive evaluation of long-term exposure to respirable dust and other hazardous agents across diverse occupations, imposing a substantial workload on epidemiological investigators and making consistency across review opinions difficult to ensure. This study aimed to develop a large language model-based system supporting assessment of the association between occupational lung disease and the workplace environment, improving the efficiency and consistency of epidemiological review opinion drafting.

Methods: The system was designed using the Atomization, Modularization, and Human-in-the-Loop framework. First, domain knowledge was extracted from 1,981 occupational disease determination records and structured into a three-tier hierarchy: atoms (minimal factual units), molecules (occupation-specific knowledge modules), and modules (section-level decision logic). Second, 15 specialized agents across two departments generated section-level review opinions for 115 epidemiological investigation reports through a hierarchical orchestration pipeline with gate verification. Third, an ablation study under three conditions evaluated each component: a single-model baseline; multi-agent orchestration with gate verification; and multi-agent orchestration combined with dense-vector retrieval of occupation-specific knowledge. Generated opinions were compared against expert-authored originals serving as the reference standard, using automated metrics and blinded expert evaluation.

Results: All 345 review opinions were generated without runtime failure. The Cohen kappa coefficient for work-relatedness determination improved from 0.032 in the first condition to 0.410 in the second and 0.485 in the third, while overall accuracy rose from 66.1 to 70.4 to 73.9 percent. The single-model baseline classified nearly all cases as work-related, detecting only one true negative; the multi-agent architecture increased true negatives to 32, and knowledge injection further increased them to 35, while reducing false positives from 39 to 8 to 5. The recall-oriented text-overlap metric increased monotonically, from 0.231 to 0.251 to 0.270. The largest improvement from knowledge injection occurred in the similar-case investigation section, by 0.130, consistent with a design in which dense-vector retrieval directly supplies occupation-specific literature evidence. The hierarchical gate achieved complete final pass rates under both multi-agent conditions. Residual false negatives primarily reflected a structural mismatch between the legal-administrative evidence standard of determination records and the medical-epidemiological standard of the reference set, rather than random error.

Discussion/Conclusions: Combining a structured domain knowledge base, hierarchical multi-agent orchestration, dense-vector retrieval, and a self-reinforcing human-in-the-loop feedback loop, the framework consistently improved both work-relatedness determination agreement and narrative quality relative to a single-model baseline. These findings suggest that automatically generated review opinions can approach expert-level quality when agent orchestration, knowledge injection, and accumulated expert feedback operate complementarily.

Keywords: Chronic obstructive pulmonary disease; Occupational disease; Large language model; Epidemiological investigation; Work-relatedness assessment

Oral Presentation

O18 Climate Change and Work

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Comparison of threshold temperatures and exposure-response relationships for occupational heat-related illness by workplace type and disease type: analysis based on emergency room-based heat-related illness surveillance system data (2012–2025)

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Introduction and Objectives: Climate change intensifies heat waves, increasing occupational heat-related illness risks. However, evidence on how threshold temperatures and exposure-response relationships differ by workplace and disease types remains limited. This study estimated and compared threshold temperatures and risk patterns across outdoor, agricultural, and indoor workplaces using 14 years of national surveillance data.

Methods: We analyzed heat-related illness cases reported to emergency rooms during summer months from 2012 to 2025 through the Korea Disease Control and Prevention Agency surveillance system. A total of 15,492 cases with confirmed workplace types were included: 8,998 outdoor, 4,493 agricultural, and 2,001 indoor cases. Generalized additive models were fitted for each workplace type and meteorological indicator to estimate exposure-response curves and threshold temperatures, defined as the first temperature where the lower bound of the 95 percent confidence interval of the first derivative exceeded zero. A distributed lag nonlinear model examined delayed and cumulative heat effects. A supplementary piecewise Gompertz generalized linear model compared relative risks at specific wet bulb globe temperature levels.

Results: Wet bulb globe temperature thresholds were 19.9, 21.9, and 23.3 degrees Celsius for outdoor, agricultural, and indoor workplaces, respectively. Relative risk at the 90th percentile temperature compared to the threshold was 19.44 with a 95 percent confidence interval from 13.30 to 28.41 for outdoor, 6.52 with a 95 percent confidence interval from 5.20 to 8.17 for agricultural, and 3.27 with a 95 percent confidence interval from 2.40 to 4.45 for indoor workplaces. Outdoor workplaces showed a continuously steepening risk curve without saturation, while agricultural and indoor workplaces saturated at higher temperatures. In the Gompertz model, at wet bulb globe temperature 25 degrees Celsius relative risks were 3.69 with a 95 percent confidence interval from 3.33 to 4.08, 2.33 with a 95 percent confidence interval from 2.12 to 2.55, and 1.91 with a 95 percent confidence interval from 1.70 to 2.15 for outdoor, agricultural, and indoor workplaces; at 33 degrees Celsius these escalated to 78.76 with a 95 percent confidence interval from 56.22 to 110.35, 11.65 with a 95 percent confidence interval from 8.87 to 15.31, and 4.49 with a 95 percent confidence interval from 3.42 to 5.88, respectively. The distributed lag nonlinear model revealed that delayed cumulative effects over several days were more pronounced in indoor workplaces, suggesting heat accumulation as a distinct risk in enclosed environments. For heat stroke, wet bulb globe temperature thresholds were lower than for other diseases (20.3 degrees Celsius for outdoor, 22.1 degrees Celsius for agricultural), indicating severe illness occurs at relatively low temperatures.

Discussion/Conclusions: Occupational heat-related illness risks differed substantially by workplace type. Outdoor workplaces had the lowest thresholds and relentlessly escalating risk, posing the greatest danger during extreme heat. Indoor workplaces showed a distinct delayed cumulative risk pattern, indicating that continuous exposure to moderately elevated temperatures is a specific hazard in enclosed environments. These findings underscore the need for workplace-specific prevention: earlier warning thresholds for outdoor and agricultural workers, and cumulative exposure monitoring for indoor workers.

Keywords: Occupational heat-related illness; Threshold temperature; Workplace type; Exposure-response relationship

Oral Presentation

O18 Climate Change and Work

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The shift of risk: hidden health inequalities among Korean workers amid heat wave disasters using a big data approach

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Introduction and Objectives: Heat waves are intensifying under the climate crisis, yet their health burden may not be distributed evenly across the workforce. Population-level trends suggesting shared adaptation can conceal a redistribution of risk toward the most vulnerable workers. This study aimed to determine whether the health burden of heat-related illness among Korean workers reflects shared adaptation or a shift of risk onto specific occupational and income groups, and to examine whether heat waves act as an amplifier of existing socioeconomic inequality.

Methods: Two complementary national data sources were analyzed. The first was an emergency room based heat-related illness surveillance system operating as a passive surveillance system and covering the period from 2011 to 2024. The second was national health insurance data covering the entire Korean population for the period from 2015 to 2023. Heat-related illness incidence was expressed as cases per million and stratified by economic activity status, by occupational category comprising office workers, skilled manual workers, service and sales workers, and non-skilled manual workers, and by income level comparing lower-income and higher-income groups across nine industrial classifications. Analyses examined long-term annual trends in relation to the number of heat-wave days, weekly seasonal patterns relative to ambient temperature, differences before and after the year 2018, and the association between heat-related illness and maximum temperature to assess whether disparities widened with increasing thermal exposure.

Results: In the emergency room surveillance system, the economically inactive population showed a higher incidence than workers, at 69.58 compared with 36.98 cases per million. Among workers, the skilled manual group showed relative stabilization or decline after the year 2018 despite comparable later heat-wave intensity, consistent with adaptation. In contrast, the non-skilled manual group increased sharply after the year 2022 and became the highest-incidence group of all occupational categories. The difference between skilled and non-skilled manual workers, minimal before 2018, widened markedly thereafter. In the national health insurance analysis, the lower-income group showed higher heat-related illness incidence than the higher-income group across most industries, most strongly in manufacturing, construction, human health and social work activities, and real estate. The gap between lower-income and higher-income groups widened as maximum temperature increased, indicating that vulnerability scaled with thermal exposure.

Discussion/Conclusions: The convergence of occupation-based and income-based analyses indicates that apparent population-level adaptation to heat waves masks a shift of risk onto non-skilled and lower-income workers, deepening rather than narrowing health inequality. A heat wave is not an equal-opportunity threat; it acts as an inequality amplifier that concentrates harm at the intersection of occupational and socioeconomic vulnerability, and societal or technological progress does not automatically guarantee climate health equity. Climate adaptation policy should move beyond universal measures toward equity-based frameworks that prioritize occupational heat-risk management for non-skilled and outdoor workers, scale protection with exposure and income vulnerability, and integrate labor, health, and environmental data, so that adaptation reduces inequality rather than redistributing risk.

Keywords: Heat-related illness; Occupational health; Health inequality; Climate change; Socioeconomic disparity

Oral Presentation

O19 Workplace Disaster Preparedness and Response

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From compliance to competence: implementing a data-driven emergency preparedness framework in industrial occupational health centres at Reliance Industries Limited, India

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Background: Reliance Industries Limited (RIL) operates multiple manufacturing sites, each supported by well-equipped Occupational Health Centres (OHCs). To strengthen emergency preparedness, RIL transitioned from a compliance-based monitoring approach to a competence-driven, data-oriented framework through the implementation of an Emergency Medical Services (EMS) Scoring System and Emergency Quality Indicators (EQIs). This model emphasizes performance benchmarking, continuous improvement, skill enhancement, and evidence-based decision-making rather than checklist-based regulatory adherence. Standardized EMS scoring and EQIs have been deployed across all OHCs to enable objective evaluation of emergency readiness and response effectiveness.

Objectives: To evaluate the effectiveness of a standardized EMS scoring framework in improving emergency preparedness, response capability, and system-wide consistency across industrial healthcare settings.

Materials and Methods:

A multidimensional EMS scoring framework was implemented across OHCs, covering eight key domains:

1. Leadership and command structure
2. Risk and hazard preparedness (including site-specific risk profiling)
3. Communication and coordination systems
4. Clinical preparedness (emergency drugs, antidotes, equipment, triage, ambulance readiness)
5. Operational continuity (surge capacity and service continuity planning)
6. Logistics and supply chain management
7. Training and competency (mock drills, simulations, skill validation)
8. Ambulance services

Each domain includes multiple structured sub-parameters, cumulatively scored out of 100. Assessments are conducted fortnightly to ensure continuous monitoring, standardization, and rapid gap closure. Additionally, monthly evaluation using EQIs measures performance across key areas: emergency preparedness, clinical management, procedural adherence, and patient and staff safety.

Results: The EMS scoring system enabled granular and objective assessment across all domains. Fortnightly audits demonstrated sustained high performance, with mean compliance exceeding 90% (range: 90–96%), and several sites consistently achieving ≥95%, indicating low variability and strong standardization.

Monthly EQI monitoring showed overall compliance above 90% (mean ± SD: ~92 ± 3%). Key indicators—including emergency preparedness, clinical response, procedural adherence, and safety metrics—remained stable with minimal variance. Continuous data monitoring facilitated early identification of gaps and timely corrective actions, ensuring consistent system reliability.

Conclusions: The EMS scoring system and EQI-based framework provide a scalable and replicable model for strengthening emergency preparedness in industrial healthcare settings. This data-driven approach supports the transformation of OHCs into high-reliability units capable of delivering standardized, rapid, and outcome-focused emergency care in industrial OHCs.

Oral Presentation

O19 Workplace Disaster Preparedness and Response

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From crisis to capability: PETRONAS' medical emergency response and mass casualty incident preparedness

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Introduction: Medical emergency response (MER) in the energy sector is uniquely challenged by remote operations, high-risk activities, and constrained evacuation timelines. Without robust preparedness, such conditions significantly elevate the risk of preventable fatalities and operational disruption, particularly during Mass Casualty Incidents (MCI). PETRONAS has addressed these challenges through a comprehensive, risk-based MER framework aimed at ensuring crisis readiness, safeguarding workforce health, and maintaining operational resilience across its global portfolio.

Methods: PETRONAS' MER preparedness is underpinned by systematic situational analysis and risk assessment tailored to comprehend specific operational contexts and customise the preparedness. Site-specific MER plans are developed using a structured four-stage response model encompassing immediate lifesaving intervention by Designated First Aiders, medical stabilisation by medical professionals, evacuation to a tertiary hospital, and specialty care when necessary. MCI preparedness is embedded through the adoption of Simple Triage and Rapid Treatment (START) principles, escalation pathways, and coordination mechanisms with medical emergency services. Capability assessments of designated public and private hospitals are conducted to validate readiness and available specialties. Continuous assurance is achieved through stakeholder engagement with national health authorities, regular tabletop and tier-based emergency drills.

Results: Implementation of the integrated MER framework has strengthened PETRONAS' ability to anticipate, respond to, and sustain medical care during emergencies, including in remote and logistically constrained environments. The approach has elevated on-site medical capability, reduced sole dependency on evacuation as a lifesaving measure, and enhanced preparedness for complex scenarios. Emergency drills consistently validate and test a coordinated response with timely decision-making under stress.

Analysis and Conclusions: PETRONAS' MER and MCI preparedness exemplifies how proactive, risk-based governance can transform emergency response into a strategic safety barrier. The framework has demonstrably improved workforce protection, supported structured escalation during medical crises, and reinforced business continuity, reflecting PETRONAS' adoption of best-practice approaches to crisis-ready medical emergency preparedness in a high-risk setting.

Keywords: Medical emergency response; Mass casualty; Disaster; Crisis and occupational health

Poster Presentation

Poster Presentation

P1 Occupational Medicine

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Workplace air quality and chemical exposure as key predictors of occupational respiratory disease: a nationwide analysis of Malaysian workers

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Objectives: To determine the prevalence of occupational respiratory disease (ORD) and identify socio-demographic, occupational, and workplace environmental exposure factors associated with ORD among workers across major industrial sectors in Malaysia.
Methods: A cross-sectional analysis was conducted using the National Occupational Disease and Injury Prevention (NODIP) database integrated with workplace assessment records. A total of 34,220 workers from seven industrial sectors were included. Socio-demographic characteristics, health status, occupational exposures, and workplace assessment indicators, including indoor air quality (IAQ) and chemical exposure risk, were analysed. Logistic regression was performed to identify factors associated with ORD and estimate adjusted odds ratios (AORs).
Results: The prevalence of ORD was 2.3%. Compared with the hotel and restaurant sector, workers in the mining and quarrying (AOR 20.91), utilities (AOR 17.72), construction (AOR 15.08), and manufacturing (AOR 6.45) sectors had significantly higher odds of ORD. Inadequate IAQ (AOR 3.84) and unacceptable chemical exposure (AOR 3.37) emerged as the strongest workplace predictors of ORD. Smoking (AOR 1.96), allergy (AOR 1.51), hypertension (AOR 1.36), shift work, prolonged working hours, and confined workspaces were also independently associated with ORD.
Conclusions: Occupational respiratory disease is driven by sector-specific workplace exposures and environmental conditions. Inadequate indoor air quality and unacceptable chemical exposure emerged as major independent predictors, highlighting the importance of targeted environmental control and risk management strategies to reduce the burden of occupational respiratory disease in Malaysia.

Keywords: Occupational respiratory disease; Indoor air quality; Chemical exposure; Occupational health; Malaysia

Poster Presentation

P1 Occupational Medicine

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-061
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Bridging the gap between knowledge and safe practice: a study of needle stick injuries at Hospital Sultan Ismail Johor Bahru

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Background & Objectives: The primary aim of this study was to determine the prevalence of Needle Stick Injuries (NSI) among healthcare workers at Hospital Sultan Ismail (HSI) and to evaluate their Knowledge, Attitude, and Practice (KAP) regarding biological hazards at workplace and preventive measures.
Methods: A cross-sectional study was utilized, integrating a secondary data analysis of 116 reported NSI incidents (2022–2024) from the hospital's Public Health Unit with an online KAP survey administered to a convenience sample of 403 healthcare workers across multiple clinical designations and departments.
Results: Surveillance data highlighted an escalating trend of NSIs, rising from 28 incidents in 2022 to 47 in 2024. Junior medical staff bore the highest burden, with House Officers and Medical Officers accounting for 33.6% and 30.2% of cases respectively. Injuries predominantly occurred in high-stress inpatient wards (44.0%) during the handling of patients or needle sharps (45.7%). Concurrently, the KAP survey indicated a 17.9% lifetime prevalence of NSIs among respondents. Although theoretical knowledge was excellent (97.8% understood universal precautions), hazardous practice were noted, such as manually separating needles before disposal (18.6%), disassembling needles by hand (10.7%), and recapping used needles (2.7%). Only half (49.4%) of staff correctly identified the required 10-minute water flushing and squeezing emergency protocol.
Conclusions: High theoretical knowledge and conventional continuous medical education may be insufficient to collectively translate into safe handling of sharps especially during fast-paced clinical procedures. To curb NSI prevalence, a paradigm shift from passive education to active behavioral enforcement must be instilled to HCW. This includes targeted interventions for high-risk junior demographics, strict ward-level audits by the Public Health Unit, and the total elimination of unsafe practices.

Poster Presentation

P1 Occupational Medicine

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Fitness-for-work assessment and return-to-work planning in a hairstylist with grade 2 spondylolisthesis: a case-based occupational health approach

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Background: Spondylolisthesis is a spinal disorder involving anterior displacement of a vertebral body, commonly associated with chronic low back pain and functional limitation. Workers in physically demanding occupations, such as hairstyling, are particularly vulnerable due to prolonged standing, repetitive movements, and awkward postures. This case highlights the occupational impact of symptomatic spondylolisthesis and the role of structured fitness-for-work (FFW) assessment.
Objectives: To evaluate the functional capacity and occupational limitations of a hairstylist with grade 2 spondylolisthesis, and to develop a multidisciplinary, evidence-based return-to-work (RTW) plan incorporating rehabilitation, physiotherapy, and occupational therapy.
Materials and Methods: A case-based occupational health assessment was conducted integrating clinical evaluation, imaging review, and occupational history. Functional status was quantified using the Visual Analogue Scale (VAS) for pain and Oswestry Disability Index (ODI). Psychosocial risk stratification was performed using the Keele STarT Back Screening Tool (SBST). Workplace risk assessment and job demand analysis were undertaken. Sickness absence was evaluated using the Bradford Factor to objectively quantify absenteeism burden. A multidisciplinary intervention involving rehabilitation, physiotherapy, and occupational therapy was included in the RTW planning.
Results: The worker reported persistent low back pain (VAS score 6–7/10) with moderate functional disability (ODI range 21–40%). SBST stratification suggested medium risk of chronicity due to physical and occupational factors. Absenteeism analysis demonstrated an elevated Bradford Factor, indicating recurrent short-term absence impacting productivity. Functional limitations included intolerance to prolonged standing (>30–60 minutes), repetitive bending, and sustained static posture. The worker was certified temporarily fit for work with restrictions.A structured RTW plan incorporating ergonomic modifications, sit–stand strategies, task rotation, graded activity, and multidisciplinary rehabilitation was implemented. Physiotherapy focused on core strengthening, lumbar stabilization, and posture correction, while occupational therapy addressed task modification, energy conservation, and work-specific functional retraining. Planned reassessment was scheduled at 4–6 weeks.
Conclusions: Individualized FFW assessment and structured RTW planning are essential in managing workers with musculoskeletal disorders. Integration of rehabilitation, physiotherapy, and occupational therapy within a multidisciplinary framework enhances functional recovery, reduces absenteeism, and supports sustainable employment.

Keywords: Spondylolisthesis; Low back pain; Fitness for work; Return to work; Occupational health; Physiotherapy; Occupational therapy; Rehabilitation; Ergonomics; Musculoskeletal disorders

Poster Presentation

P1 Occupational Medicine

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-081
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Evaluating sinonasal squamous cell carcinoma in a nickel-exposed port operator: an evidence-based application of the Indonesia's seven-step occupational disease diagnostic framework

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Introduction: Sinonasal squamous cell carcinoma (SSCC) is a rare epithelial malignancy with an incidence of 0.2–1 per 100,000 population annually. It is associated with occupational exposure to carcinogens such as nickel, formaldehyde, and wood dust. Port operators may be exposed to nickel ore during cargo inspections. This study aims to apply the seven-step occupational diagnosis method to determine whether SSCC in a port operator can be classified as an occupational disease related to nickel exposure.

Methods: This case report examines a 29-year-old male port operator using Indonesia's seven-step occupational disease diagnostic guidelines. Data were collected through autoanamnesis, physical examination, and review of medical records, including MRI and biopsy findings. An evidence-based literature review, using PubMed and Scopus, was done with keywords sinonasal carcinoma, occupational disease, nickel, port workers.

Results: The literature review showed that while nickel and its compounds are classified as Group 1 carcinogens by the IARC, the risk of developing SSCC is typically associated with a long latency period of at least 10-15 years of chronic exposure. In this case, the patient, employed as Nickel-Exposed Port Operator for 3 years, before he was diagnosed with SSCC (T4bN0M0) in 2024, with symptoms that began in 2022. His duties included intermittent inspection of nickel-transporting trucks (~5 times/day, 5–10 minutes each) and potential exposure to formaldehyde from ship exhaust. He had a smoking history of 20 cigarettes/day for seven years. Formaldehyde exposure was considered negligible due to rapid outdoor dispersion.

Discussion: Despite confirmed exposure, the short latency period and smoking history weaken the causal link between occupational exposure and SSCC. Based on the seven-step diagnostic framework, the condition is unlikely to be classified as an occupational disease.

Keywords: Sinonasal squamous cell carcinoma (SSCC); Occupational disease; Nickel exposure; Port workers

Poster Presentation

P1 Occupational Medicine

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An evidence-based evaluation of occupational hypothyroidism as a work-aggravated disease in a radiographer with prior nasopharyngeal radiotherapy

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Background: Occupational exposure to low-dose ionizing radiation is a risk factor for thyroid dysfunction, among radiographers. The thyroid gland is highly radio-sensitive and vulnerable to cumulative radiation effects, especially in individuals with prior therapeutic radiation exposure. This study aims to analyse the occupational diagnosis of hypothyroidism as a work-aggravated disease in a radiographer with a history of nasopharyngeal cancer treated with radiotherapy.

Methods: Clinical evaluation, physical examination, and laboratory investigations including serial TSH, FT4, and anti-TPO measurements were performed to diagnose hypothyroidism secondary to radiation thyroiditis in a 30-year-old male radiographer. A systematic literature search was conducted through PubMed, Cochrane Library, and Scopus using the PECO framework, and selected articles were appraised using Oxford Centre for Evidence-Based Medicine appraisal tool. Occupational diagnosis was established using the seven-step occupational disease diagnostic framework and causality was assessed using the Bradford Hill criteria.

Results: The current evidence demonstrated an association between chronic low-dose radiation exposure and thyroid dysfunction: decreased T3 and T4 levels, increased TSH levels, and a higher prevalence of subclinical hypothyroidism. A dose–response relationship was observed, increasing cumulative exposure associated with a greater risk of thyroid impairment. In this case, prior high-dose radiotherapy was identified as the primary initiating factor, while occupational exposure without adequate thyroid protection contributed as an aggravating factor.

Conclusions: Based on the seven-step occupational diagnostic analysis and Bradford Hill criteria assessment, this case was classified as a Work-Aggravated Disease, wherein occupational radiation exposure contributed additively to thyroid damage initially caused by prior therapeutic radiotherapy.

Keywords: Hypothyroidism; Radiation thyroiditis; Radiographer; Occupational disease; Low-dose ionizing radiation

Poster Presentation

P1 Occupational Medicine

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-122
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Burden of premature mortality among the working-age population in Malaysia, 2023: insights from the Malaysian Burden of Disease Study

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Introduction: Premature mortality among Malaysia's working-age population poses significant public health and economic challenges, resulting in loss of productive years and increased societal burden. Identifying the leading causes of death is essential to guide prevention strategies and occupational health planning. This study aimed to examine the primary causes of premature mortality among the working-age population aged 15-64 years in Malaysia in 2023.

Materials and Methods: This cross-sectional study analysed 2023 mortality data from the Department of Statistics Malaysia. Deaths were classified into 162 causes based on the International Classification of Diseases, 10th Revision (ICD-10), following the Malaysian Burden of Disease Study methodology. Years of life lost (YLL) were calculated by multiplying cause-, age-, and sex-specific deaths by the remaining life expectancy from national life tables. Analyses were conducted using R software. Age-standardised mortality rates (ASMR) and age-standardised YLL rates (ASYLLR) were computed using the direct standardisation method with the WHO World Standard Population (2000-2025) as reference.

Results: Premature mortality accounted for 37.5% of 196,965 total deaths, with males contributing 65.7% and females 34.3%. Ischaemic heart disease was the leading cause (17,706 deaths; ASMR=80.1 per 100,000; ASYLLR=2055.1), followed by lower respiratory infections (7064; ASMR=31.6; ASYLLR=863.8), stroke (6457; ASMR=29.1; ASYLLR=750.7), road injuries (5202; ASMR=22.5; ASYLLR=919.0), and diabetes mellitus (2707; ASMR=12.3; ASYLLR=302.6). Cardiovascular diseases ranked first in both sexes. Males experienced higher mortality, particularly from ischaemic heart disease (76.7%), stroke (64.2%), and road injuries (87.1%), whereas females had relatively higher deaths from diabetes mellitus (42.1%) and breast cancer (99.8%).

Conclusions: Premature mortality in Malaysia's working-age population is predominantly driven by non-communicable diseases, with contributions from infections and injuries. Notable sex disparities highlight the need for targeted, sex-sensitive public health and occupational interventions to reduce preventable deaths and years of life lost.

Keywords: Premature mortality; Working-age population; Age-standardised death rate; Years of life lost

Poster Presentation

P1 Occupational Medicine

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-126
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Lumbar disc herniation in a radiographer: a case-based evaluation using a seven-step occupational diagnostic framework

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A 28-year-old male radiographer in Indonesia developed radicular low back pain after a marked increase in workload. This case-based occupational evaluation examined whether his lumbar disc herniation was related to work by integrating clinical assessment, ergonomic exposure assessment, evidence-based literature appraisal from multiple electronic databases, and causality assessment. Clinical assessment included occupational history, symptom history, physical examination, lumbar magnetic resonance imaging, and electromyography. Ergonomic exposure was assessed using the Rapid Entire Body Assessment method. A structured literature search and critical appraisal were conducted, followed by assessment using the Bradford Hill criteria. The clinical findings confirmed lumbar disc herniation at the lumbar five to sacral one level with right lumbosacral radiculopathy. Work exposures included manual patient transfers and positioning of 15 to 20 patients per shift, frequent trunk flexion, trunk rotation, squatting, prolonged static standing, night shifts, and lead apron use weighing 4 to 6 kilograms for 5 to 7 hours per shift. The ergonomic assessment showed a high risk score. Over 3.5 years, total work time was 7,507.5 hours, including 1,200.5 hours of manual handling, 1,251.3 hours of bending and squatting, and 4,504.5 hours of static standing. The estimated cumulative lifting load was approximately 486,500 kilograms. Body mass index was 25.95 kilograms per square meter, and no clear non-occupational contributor was identified. Evidence from comparable health care worker populations showed increased odds of lumbar disc disease and disc herniation, with odds ratio values ranging from 2.45 to 2.70, while nonphysician health care workers showed higher odds than the general population with an odds ratio of 1.22. These findings supported temporality, biological plausibility, and classification as a work-aggravated disease. Radiology departments should strengthen ergonomic controls, reduce cumulative manual handling, provide safe patient transfer support, review lead apron use and shift organization, and implement early reporting and return-to-work programs for radiographers with low back symptoms.

Keywords: Lumbar disc herniation; Radiographer; Occupational diagnostic framework; Ergonomic exposure; Work-aggravated disease

Poster Presentation

P1 Occupational Medicine

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A cluster of trimellitic anhydride–induced occupational asthma and rhinitis: uncovering a decontamination-related secondary exposure pathway after process modification\

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Background: Trimellitic anhydride (TMA) is a well-known respiratory sensitizer. However, real-world evidence linking clustered cases with process-level interventions remains limited.
Methods: Ten workers handling chemical agents in the same department were screened using a respiratory questionnaire. Four symptomatic workers were identified, and detailed occupational histories with on-site process evaluation were conducted.
Results: Four male workers with 6–14 years of exposure developed rhinitis and/or asthma, including one acute asthma episode with urticaria requiring emergency care. A cluster of TMA-induced sensitization was suspected. Investigation identified high exposure during open handling and oven-based processing. Process modification (use of higher-purity TMA, PAPR, and direct transfer to reaction vessels) reduced exposure time. Notably, despite these improvements, the absence of a dedicated decontamination area created a previously underrecognized pathway for secondary exposure, potentially triggering symptoms in sensitized individuals.
Conclusions: This study highlights a cluster of TMA-related respiratory disease and demonstrates that even after process optimization, residual risks may persist. Identification of decontamination-related secondary exposure represents a novel occupational hazard pathway. Comprehensive control strategies should include not only exposure reduction but also spatial segregation and dedicated decontamination design.

Keywords: Trimellitic anhydride; Occupational asthma; Occupational rhinitis; Sensitization; Cluster

Poster Presentation

P1 Occupational Medicine

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Beyond compliance: hidden exposure risks in non-destructive testing worker

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Industrial radiography workers in non-destructive testing (NDT) are chronically exposed to low-dose ionizing radiation, yet real-world exposure may be underestimated. We report a 47-year-old male NDT worker with over 10 years of occupational exposure who developed leukemia without prior hematologic disease. His cumulative recorded radiation dose was 21.12 mSv, consistently within regulatory limits, with regular dosimetry monitoring and documented radiation protection practices.

Detailed review of work logs demonstrated frequent radiographic operations using high-activity sources in dynamic field conditions, requiring task-specific adjustments in time, distance, and shielding. These conditions may limit the effectiveness of standard radiation protection measures and introduce variability in actual exposure.

Recent epidemiological studies have shown increased risks of leukemia and lymphoma even at low cumulative doses, supporting a linear no-threshold model. Furthermore, discrepancies between recorded and actual exposure have been reported in industrial settings, including incomplete badge use and challenges in monitoring mobile operations.

This case highlights that compliance with radiation safety standards does not necessarily equate to accurate exposure assessment. NDT workers may represent an under-recognized high-risk population due to potential underestimation of cumulative exposure. Clinicians should consider occupational radiation history even when documented doses fall within permissible limits. This case bridges the gap between population-based risk estimates and real-world occupational exposure uncertainty, underscoring the need for improved exposure monitoring strategies in industrial radiography.

Poster Presentation

P1 Occupational Medicine

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Linear melanonychia in a cytotoxic drug-handling pharmacist

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Background: Linear melanonychia presents as a pigmented longitudinal band on the nail plate. While most cases are benign, it can also be an early sign of subungual melanoma. Although drug-induced melanonychia is well-documented in patients receiving systemic chemotherapy, similar pigmentary changes are rarely described among healthcare workers occupationally exposed to hazardous drugs.
Objectives: To report a case of cytotoxic drug-associated linear melanonychia detected in a pharmacist and to highlight the occupational health implications of such dermatological findings.
Materials and Methods: We evaluated a 33-year-old female pharmacist who prepared cytotoxic agents, including platinum compounds and anthracyclines, in a controlled negative- pressure environment. The clinical assessment included a physical examination, routine laboratory investigations, and a histopathological evaluation of a nail plate biopsy.
Results: The patient developed progressive longitudinal melanonychia on all fingernails except the bilateral fifth digits, accompanied by a pseudo-Hutchinson sign. Laboratory investigations were within normal limits, and the histopathological examination of the nail biopsy showed no evidence of malignancy, confirming a benign diagnosis. Following an administrative reassignment to a supervisory role without direct chemotherapy reconstitution, a gradual improvement in nail pigmentation was observed within a few months.
Conclusions: Low-level occupational exposure to cytotoxic drugs is a potentially reversible cause of linear melanonychia. This sentinel dermatological finding emphasizes the critical need for structured medical surveillance, prompt exclusion of malignancy, and continuous evaluation of exposure control measures to safeguard healthcare workers.

Poster Presentation

P1 Occupational Medicine

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Circulating angiogenic cells as a potential biomarker for cardiovascular toxicity in workers exposed to benzene

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Introduction: Benzene is a prevalent industrial toxin traditionally associated with bone marrow suppression. However, contemporary evidence identifies it as a significant driver of cardiovascular injury through oxidative stress and endothelial destruction. This review examines the efficacy of Circulating Angiogenic Cells (CACs) as a novel biological indicator for identifying subclinical vascular damage in populations with high-risk occupational exposure.
Methods: A systematic literature search was performed on October 9, 2024, across PubMed, Scopus, and Google Scholar. Adhering to PRISMA protocols, 70 records were screened, with two cross-sectional human studies meeting the PECO eligibility criteria. The evidence quality was categorized as Level 2 based on the Oxford Center for Evidence-Based Medicine (CEBM) framework.
Results: Analysis reveals a potent inverse relationship between benzene exposure and vascular repair capacity. Quantitatively, every 0.1 mg/g creatinine rise in the urinary metabolite trans, trans-muconic acid (t,t-MA) correlates with a significant reduction in vital CAC subtypes: CD31+/34+/45+ (CAC-2) decreased by 8.7%, CD31+/34+/45+/AC133-(CAC-8) by 8.9%, and CD34+/45+/AC133+(CAC-14) by 9%. This depletion is most critical in high-risk occupations, such as petrochemical refining, fuel handling, and urban transportation, where benzene concentrations often exceed ambient levels. Benzene exposure also increased LDL levels by 34% and total cholesterol by 12% in murine models, further escalating the risk of atherosclerosis.
Discussion: Unlike conventional haematological screenings, CAC monitoring provides a direct mechanistic link to atherosclerosis, hypertension, and heart failure by assessing the body's actual vascular regenerative potential. This screening serves as a primary tool for early detection of subclinical cardiovascular injury, allowing for intervention before permanent myocardial or arterial damage occurs.
Conclusions: CACs are a sensitive biomarker for workplace health surveillance in benzene-intensive industries. While limitations such as measurement heterogeneity exist, integrating CAC assessments into periodic medical check-ups can significantly enhance the prevention of occupational cardiovascular disease.

Keywords: Benzene toxicity; Cardiovascular risk; Circulating angiogenic cells; Occupational health surveillance; Endothelial dysfunction

Poster Presentation

P1 Occupational Medicine

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Occupational risk of cervical disc herniation among shoe factory workers: establishing occupational disease diagnosis

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Introduction: Cervical disc herniation (CDH) is a degenerative spinal disorder frequently associated with biomechanical stressors such as prolonged neck flexion, repetitive movements, and static working postures. Shoe manufacturing workers are exposed to those significant ergonomic risks. We report the case of a 36-year-old male shoe factory worker with 12 years of employment who presented with neck pain radiating to the left shoulder and arm.
Methods: A case study combined with literature review using the PECO framework was conducted to evaluate occupational exposure and determine work-related causality using the Indonesia's Seven-Step Occupational Disease Diagnostic approach. Literature research was performed using PubMed, Scopus, and manual searching. Five selected articles were appraised using Oxford Centre for Evidence-Based Medicine appraisal tool and causality assessed with Bradford Hill criteria.
Results: Patient was diagnosed with cervical disc herniation C3–4 to C6–7. Occupational exposures included prolonged neck flexion and left lateral flexion during sole-bonding tasks, repetitive upper extremity pressing movements (≥50 times/minute), and static standing with forward neck flexion during shoelace-tidying tasks (target ≥100 pairs/hour). No significant non-occupational risk factors were identified. Literature evidence demonstrated associations between static neck posture and cervical disc herniation risk (IRR: 0.9), increased risk for doctors (OR: 1.356) and long-term employment in drivers who worked more than ten years ($p < 0.001$). Bulging and extrusion & sequestration were significantly higher in construction workers than other occupational groups, whereas protrusion were most frequently observed in healthcare workers ($p < 0.001$).
Conclusions: Application of the seven-step diagnostic approach and assessing causality using the Bradford Hill criteria confirmed CDH in this worker as an occupational disease.

Keywords: Cervical disc herniation; Occupational disease; Shoe factory workers

Poster Presentation

Poster Presentation

P1 Occupational Medicine

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Skin signals from work: unveiling probable occupational contact dermatitis in Klang Valley clinics

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Introduction: Occupational contact dermatitis (OCD) is a leading work-related skin disease in Malaysia, yet local data on its characteristics and occupational relevance remain limited. This study aimed to determine the proportion of probable OCD and associated factors among workers from multiple industrial sectors presenting to skin clinics in Klang Valley, addressing gaps in clinic-based evidence across diverse occupations.

Materials and Methods: A cross-sectional study was conducted among 409 workers presenting with dermatitis to four selected skin clinics in Klang Valley. Data were collected using the validated Nordic Occupational Skin Questionnaire (NOSQ-2002) and occupational causation assessed via Mathias criteria (probable OCD defined as ≥4 criteria met). Sociodemographic characteristics, work-related factors (job title, sector, exposure to irritants/allergens, PPE use), clinical features, and medical history were analyzed using descriptive and bivariable statistics in IBM SPSS Statistics.

Results: A substantial proportion (29.3%) fulfilled criteria for probable OCD. Significant associations included male gender (χ^2=6.24, p = 0.012), exposure to irritants and wet work, dermatitis extending to wrists/forearms (χ^2=185.28, p = 0.001), and atopic eczema history (χ^2=7.25, p = 0.007). Services (31.5%) and manufacturing (19.8%) sectors predominated; most had >15 years employment (58.4%) and always used PPE (74.1%). Multivariable analysis yielded no stable model.

Conclusions: Clinic-based workers show high probable OCD linked to irritant exposures and atopy, underscoring needs for early recognition and exposure controls. These findings inform targeted occupational health interventions in high-risk Malaysian sectors, enhancing prevention and surveillance.

Keywords: Occupational contact dermatitis; Mathias criteria; NOSQ-2002; Irritant exposure; Occupational health

Poster Presentation

P1 Occupational Medicine

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Small cell lung carcinoma in a dip soldering worker: an occupational diagnosis assessment

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Small cell lung carcinoma is the most aggressive subtype of lung cancer, accounting for approximately 10 to 15 percent of all cases, with a five-year survival rate below 7 percent. Although tobacco remains the dominant risk factor, occupational inhalation exposure to carcinogenic substances including polycyclic aromatic hydrocarbons and heavy metal fumes has been increasingly recognized as an independent contributing factor, particularly among never-smokers. We report a case of a 45 year old woman who had never smoked with 25 years of employment at an electronics component manufacturing company, who was diagnosed with right lung small cell lung carcinoma at an advanced stage, with pleural and vertebral metastases. She had worked for 24 years as a relay inspection operator before being reassigned to a dip soldering workstation approximately three months prior to symptom onset. At the dip soldering workstation, she was exposed to mixed metal fumes from molten solder, rosin flux vapors, polycyclic aromatic hydrocarbons generated during the soldering process, and organic solvent vapors. Despite using respiratory protection and smoke extractors, she consistently perceived a strong odor, suggesting inadequate exposure control. Diagnosis was confirmed histopathologically via pleural biopsy. A systematic literature review was conducted across four databases yielding five eligible studies, which were critically appraised using the Oxford Centre for Evidence-Based Medicine framework. The appraised studies demonstrated consistent associations between occupational exposure to metal heating fumes and polycyclic aromatic hydrocarbons and an increased risk of lung cancer, including small cell lung carcinoma, particularly in never-smokers with long-term cumulative exposure. Based on these studies, seven step occupational disease diagnostic framework was applied in accordance with Indonesian Occupational medicine standards. Assessment of the Bradford Hill criteria revealed that while biological plausibility, consistency, and specificity of the association were supported by the literature, the temporality and biological gradient criteria were not fulfilled. The dip soldering exposure lasted only approximately three months, far below the cumulative thresholds documented in the reviewed literature as biologically meaningful. No objective industrial hygiene measurements were available, and no genomic mutational signature analysis was performed to confirm carcinogen-specific molecular alterations. Based on this assessment, the small cell lung carcinoma in this patient does not fulfil the criteria for an occupational disease under the applicable diagnostic standards. Nonetheless, occupational exposure remains biologically plausible as a contributing factor. Recommendations include regular industrial hygiene monitoring at dip soldering workstations, evaluation and improvement of local exhaust ventilation systems, substitution of flux materials with alternatives that produce lower emission, implementation of periodic respiratory health surveillance for exposed workers, and complete documentation of occupational exposure histories to support future assessments.

Keywords: Small cell lung carcinoma; Dip soldering; Occupational exposure; Soldering fumes; Occupational disease diagnosis

Poster Presentation

P1 Occupational Medicine

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Silicotuberculosis complicated by progressive airflow obstruction in a non-smoking demolition worker: a case report and diagnostic discussion

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Background: Silicotuberculosis is an underdiagnosed occupational lung disease. Silica-exposed workers face a significantly elevated risk of active TB, attributable to silica-induced impairment of alveolar macrophage function and T-cell immunity. The clinical distinction between silicotuberculosis, post-TB lung disease, and comorbid COPD remains diagnostically challenging.
Case Presentation: A 51-year-old non-smoking male demolition worker with approximately 20 years of unprotected crystalline silica exposure (estimated by family history and occupational union records) presented with progressive dyspnea. Chronic silicosis was confirmed at age 43 by high-resolution CT; TB was excluded by serial sputum AFB smears and cultures. Five years later, active pulmonary TB was diagnosed by lung biopsies demonstrating caseating granulomata; M. tuberculosis was never isolated on repeated sputum cultures (one culture incidentally yielded NTM); paucibacillary disease in the setting of advanced silicotic fibrosis likely accounts for the microbiological negativity. Despite completing over two years of anti-TB therapy, the patient developed recurrent bacterial pneumonia and progressive respiratory failure, dying at age 51.
COPD Differential Diagnosis: Pulmonary function testing revealed early obstructive changes at age 33, progressive airflow obstruction. Multiple hospitalizations carried COPD diagnostic codes. However, without a smoking history or confirmatory post-bronchodilator spirometry, attributing airflow obstruction solely to COPD is problematic. Advanced silicosis causes airway remodeling and fibrosis-related gas trapping; post-TB structural lung damage may independently produce obstructive-restrictive mixed patterns. The airflow obstruction is most parsimoniously explained by cumulative silicosis and post-tuberculous sequelae.
Conclusions: This case illustrates the pathogenic synergy of silica exposure, silicosis-mediated immune dysregulation, and TB-driven lung destruction culminating in fatal respiratory failure. Clinicians should suspect silicotuberculosis in silica-exposed workers, recognize that advanced silicotic fibrosis may obscure microbiological TB confirmation, and critically evaluate COPD diagnoses in non-smokers with occupational lung disease.

Poster Presentation

P1 Occupational Medicine

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Hidden psychological hazards in public transportation workers: occupational PTSD following emergency response to workplace violence

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Background: Workplace violence in public transportation systems is an emerging occupational hazard. While physical injuries are widely recognized, psychological trauma among frontline transportation workers remains underreported and insufficiently addressed in occupational safety frameworks.
Case Presentation: We report a case of a young female frontline metro worker employed in a metropolitan public transportation system who developed post-traumatic stress disorder (PTSD) following occupational exposure to a severe violent incident during routine duty. She was required to assist in passenger evacuation and maintain situational monitoring of a potentially dangerous individual under imminent threat. During the event, she was exposed to injured victims, blood-stained surroundings, chaotic evacuation, and sustained psychological stress without direct physical injury. Within days, she developed insomnia, recurrent intrusive memories, hypervigilance, palpitations, dyspnea, avoidance behavior, and impaired concentration. Symptoms persisted for more than one month and significantly affected her ability to perform platform-related duties. Clinical and occupational medicine evaluations confirmed PTSD. Occupational disease certification was established based on exposure history, temporal relationship, and exclusion of non-occupational causes.
Discussion: This case illustrates an underrecognized category of occupational hazard in transportation workers. The intensity, duration, and proximity of exposure to life-threatening events may serve as a semi-quantitative framework for assessing psychological risk. It highlights that workers in non-traditional first responder roles may experience trauma comparable to formally trained emergency personnel. This case also underscores the emergence of "situational first responders" in modern occupational settings.
Conclusions: Public transportation workers may face high-risk psychological exposures even without physical injury. Implementation of structured critical incident response protocols, including psychological first aid, early screening, and protected return-to-work programs, should be incorporated into occupational safety systems. Integrating mental health protection into workplace safety policies is essential to address emerging risks in modern transportation environments.

Keywords: Occupational PTSD; Workplace violence; Transportation workers; Psychological hazard; Occupational safety

Poster Presentation

P1 Occupational Medicine

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Proportion of enterprises' potential recognition of fit notes: a study in large enterprises in Northeastern Thailand

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Introduction: The Fit Note, a legally mandated medical certificate in the United Kingdom, classifies workers as "not fit for work" or "may be fit for work with accommodations" promoting early return to work while maintaining confidentiality by not disclosing medical diagnoses. However, evidence regarding potential recognition of Fit Note within Thai enterprises remains limited.

Objectives: 1) To study the proportion of enterprises that demonstrate potential recognition of Fit Notes and 2) to describe their knowledge, attitudes, and practices regarding medical certificates and to assess opinions on Basic Occupational Health Services.

Methods: The questionnaire has been distributed via a Google Form link sent to the email addresses of three respondents per enterprise, including supervisor, safety officer, and human resources personnel across large-sized enterprises with more than 200 employees in both hospital and industrial sectors in Northeastern Thailand. It covers Demographic Information, Medical Certificate Knowledge, Attitudes, and Practices, Fit Note Potential Recognition, and Comments on Basic Occupational Health Services. To ensure a consensus-based approach, the Fit Note Potential Recognition is determined at the enterprise level, requiring at least two out of three respondents to share the same response for it to be recorded as a single enterprise-level response.

Results: Preliminary results indicate that, at the individual level, the overall response rate presently stands at 27.5%, comprising the hospital sector at 47.9% and the industrial sector at 16.7%. Within the hospital sector, current response rates among supervisors, safety officers, and HR personnel are 43.8%, 62.5%, and 37.5%, respectively, compared to 6.7%, 30.0%, and 13.3% within the industrial sector. Evaluating Fit Note Potential Recognition requires an enterprise-level consensus, defined as agreement among at least two out of three respondents. Based on this criterion, 13 out of 46 surveyed enterprises qualified, yielding an overall enterprise-level response rate of 28.3%. This comprises a 50.0% response rate for the hospital sector (8/16) and 16.7% for the industrial sector (5/30).

Conclusions: The outcomes will support the widespread adoption of Fit Note implementation through specially designed educational programs targeting stakeholder teams, alongside the development of supportive policies to facilitate implementation.

Poster Presentation

P1 Occupational Medicine

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Employment insecurity and sleep disturbance among male wage workers: additive interaction with occupational training

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Introduction and Objectives: Employment insecurity is associated with various adverse health outcomes, and sleep disturbance is an early sensitive indicator of work-related stress. Occupational training may buffer these negative effects, but few Korean studies have quantified the additive interaction between employment insecurity and lack of occupational training on sleep disturbance. We examined this association and the combined effects of occupational training and work environment satisfaction in Korean male wage workers.

Methods: This cross-sectional analysis used the seventh Korean Working Conditions Survey, including 12,259 male wage workers aged 20 years or older. Sleep disturbance was a summed score of six or higher on three reverse-scored items from the Minimal Insomnia Symptom Scale. Employment insecurity was perceived risk of job loss within six months. Occupational training was participation in any of on-the-job, self-paid, or employer-paid training during the past 12 months. Analyses included multiple logistic regression with stratified likelihood ratio tests, additive interaction analysis using the relative excess risk due to interaction and the attributable proportion, and three-way multiplicative interaction analysis with work environment satisfaction. Sensitivity analyses included propensity score matching, inverse probability of treatment weighting, and a 35-hour weekly working time cutoff.

Results: Of 12,259 participants, 22.8% reported employment insecurity. Employment insecurity was independently associated with sleep disturbance (adjusted odds ratio 1.51, 95% confidence interval 1.31–1.75), as was lack of occupational training (adjusted odds ratio 1.36, 1.19–1.56). The additive interaction was significant (relative excess risk due to interaction 0.830, 95% confidence interval 0.422–1.239; attributable proportion 0.391), accounting for approximately 39% of the doubly exposed group's risk. The association attenuated in the trained group (adjusted odds ratio 1.10) compared with the untrained group (1.75; p value for interaction = 0.002). Effect modification was observed by age (younger than 40 years: 2.34) and occupation (office workers: 1.96). A significant negative three-way interaction was detected with work environment satisfaction (interaction coefficient −0.788, p value = 0.021), suggesting a ceiling effect. Sensitivity analyses produced consistent estimates.

Discussion: These findings suggest that occupational training acts as a job resource that buffers the adverse health impact of employment insecurity, with younger workers and office workers representing particularly vulnerable subgroups.

Conclusions: Occupational health policy should adopt an integrated approach to combined exposures and ensure equitable access to occupational training for vulnerable groups.

Keywords: Additive interaction analysis; Employment insecurity; Occupational training; Sleep disturbance; Three-way multiplicative interaction analysis

Poster Presentation

P1 Occupational Medicine

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Latex allergy symptoms in healthcare workers using high- and low-extractable protein latex gloves in Thailand

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Introduction and Objectives: Medical latex gloves are an important cause of type I latex hypersensitivity among healthcare workers because of residual latex protein allergens. Although latex-free gloves can reduce sensitization, their high cost limits widespread use in resource-constrained settings. Reducing extractable protein levels in natural rubber latex gloves may be a more feasible strategy. This study aimed to compare latex allergy symptoms and latex sensitization between healthcare workers exposed to low- and high-extractable protein latex gloves, and to identify factors associated with allergy symptoms.

Methods: A cross-sectional analytical study was conducted among healthcare workers in northeastern Thailand. Participants were grouped according to exposure to low (<60 μg/g) or high (≥200 μg/g) extractable protein natural rubber latex gloves (323 per group). Current latex allergy symptoms and glove-use characteristics were collected using a structured self-administered questionnaire, and latex sensitization was assessed by serum latex-specific IgE. Descriptive statistics and logistic regression analyses were used to compare outcomes between groups and identify factors associated with latex allergy symptoms.

Results: Current latex allergy symptoms were reported more frequently among healthcare workers using high-extractable protein latex gloves than among those using low-extractable protein gloves (9.9% vs 4.0%; OR 2.60, 95% CI 1.36–5.22). The proportion with positive latex-specific IgE (latex sensitization) was similar between groups; however, the median latex-specific IgE level was significantly higher in the high-protein group (1.490 vs 0.675 kUA/L, $p < 0.001$). Latex allergy symptoms were additionally associated with a history of hand dermatitis (OR 3.00, 95% CI 1.53–5.89) and atopic disease (OR 2.75, 95% CI 1.33–6.13).

Discussion/Conclusion: High-extractable protein latex gloves were associated with a greater burden of latex allergy symptoms among healthcare workers. These findings suggest that lowering glove extractable protein content may be a feasible strategy to reduce occupational latex allergy symptoms in settings where latex glove use continues. Because extractable protein testing is relatively accessible and less costly than direct allergen measurement, it may provide a pragmatic basis for glove selection in resource-limited settings.

Keywords: Healthcare workers; Latex allergy; Latex sensitization; Latex glove; Extractable protein

Poster Presentation

P1 Occupational Medicine

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When the gut refuses the shift: a Crohn's disease flare-up following circadian rhythm disruption

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Crohn's disease is a chronic inflammatory bowel disease that can affect a person's ability to work. Although it is not an occupational disease, certain workplace factors may trigger or worsen symptoms and affect work performance. This case highlights the impact of circadian rhythm disruption on Crohn's disease activity and the role of occupational health interventions in supporting employees with Crohn's disease. A 30-year-old technician in an electronics manufacturing company was referred for occupational health assessment following an acute flare-up of Crohn's disease. He had been diagnosed with Crohn's disease several years earlier and underwent a right hemicolectomy two years ago. Following surgery, his condition remained stable and he was able to perform his normal duties without major problems. He had worked regular day shifts for eight years and tolerated them well. However, six months before presentation, he was transferred to another department due to a manpower shortage. Unlike his previous role, the new position involved rotating 12-hour day and night shifts as well as manual handling activities. Over the following months, he developed frequent diarrhea, abdominal pain, fatigue, and reduced ability to perform his work effectively. His symptoms gradually worsened and eventually required hospital admission. Colonoscopy confirmed active Crohn's disease with evidence of perianal swelling with abscess, sigmoid colitis, anastomotic ulcers, and terminal ileitis. He was subsequently started on immunosuppressive therapy with azathioprine and prednisolone, with two-weekly admissions to the hospital for regular infliximab infusions. During the assessment, the employee reported that his symptoms were particularly troublesome during night shifts. He also described frequent episodes of loose stools that required him to leave and re-enter the production area multiple times, affecting his work performance. Notably, his condition had remained stable for several years while working regular daytime hours, and the recurrence of symptoms only occurred after he started working rotating shifts. Circadian rhythm disruption from shift work alters melatonin secretion, impairs gut-barrier permeability, and dysregulates pro-inflammatory pathways, which may have contributed to the flare-up in this case. To support his recovery, several workplace adjustments were recommended, including a gradual return to work, permanent allocation to day shifts, restrictions from manual handling, regular rest breaks, easy access to toilet facilities, and flexibility to attend hospital appointments. At review three months later, the employee reported significant improvement in his symptoms. He had returned to work on permanent day shifts and reported no further episodes of diarrhea. This case highlights the possible relationship between circadian rhythm disruption and a Crohn's disease flare-up. Recognition of potential workplace triggers and appropriate workplace adjustments, particularly modification of shift schedules, helped support recovery, continued employment, and reduced the risk of further sickness absence.

Keywords: Crohn's disease; Shift work; Circadian rhythm disruption; Workplace adjustments; Return to work

Poster Presentation

P2 Fitness for Work

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A case study of false-positive organophosphate poisoning associated with supplements in a vector control worker

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Background: Medical surveillance for vector control workers monitoring organophosphate (OP) toxicity relies heavily on serum cholinesterase measurement. However, unprescribed health supplements can alter liver function and metabolic enzymes, complicating fitness-for-work assessments by mimicking OP poisoning.
Objectives: To describe the clinical evaluation and multidisciplinary management of a false-positive severe OP poisoning case, aiming to establish a safe return-to-work protocol.
Materials and Methods: A retrospective case study reviewed the medical records of an asymptomatic 36-year-old vector control worker with "Severe Poisoning" (37.4% and 37.1% reduction from baseline level) in August 2024 and February 2025. Clinical data, laboratory results including Cholinesterase, Liver Function Tests (LFT), and Renal Function Tests (RP), alongside fitness-for-work workflow, were analysed.
Results: Despite lacking alternative OP exposure, the worker exhibited severe cholinesterase suppression (5.76 kU/L, baseline 9.15kU/L) and elevated ALT (up to 319 U/L). A detailed history revealed regular bodybuilding supplement intake starting in December 2023. Expert consultations confirmed these supplements can impair liver function and alter OP metabolism, but may also reduce liver enzyme levels causing false-positive cholinesterase suppression. Following strict supplement cessation and temporary removal from fogging duties, his Cholinesterase (8.21 kU/L) and ALT (43 U/L) completely normalized by April 2025. A multidisciplinary consensus subsequently cleared him for a trial return-to-work, supported by rigorous health monitoring and a qualitative respirator fit test.
Conclusions: Health supplements can simulate OP poisoning, posing a significant diagnostic challenge. Acquiring comprehensive lifestyle histories and implementing structured, multidisciplinary return-to-work strategies are crucial to prevent unnecessary occupational restrictions and safely retain skilled personnel.

Poster Presentation

P2 Fitness for Work

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Shaping a sustainable workforce: a PETRONAS enterprise-wide fitness initiative

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Introduction: Workplace fitness programs are often implemented as isolated, site-level initiatives with limited governance, leading to inconsistent delivery and sustainability. PETRONAS recognizes employee physical fitness as a strategic enabler of workforce resilience, operational safety, and long-term sustainability. To address physical inactivity and related health risks, PETRONAS Occupational Health introduced a centrally governed, enterprise-wide Fitness Enhancement Program (FEP) encompassing both physical and mental health. This presentation describes the leadership-driven design, governance, and implementation of an enterprise-wide fitness initiative aimed at strengthening preventive health, enhancing work ability, and embedding wellbeing into organizational culture.

Materials and Methods: The FEP was deployed across PETRONAS operations as a standardized Occupational Health initiative under central oversight. The framework included fitness screening, individualized exercise guidance, structured physical activity interventions, health education, and periodic monitoring. Strong leadership commitment, clear governance structures, and integration with existing Occupational Health systems ensured consistency while allowing site-level flexibility. Implementation experience, participation trends, and observed outcomes were documented descriptively.

Results: The enterprise-wide governance model enabled consistent rollout, high participation, and sustained engagement across locations. Based on prior similar programs among high-risk employees, participants are expected to show improvements in physical fitness, functional capacity, and health awareness. The program supports long-term adherence to healthy lifestyles and fitness for work, aligning with PETRONAS' sustainability and wellbeing agenda.

Conclusions: Enterprise-wide, well-governed fitness initiatives offer greater consistency, reach, and sustainability than fragmented programs. Embedding fitness within Occupational Health frameworks strengthens preventive health, enhances workforce resilience, and supports sustainable organizational performance amid rising non-communicable diseases.

Keywords: Occupational health; Enterprise-wide program; Leadership commitment; Workforce sustainability; Fitness to work

Poster Presentation

P2 Fitness for Work

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-093
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Are general medical check-ups adequate for safety-sensitive and physically demanding jobs in the plantation industry?

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Introduction: General medical check-ups (MCUs) are widely implemented in the plantation industry as part of occupational health practices. However, these assessments are largely generic and may have limited ability to predict occupational accidents, particularly in safety-sensitive and physically demanding jobs.

Materials and Methods: A mixed-methods study was conducted involving 191 plantation workers. Quantitative analysis included bivariate analysis with risk ratio (RR) estimation and multivariable logistic regression to assess associations between MCU-based fitness-for-work status, chronic conditions (hypertension, diabetes mellitus, obesity), and occupational accidents. Secondary data analysis, qualitative interviews, and expert panel discussions were performed to explore contextual factors and validate findings. Ethical approval was obtained from the Institutional Ethics Committee of Universitas Padjadjaran.

Results: Of 191 workers, 41.9% reported occupational accidents. No subgroup demonstrated a significantly different risk of occupational accidents. None of the variables were significantly associated with occupational accidents (all $p > 0.05$). This suggests that general health indicators used in MCUs may not reflect occupational risk exposures relevant to workplace accidents. Workers classified as fit and unfit demonstrated comparable accident rates (42.0% vs 40.0%, $p = 0.901$), with consistent findings from RR estimates. Multivariable logistic regression confirmed the absence of significant predictors, with work fitness status (OR 1.30; 95% CI 0.32–5.28), hypertension (OR 0.59; 95% CI 0.30–1.17), diabetes (OR 0.38; 95% CI 0.07–2.15), and obesity (OR 1.10; 95% CI 0.59–2.07) all showing non-significant associations. The model demonstrated limited explanatory power (Nagelkerke $R^2 = 0.024$).

Conclusions: General MCUs demonstrate limited predictive value for occupational accidents and may not adequately identify at-risk workers in safety-sensitive and physically demanding roles. These findings highlight the need for more targeted and risk-based approaches in occupational health practice.

Keywords: Occupational health surveillance; Medical check-up; Fitness for work; Occupational injury

Poster Presentation

P2 Fitness for Work

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Metabolic syndrome among healthcare workers in Kuala Selangor district health office: a workplace health surveillance signal for sustainable occupational health

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Healthcare workers are central to population health delivery, yet their own cardiometabolic risks are often under-recognised within occupational health programmes. Metabolic syndrome represents a clustering of modifiable risk factors that may affect long-term work ability, productivity, and workforce sustainability. This study assessed the prevalence and associated factors of metabolic syndrome among healthcare workers in Kuala Selangor, Malaysia, in alignment with workplace health promotion and non-communicable disease prevention priorities. A cross-sectional analysis was conducted using health screening data from 86 healthcare workers in Kuala Selangor. Metabolic syndrome was defined as the presence of at least three of five components: abdominal obesity, raised triglycerides, reduced HDL cholesterol, raised blood pressure, and raised fasting blood glucose. Descriptive analysis was used to estimate prevalence and component distribution. Group comparisons were performed between workers with and without metabolic syndrome. Logistic regression was used to identify predictors, with adjusted estimates reported as adjusted odds ratios (AOR), 95% confidence intervals (CI), and p-values. The prevalence of metabolic syndrome was 12.8% (95% CI: 7.3%-21.5%). The most frequent metabolic risk components were abdominal obesity (39.5%), raised triglycerides (31.4%), and reduced HDL cholesterol (22.1%). Workers with metabolic syndrome had higher mean BMI, waist circumference, systolic blood pressure, diastolic blood pressure, and triglyceride levels compared with those without metabolic syndrome. Obesity was more common among workers with metabolic syndrome (72.7%) compared with those without metabolic syndrome (22.7%). In multivariable analysis, BMI remained independently associated with metabolic syndrome after adjustment for age and gender, with each 1 kg/m^2 increase in BMI associated with 30% higher odds of metabolic syndrome (AOR 1.30, 95% CI: 1.04-1.61, p = 0.020). Approximately one in eight healthcare workers had metabolic syndrome, with abdominal obesity and dyslipidaemia forming the dominant risk pattern. BMI was the main independent predictor, highlighting adiposity as a practical screening and intervention target. These findings support the integration of routine workplace metabolic risk surveillance, targeted weight management, nutrition support, and staff wellness interventions within healthcare settings. Protecting the cardiometabolic health of healthcare workers is a strategic occupational health priority for sustaining a resilient health workforce.

Keywords: Metabolic syndrome; Healthcare workers; Occupational health; Workplace health promotion; Non-communicable disease; Malaysia

Poster Presentation

P3 Occupational Health and Safety Legislation

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A review on the regulatory compliance and implementation effectiveness of Taiwan's ergonomic hazard prevention guidelines associated with work-related musculoskeletal disorder

Yaw-Huei Hwang

In Taiwan, the Ergonomic Hazard Prevention Guidelines Associated with Work-related Musculoskeletal Disorder have been in effect since 2014. A phased evaluation was conducted to examine regulatory compliance and implementation effectiveness over the past decade using an online questionnaire survey. Survey respondents included enterprise-based occupational safety and health (OSH) personnel and occupational health nurses, on-site service occupational physicians and nurses, and labor inspectors. In total, 1,067 valid questionnaires were collected and analyzed.

The results indicate that only approximately 40% of enterprise-based OSH personnel and occupational health nurses reported direct involvement in conducting ergonomic assessments, whereas the majority of on-site service personnel reported frequent or comprehensive participation in such activities. Furthermore, only 12.7% of enterprise-based OSH personnel and nurses indicated that senior management was "aware of and familiar with the guidelines," while nearly 30% perceived supervisors as "not very concerned" or "not concerned at all" about ergonomic hazard prevention.

Across stakeholder groups, enterprises were commonly reported to face shortages in internal organizational resources and investment, as well as insufficient government support and professional capacity. In addition, both on-site service personnel and labor inspectors identified employee cooperation as a major challenge during implementation. Despite these constraints, 41.3% of labor inspectors, 36.1% of on-site service occupational physicians and nurses, and 30.3% of enterprise-based OSH personnel and nurses, respectively, rated the preventive impact of implementing ergonomic hazard prevention programs as "very helpful." Nevertheless, there was a broad consensus that most enterprises tend to prioritize formal regulatory compliance over substantive ergonomic improvements.

Regarding future revisions of the guidelines, all three professional groups expressed a strong need for additional ergonomic improvement case examples and more comprehensive introductions to assessment and intervention tools. Moreover, respondents emphasized the importance of incorporating content related to office ergonomics, and psychosocial risk factors, along with more practice-oriented and application-focused case studies.

Keywords: Ergonomics guidelines; Musculoskeletal disorders; Regulatory compliance and implementation; Online questionnaire

Poster Presentation

P3 Occupational Health and Safety Legislation

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Asbestos exposure and health risks in jade processing workers in Taiwan

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Objectives: This study aimed to clarify whether workers in non-mining nephrite jade–processing industries in Taiwan are exposed to asbestos or other dusts during processing operations, and to evaluate the associated health risks.
Methods: This study contacted 35 nephrite jade–processing workshops across Taiwan. A total of 84 air samples were collected. Airborne fiber concentrations were measured, and fiber mineral types were further identified using transmission electron microscopy (TEM). The mineral composition of jade materials was analyzed by X-ray diffraction (XRD).
Results: The highest asbestos concentrations were observed during coarse grinding operations, followed by cutting and fine grinding. TEM and mineralogical analyses indicated that most fibers were amphibole minerals belonging to the tremolite–actinolite series, consistent with the mineralogical characteristics of nephrite jade. Estimated excess lifetime cancer risk (ELCR) ranged from 5.8×10^{-6} to 3.29×10^{-2}, suggesting potential health hazards associated with long-term exposure.
Conclusions: Nephrite jade–processing activities may release amphibole fibers with asbestos-like morphology, and long-term inhalation poses carcinogenic risks. Exposure levels in some workers exceeded international recommended limits, highlighting the necessity of improving occupational safety measures.

Keywords: Asbestos; Occupational exposure; Cancer risk; Nephrite jade; Risk assessment

Poster Presentation

P3 Occupational Health and Safety Legislation

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When work takes a toll on the heart: a case of work-related acute myocardial infarction in Singapore

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Background: Acute myocardial infarction (AMI) is not a notifiable occupational disease in Singapore under the Workplace Safety and Health Act. Nevertheless, AMI may still be compensable under Singapore's Work Injury Compensation Act 2019 if work is shown to have contributed to the cardiac event. However, establishing "work-relatedness" remains challenging for Occupational Medicine (OM) physicians.
Objectives: To examine how occupational investigations, local case law, international standards, and epidemiological evidence can inform OM physicians' assessment in the evaluation of work-relatedness of AMI.
Materials and Methods A detailed case review was conducted, involving occupational investigations and working hours analysis, which were further triangulated with Singapore case law, international frameworks and published epidemiological evidence.
Results: The deceased, a 40-year-old construction worker without cardiovascular risk factors, died of AMI after a morning shift. Working hours analysis revealed overtime work exceeding 72 hours per month over five consecutive salary cycles, and 124 consecutive days without rest days, far exceeding existing international thresholds (Japan, Korea, Taiwan) used to establish work-relatedness. Singapore case law (NTUC Income v Narayasamy [2006], Allianz v Ma Shoudong [2011], Arpah Bte Sabar v Colex Environmental [2019], Sompo Insurance v Tay Jia Yi [2022]) had established that work need not be the sole cause of AMI, pre-existing conditions do not preclude compensability, and the burden lies with the employer to prove existing medical conditions were the only cause of death. Scientific evidence also showed elevated cardiovascular risk with long working hours. The OM physician therefore assessed that cumulative excessive overtime was highly likely to have contributed to the fatal AMI.
Conclusions: Integrating findings from occupational investigations, local case law judgments, existing international frameworks on overtime work, and scientific evidence can be used to formulate the OM assessment on work-related AMI. Regulatory enforcement of overtime limits is needed to protect workers from overwork-related cardiovascular harm.

Keywords: Cardiovascular disease; Work-relatedness

Poster Presentation

P4 Occupational Health Policies

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Workplace environment improvement program for small-scale printing businesses: the Korean experience

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Small-scale printing establishments in Seoul constitute one of Korea's most concentrated clusters of micro-enterprise manufacturing, with 74.4% employing fewer than five workers. Among the various occupational hazards present in these establishments, exposure to organic solvents — particularly toluene — poses the most significant health risk, alongside noise, rotating day–night shifts, and ergonomic strain from prolonged standing and manual handling of heavy paper stock. However, these establishments lack in-house occupational health and safety capacity owing to their economically marginal scale of operation. Although statutory work environment monitoring and special health examinations are conducted periodically, their recommendations for engineering controls, ventilation improvements, and personal protective equipment rarely translate into actual workplace changes. The Seoul Workers' Health Center, established to support occupational disease prevention and build occupational health and safety capacity in small and micro-enterprises, launched a workplace environment improvement project targeting small printing establishments in 2021. To overcome the limitations of paper-based recommendations that had failed to translate into meaningful workplace improvements, this project adopted a novel three-pronged approach. First, open consultations were conducted with employers and workers to identify the barriers to workplace improvement. Second, moving beyond written or verbal recommendations, concrete and acceptable alternatives were proposed to facilitate behavioral change. Third, workers were supported in gaining positive firsthand experience of the changes implemented. Building on this approach, and following multiple site visits and consultations, the Center introduced a set of alternative work tools designed to reduce organic solvent exposure — dedicated solvent dispensing containers, sealed disposal bins for solvent-soaked rags, and enclosed units to replace open solvent washing basins — chosen for usability, adaptability, and affordability.

Several key findings emerged. First, physical modifications to equipment proved more effective in changing worker behavior than educational materials or verbal recommendations: small, visible changes often triggered cascading voluntary improvements. Second, the experience of successfully making such changes shifted workers' perceptions, fostering a sense of agency — a recognition that meaningful improvement was both achievable and something they themselves could accomplish. Third, interventions refined through site-level experience were readily transferable to establishments with similar processes, and the existence of visible precedents lowered the threshold for explanation and adoption — indicating potential for development into a scalable program.

Based on these findings, several recommendations are proposed. Occupational health improvement in micro-enterprises cannot be achieved through regulation alone; a context-sensitive, supportive approach offering concrete and affordable alternatives is essential. Workers' Health Centers should be supported in their role as field-based partners to both employers and workers, and their capacity for planning and implementing site-level interventions should be expanded. Cooperation across relevant agencies — both technical and financial — is needed to support the selection of suitable alternative equipment, including custom adaptation where necessary.

Keywords: Small business; Occupational exposure; Workplace improvement program; Occupational health services; Printing industry

Poster Presentation

P4 Occupational Health Policies

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Assessing the unmet occupational health needs of vulnerable workers in Busan Korea: a call for a tailored regional center

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Introduction: Vulnerable workers, including migrant, small-enterprise, platform, and care workers, face a disproportionate risk of occupational injuries and illnesses. Despite existing national frameworks, these groups often remain in the blind spots of occupational health services. This study investigated the unmet occupational health needs of vulnerable workers in Busan to evaluate the necessity of establishing a specialized regional occupational health center.

Methods: A cross-sectional survey was conducted among 772 vulnerable workers in Busan Korea, comprising migrant workers (n=245), small-enterprise workers (n=247), platform workers (n=182), and care workers (n=98).

Results: The survey revealed significant, group-specific occupational health burdens. Platform workers reported the highest prevalence of systemic fatigue (59.9%) and ocular diseases (29.7%). Mental health issues were severely prevalent; insomnia affected 49.3% of small-enterprise workers and 49.0% of migrant workers, while anxiety (41.9%) and depression (30.2%) were highly reported among care workers. Additionally, respiratory and skin conditions were prominent in small-enterprise workers (15.0% and 15.8%, respectively). Despite these heavy health burdens, nearly half of the total respondents reported experiencing presenteeism (working while sick). The utilization of standard occupational health services remained critically low, with migrant workers isolated by language barriers and platform workers lacking basic social insurance coverage. Consequently, an overwhelming majority (96.5%) of the respondents strongly agreed that establishing a specialized local occupational health center is necessary to address their specific vulnerabilities.

Conclusions: The current national occupational health system is insufficient to protect the diverse and emerging classes of vulnerable workers. The establishment of a local, tailored occupational health center in Busan is essential. Such a center must provide accessible, group-specific services, including language support for migrants, psychological care for platform and care workers, and proactive health management for small-enterprise workers, thereby serving as a crucial safety net.

Keywords: Vulnerable workers; Occupational health center; Migrant worker; Platform worker; Care worker

Poster Presentation

P4 Occupational Health Policies

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Perceived facilitators and barriers for reporting of occupational diseases among healthcare professionals

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Introduction: Occupational diseases contribute significantly to global morbidity, mortality and economic burden, yet remain under-reported in many settings. In Brunei Darussalam, notification of occupational diseases is legally mandated, however reporting remains suboptimal, limiting the availability of national data. This study aimed to assess the knowledge, attitudes and practices of medical practitioners regarding occupational disease notification and to identify perceived facilitators and barriers to reporting.

Methods: A cross-sectional study was conducted among medical practitioners registered with the Brunei Medical Board. Data were collected using a pre-tested, self-administered, web-based questionnaire adapted to the local context. The survey captured sociodemographic characteristics, occupational health training, knowledge and attitudes towards occupational disease notification, and perceived facilitators and barriers. The questionnaire was distributed via email, after which data were analysed using SPSS Version 20. Descriptive statistics were used to summarise variables, while Chi-square and Fisher's exact tests assessed associations between categorical variables.

Results: A total of 187 medical practitioners participated (response rate 27.4%). Most respondents lacked prior occupational health training (83.4%) and occupational health work experience (78.6%), although 55.6% had encountered occupational diseases in clinical practice. Only 16.6% reported notifying occupational diseases in the past year. Practitioners with occupational health training were more likely to report occupational diseases compared to those without (29.0% vs. 14.1%, $p = 0.04$), as were those with occupational health work experience (30.0% vs. 12.9%, $p = 0.01$). While 50.3% of medical practitioners perceived themselves to have adequate knowledge to diagnose occupational diseases and 48.1% reported that they were aware of notification processes, only 39.5% had ever notified occupational disease cases. Key barriers included inadequate training, diagnostic uncertainty and time constraints, while facilitators included clear diagnostic guidelines (58.8%), formal occupational health training (55.6%) and guidance on notification procedures (50.8%).

Conclusions: Notification of occupational diseases among medical practitioners in Brunei Darussalam remains suboptimal, driven by gaps in training, knowledge and systemic barriers. Strengthening occupational health education, improving access to clear guidelines and streamlining notification processes are essential to enhance reporting practices and support effective occupational disease surveillance.

Keywords: Occupational diseases; Notification; Barriers; Facilitators; Surveillance

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Current status and challenges of autonomous chemical management in Japanese manufacturing SMEs

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Introduction: In Japan, regulatory amendments introducing autonomous management of workplace chemical substances have been enacted to prevent related health disorders. Occupational accidents involving chemical substances occur more frequently in smaller workplaces, making chemical management in small and medium-sized enterprises (SMEs) a critical issue. This study aimed to assess current practices in autonomous chemical management in SMEs and to explore strategies to promote such management.

Materials and Methods: A self-administered, anonymous questionnaire survey was conducted from July 2025 to March 2026 among employers or chemical management personnel in manufacturing SMEs with fewer than 300 employees. Survey items included basic characteristics, industry type, company and workplace size, and chemical use. Respondents handling chemicals were asked about management practices. Descriptive statistics were calculated, and comparisons were made by company and workplace size.

Results: Responses were obtained from 94 participants. Most respondents were in their 50s (39.4%), male (69.6%), and held management positions (47.9%). Manufacturing accounted for 85.1% of workplaces, and 43% had 100–299 employees. Chemical substances were handled in 67 workplaces (71.3%). The most common measures included the use of personal protective equipment (88.1%) and the appointment of a chemical substance manager (86.6%). Risk assessment was conducted in 68.7% of workplaces, exposure reduction measures in 59.7%, and health examinations with record-keeping in 56.7%.

Conclusions: While basic measures are widely implemented, systematic management practices such as risk assessment, worker education, and health management remain insufficient. Greater awareness and structured management systems are needed, along with support from occupational health professionals.

Keywords: Chemical management; Manufacturing industry; SMEs

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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The influence of safety training on technicians' safety culture in the pharmaceutical manufacturing industries in Kenya

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Technicians in pharmaceutical manufacturing industries work in sensitive occupational settings. They are routinely exposed to chemical hazards due to the nature of their work. In order for them to perform, safety is paramount. This research assessed the influence of safety training on safety culture of technicians in pharmaceutical manufacturing industries in Nairobi County. To achieve the objective, descriptive survey research design was employed. In selecting the study sample purposive sampling was utilized. Thirty-three (33) Pharmaceutical Manufacturing Industries were selected based on the inclusion criteria from the study area, Nairobi Metropolitan. Pharmaceutical Manufacturing Industries formed the sampling unit from where respondents were drawn. The population of the study was 4,000 employees drawn from the sampled Pharmaceutical Manufacturing Industries. The sample of the study was three hundred and seventy-nine (379) respondents, who comprised of Technicians. Data was collected through self-administered structured questionnaires and observation. The collected data was subjected to quantitative and qualitative analysis by employing SPSS. The results show that the safety maturity level recorded in 85% of the pharmaceutical manufacturing industries is at continually improving safety maturity level and only 15% of the sampled industries were at the involving safety maturity level. This was based on an analysis of the safety culture key dimensions. The findings have also shown that majority of the respondents at 75.4% had their first encounter with OSH training at work environment commonly referred to as On the Job Training (OJT) and only 23.3% were trained during their academic/professional education. The findings have shown that a majority of the respondents; 89.0% and 80.8% of the respondents had been trained on the requirements of OSH Act 2007 and Evacuation procedures respectively. Notably, the training area with the least awareness was Exposure Limits of hazardous chemicals and substances at 29.1% across all PMI's. The p values for OSH Training and Safe work documentation are $p < 0.001$ and 0.421 respectively, indicating that OSH training is a statistically significant predictor of Safety Culture. Based on the results the study accepts the null hypothesis; there is a statistically significant difference in influence of safety training on safety culture of technicians among pharmaceutical manufacturing industries. The study therefore concludes that OSH training has a significant positive influence on safety culture in pharmaceutical manufacturing industries in Nairobi, Kenya. The study indicates that there is need to incorporate OSH competency in the professional training of potential employees in the pharmaceutical manufacturing industries in Kenya.

Keywords: Occupational safety and health; Training; Safety culture; Pharmaceutical manufacturing industries

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Silent but persistent: occupational lead poisoning among battery industry workers in Tunisia

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Background: Lead remains a major occupational hazard due to its cumulative toxicity and multisystem effects. Although preventive measures have reduced exposure in many settings, certain industries continue to present a significant risk. In Tunisia, occupational exposure to lead persists, particularly in battery manufacturing, raising ongoing concerns for workers' health.
Objectives: This study aimed to describe the socio-professional characteristics and biological profile of workers with occupational lead poisoning and to examine their recognition as occupational diseases.
Materials and Methods: A retrospective descriptive study was conducted over a four-year period (October 2021 to October 2025), including all cases of suspected occupational lead poisoning assessed by the Regional Committee for the Recognition of Occupational Diseases. Data on occupational history, duration of exposure, clinical findings, and biological parameters, including blood lead levels and urinary delta-aminolevulinic acid, were collected and analyzed.
Results: A total of 48 cases were identified, all involving male workers employed in battery manufacturing. The mean age was 36.8 years, and the average duration of exposure exceeded seven years. Occupational exposure was confirmed in all cases. Most workers were asymptomatic, and diagnosis was based primarily on biological abnormalities, including markedly elevated blood lead levels and increased urinary delta-aminolevulinic acid. Temporary removal from exposure was required in all cases. All cases were recognized as occupational diseases according to national criteria.
Conclusions: Occupational lead exposure remains a persistent issue in high-risk industries despite existing surveillance measures. Strengthening preventive strategies and reducing lead use are essential to better protect workers and limit long-term health consequences.

Keywords: Occupational lead exposure; Lead poisoning; Battery manufacturing workers; Occupational diseases; Biological monitoring; Workplace health surveillance

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Occupational health risks in Asian power battery recycling: focus on mixed chemical exposures and biological aging

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Introduction: The booming electric vehicle market has made power battery recycling a core component of the global circular economy, yet it faces unique occupational health and safety (OHS) challenges in both formal and informal recycling settings across Asian. Multi-metal toxicity involving nickel sulfate ($NiSO_4$), cobalt oxide (Co_3O_4), manganese dioxide (MnO_2), and lead carbonate ($PbCO_3$), as well as process-specific hazards, remains underrecognized, with limited evidence supporting global OHS-aligned sustainable mitigation strategies. This study characterized chemistry-specific occupational hazards, multi-metal synergistic toxicity, and long-term health impacts in Asian power battery recycling, and proposed evidence-based, industry-tailored sustainable OHS interventions.

Materials and Methods: A systematic review was conducted in accordance with the PRISMA 2020 guidelines, with searches performed in PubMed, Embase, Web of Science, and CNKI databases. The review synthesized 23 peer-reviewed studies (2016–2026) from East Asia (China, Japan, South Korea), Southeast Asia (Indonesia, Vietnam, Malaysia), and South Asia (India, Bangladesh, Pakistan). Studies were screened for data on chemical exposure, health outcomes, and intervention efficacy to identify risk patterns and evidence-based control measures.

Results: Key findings: (1) Severe overexposure to nickel-cobalt-manganese (NCM) dust (3–10× occupational exposure limits [OELs]), hydrogen fluoride (HF)/phosphoryl fluoride (POF_3) (up to 12× OELs), N-methylpyrrolidone (NMP) (up to 16× OELs in formation workshops), and lead (mean worker blood lead level: 41.7 μg/dL). (2) Multi-metal toxicity was significantly associated with biological age acceleration (3–5 years of acceleration in workers with >5 years of exposure), as measured by telomere length ($r = -0.42$, $p < 0.01$), 8-OHdG ($r = 0.38$, $p < 0.05$), and DNA methylation age acceleration. Urinary nickel (maximum 753.84 μg/L) and cobalt (maximum 378.58 μg/L) levels exceeding reference values were significantly associated with respiratory symptoms (OR 2.06–3.97) and skin symptoms (OR 1.70–2.28). Renal impairment (observed in 60–72% of workers), cardiac dysfunction (prolonged QT interval, decreased left ventricular ejection fraction [LVEF]), ocular damage (conjunctivitis, corneal opacity, dry eye syndrome), and anemia/hypertension (prevalence 28.0–29.8%) were also documented. (3) Validated interventions included automated dismantling (achieving 60–80% dust reduction), chemistry-specific sorting (40% reduction in exposure), targeted health surveillance, protective goggles (60–70% reduction in eye-related risks), and ventilation systems for NMP control. (4) A semi-quantitative occupational risk assessment framework was developed, featuring four-tier risk ratings based on exposure concentrations relative to OELs (Low: <OEL, Medium: 1–3× OEL, High: 3–10× OEL, Very High: >10× OEL) for mixed chemical exposures.

Conclusions: Asian power battery recycling is associated with severe industry-specific OHS risks stemming from multi-metal toxicity and accelerated biological aging. Chemistry-informed process optimization, tiered engineering controls, and targeted health surveillance are critical to protect workers and advance the sustainability of the circular economy, thereby providing a scalable framework for global battery recycling OHS policies.

Keywords: Power battery recycling; Occupational health risks; Mixed chemical exposures; NMP organic solvents; Biological aging; Sustainable interventions

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Prevalence of depression and related factors among Korean large purse seine fishermen: a cross-sectional study

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Introduction: Depressive disorder is a common mental illness, and the World Health Organization (WHO) estimates that it will become the disease with the highest disease burden by 2030. Large-scale purse seine fishing, a form of coastal fishery, is a highly dangerous and stressful occupation. There are psychological stressors, including high hazards due to extreme natural environments and the use of heavy equipment, long working hours, prolonged isolation from society and family life on board, as well as economic hardship and job insecurity resulting from declining catches. This study was conducted to evaluate the prevalence of depression and related factors among large-scale purse seine fishermen.

Methods: Data were obtained from the Database at Busan Paik Hospital Center for Fishermen's Safety and Health. Sociodemographic characteristics such as age, alcohol consumption, and smoking, as well as fishing work experience, depression, and psychological stress, were analyzed. The levels of depression and psychological stress were investigated using the National Depression Scale Brief Version (NDS_BV) and the National Stress Scale Brief Version (NSS_BV) from the Korean National Center for Mental Health (2024). Depressive disorder and psychological stress were evaluated according to the User Guide for Korean Mental Health Scales (Korean National Center for Mental Health, 2024).

Results: The prevalence of suspected depressive disorder among the total subjects was high at 5.4%. The prevalence of suspected depressive disorder was higher among younger individuals and those with less experience in fishing. The prevalence was also higher in the presence of psychological stress. Less experience in fishing and the presence of psychological stress were identified as risk factors for depressive disorder.

Conclusions: It is considered necessary to establish preventive policies and engage in active risk factor management activities to reduce risk factors for mental illness among fishermen.

Keywords: Large purse seine fishermen; Depression

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Musculoskeletal symptoms and related factors among Korean fisherwomen, Haenyeo: a cross-sectional study

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Introduction: Haenyeo are Korean fisherwomen who dive without oxygen equipment to harvest seaweed and shellfish. Their work exposes them to multiple risk factors for musculoskeletal disorders (MSDs). This study evaluates musculoskeletal symptoms (MSS) and related factors among Haenyeo.
Methods: Data were obtained from the Busan Paik Hospital Center for Fishermen's Safety and Health. Variables included sociodemographic characteristics (age, education, marital status, household composition, housework time, income, employment, and fishing duration) and diving work factors (days and hours dived, number of dives, bottom time, and diving depth). MSS were assessed using the Musculoskeletal Symptom Survey Form (KOSHA Code H-30-2008), and psychosocial stress was measured using the Psychosocial Wellbeing Index-Short Form (PWI-SF). Participants reporting MSS lasting more than one week or occurring at least monthly in the past year were classified as "Criterion 1."
Results: The prevalence of Criterion 1 was 93.7%. The most affected body parts were the lower back (82.7%), knees (70.9%), and shoulders (56.7%). Multivariate logistic regression showed that annual diving days were associated with neck and shoulder MSS; psychosocial stress was linked to MSS in the neck, hands/wrists, and knees; having a second job was associated with knee MSS; and living with two or more family members was associated with lower back MSS.
Conclusions: Considering these results, preventive and management strategies for MSDs among Haenyeo are needed.

Keywords: Haenyeo; Musculoskeletal disorders

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Development of Augmented Reality Physical Ergonomics (ARPE) training module for manual material handling workers: a fuzzy Delphi study and platform development

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Introduction: Manual material Handling (MMH) workers face an increased risk of work-related musculoskeletal disorders (WMSDs) due to the physically intensive nature of their tasks. Conventional ergonomic training methods often do not engage learners effectively. This study aims to develop an Augmented Reality Physical Ergonomics (ARPE) training module designed to enhance ergonomic knowledge, self-assessment, and preventive practices through an immersive learning experience for MMH workers.

Methods: The ARPE training module, comprising three domains (knowledge, self-prevention, and self-evaluation) and 25 subdomains, was developed through an extensive literature review. Subsequently, the fuzzy Delphi method was employed to gather consensus from a panel of 10 experts regarding the content of the ARPE training module. Based on expert consensus, the ARPE training module was developed using the MAKAR AR mobile app as its platform, which is designed for AR-integrated content creation. A separate website was created to guide users in using the ARPE training module.

Results: All subdomains achieved expert consensus for inclusion (threshold values: 0.2; expert agreement: 75%; Amax: 0.5) and were retained. Experts endorsed all domains and subdomains, emphasizing the importance of each in ensuring the effectiveness of the ARPE training module. The ARPE training module platform utilizes MAKAR mobile apps and integrates non-immersive AR systems. This platform development follows key principles, incorporating ergonomic guidelines into the AR content to demonstrate proper body mechanics, posture, and the use of ergonomic tools. A guide and manual for using the training module, including step-by-step instructions for downloading and using the Makar apps, is available on the ARPE training module website.

Conclusions: The Validated ARPE training module includes essential domains vital for ergonomic training among MMH workers. Using AR in ergonomics training enhances participant engagement, making learning more engaging and aligning with the global trend of utilizing advanced technologies to strengthen ergonomic methodologies across various industries.

Keywords: Augmented reality (AR); Ergonomics training; Manual material handling (MMH); Work-related musculoskeletal disorders (WMSDs); Interactive learning

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Fall-prevention behavior patterns during care tasks among care workers in elderly care facilities: a Safety-II perspective

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Introduction: Falls among workers in social welfare facilities, including care workers, are common and represent a major occupational safety concern. From a Safety-II perspective emphasizing everyday successful practices that support safety, this study aimed to identify patterns of fall-prevention behaviors routinely practiced by care workers.
Materials and Methods: A questionnaire was developed based on interview surveys with care workers in elderly care facilities. It included 40 items on fall-prevention behaviors, including those performed during care tasks in elderly care facilities and practiced in home settings, 3 items on near-falls (i.e., almost falling), and 8 profile items. An online survey was conducted with 474 care workers, who rated the frequency of each behavior and near-falls using a five-point Likert scale. The study was approved by the ethics review board of the first author's institution. Exploratory factor analysis with promax rotation was performed on items related to fall-prevention behaviors during care tasks in elderly care facilities.
Results: Six factors were identified, accounting for 66.8% of the total variance: (1) adjusting work conditions and resident handling techniques to reduce physical burden, (2) sharing information about older residents with colleagues, (3) checking for visible fall hazards in advance, (4) using resident-centered verbal communication, (5) seeking assistance within the team, and (6) arranging the environment to prevent slipping.
Conclusions: Fall-prevention behaviors were multifaceted, involving not only individual actions but also interactions with colleagues and older residents, as well as environmental management. These findings highlight the importance of understanding how safety is achieved in everyday practice through interactions among care workers, residents, and the environment, suggesting the need for a comprehensive, systems-oriented perspective. In addition, the relationships among these fall-prevention behavior patterns, those practiced in home settings, and the frequency of near-falls will be examined using regression analysis, and the results will be reported.

Keywords: Fall prevention; Care workers; Safety-II; Elderly care facilities

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Association of job psychosocial factors and work engagement with sleep quality among shift workers in an oleochemical industry setting

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Background: Sleep disturbance is common among shift workers and may be associated with psychosocial job characteristics and work engagement. However, evidence from Malaysian industrial populations remains limited.
Objectives: To determine the prevalence of poor sleep quality and examine its associations with psychosocial job factors and work engagement among employees in an oleochemical plant.
Methods: A cross-sectional study was conducted among 225 shift workers in an oleochemical factory. Sleep quality was assessed using the Malay version of the Pittsburgh Sleep Quality Index (PSQI-M), with a global score >5 indicating poor sleep. Psychosocial job factors were measured using the Malay version of the Job Content Questionnaire (JCQ-M), and work engagement was assessed using the Malay version of the Utrecht Work Engagement Scale (UWES-M). Bivariate logistic regression analyses were conducted to examine the associations of psychosocial job factor domains (job demand, job control, social support) and work engagement with sleep quality.
Results: The prevalence of poor sleep quality was 71.6%. Job demand (OR = 20.61, 95% CI [8.97–47.34], $p < .001$) and job control (OR = 215.36, 95% CI [48.08–964.71], $p < .001$) were both significantly associated with higher odds of poor sleep. Social support was not significantly associated with sleep quality (OR = 1.43, 95% CI [0.61–3.34], $p = .407$). Work engagement was also not significantly associated with sleep quality (OR = 1.07, 95% CI [0.70–1.64], $p = .769$).
Conclusions: High job demand and job control were strongly associated with poor sleep quality among oleochemical workers. In this context, job control may represent greater responsibility and decision-making load rather than protective autonomy. Social support and work engagement showed no meaningful associations with sleep quality. Further longitudinal studies with larger samples are needed to clarify these relationships and to better understand the mechanisms underlying sleep disturbance in shift-working populations.

Keywords: Shift work; Psychosocial work factors; Work engagement; Sleep quality; Industrial workers

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Reconstructing occupational radiation exposure in a non-destructive testing worker: a case-based semi-quantitative analysis

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Accurate assessment of occupational radiation exposure in non-destructive testing (NDT) workers is challenging due to dynamic work environments and task variability. We report the case of a male industrial radiographer with over 10 years of occupational exposure who developed leukemia without prior hematologic disease, focusing on reconstruction of his radiation exposure using detailed work records.

A comprehensive review of company logs revealed high-frequency radiographic operations involving variable source activities (approximately 30–95 Ci), exposure durations (30–200 seconds per shot), and multiple exposures per session (typically 20–40 images per shift). Tasks were performed across multiple industrial sites, requiring real-time adjustments in time, distance, and shielding, with recorded environmental dose rates demonstrating variability across work settings.

To further characterize exposure variability, a semi-quantitative estimation was conducted using task-level parameters. Repeated short-duration exposures under high-activity sources suggest substantial variation in daily exposure intensity, despite relatively stable recorded badge doses. Such intermittent high-dose-rate exposures, although brief, may not be fully captured by cumulative dosimetry.

Although personal monitoring indicated a cumulative dose of 21.12 mSv, which is within regulatory limits, this reconstructed exposure profile highlights potential limitations of conventional dose assessment in mobile industrial radiography settings. This case demonstrates the value of integrating detailed work practice data into occupational exposure evaluation. Enhanced monitoring strategies that account for task variability and exposure patterns are warranted to better characterize radiation risks in NDT workers.

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Human hair as a biomarker for polychlorinated biphenyl exposure in electronic waste recycling workers

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Introduction: Dismantling, sifting, burning, or handling old electrical components exposes electronic waste recyclers to carcinogenic polychlorinated biphenyls. Ingestion, skin contact, and chronic inhalation necessitate biomonitoring for occupational health surveillance. Serum and plasma are proven matrices, but blood sample can be invasive, logistically difficult, and unsuitable for large-scale field studies. This scientific review evaluated scalp hair as a non-invasive biomonitoring matrix for polychlorinated biphenyl exposure in electronic waste recycling workers, compared with serum and plasma biomarker.
Methods: PubMed, Scopus, ProQuest, Taylor and Francis, and hand searching were used for structured literature searches from 23 to 26 February 2026. Search terms covered electronic waste recycling workers, hair biomonitoring, serum and plasma polychlorinated biphenyl, and occupational exposure. Human biomonitoring studies, systematic reviews, cross-sectional, or case-control studies published within the previous ten years, involving productive-age non-pregnant populations, available as English full texts, and containing quantitative data were suitable for appraisal. Five studies were selected for critical appraisal.
Results: Two cross-sectional studies of Southern Chinese electronic waste workers, a ten-year Chinese community research, an Iranian multi-industry study, and a comprehensive narrative review of 178 biomonitoring investigations were used in this study. Electronic waste workers' hair polychlorinated biphenyl concentrations were 161 to 3.514 nanograms per gram dry weight and showed significant positive correlations with paired serum concentrations, with correlation coefficients from 0.49 to 0.81. The source allocation of hair polychlorinated bipheny was approximately 64 percent originated from occupational air, 27 percent from systemic blood absorption, and 9 percent from indoor dust. Chiral signature analysis supported predominant external deposition in hair, while serum reflected internal metabolism. In a ten-year biomonitoring dataset, median hair concentrations dropped 99.8 percent after regulatory enforcement.
Conclusions: Electronic trash recycling workers of polychlorinated biphenyl exposure can be monitored non-invasively using scalp hair. Its strengths include medium to long-term exposure assessment, potential retrospective exposure reconstruction, and suitability for large-scale surveillance in resource-limited settings. Standardized washing, sampling, and testing are important since workplace air and dust affect hair concentrations. Integrated hair and blood-based matrices are advised for occupational exposure tracking and risk management, while serum and plasma are for clinical interpretation and regulatory compliance.

Keywords: Polychlorinated biphenyls; Human hair biomonitoring; Electronic waste workers; Occupational exposure; Non-invasive biomarker

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Occupational demands, fatigue, and risky driving among Malaysian long-haul drivers: a study protocol for a moderated mediation model with objective validation

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Introduction: Road traffic injuries remain a leading cause of death globally, with a disproportionate burden among working-age populations in low- and middle-income countries. Long-haul drivers are particularly vulnerable due to sustained occupational demands that compromise safety. Despite growing recognition of driver fatigue, the occupational mechanisms linking job demands to risky driving behaviour remain insufficiently understood, particularly when considering emerging lifestyle factors such as chrononutrition that may influence fatigue through circadian disruption. This study protocol aims to examine these pathways among Malaysian long-haul drivers using a moderated mediation framework grounded in the Job Demands–Resources model.

Materials and Methods: A two-phase design will be employed. Phase 1 involves a cross-sectional survey of approximately 402 long-haul lorry and bus drivers across Malaysia, utilising validated instruments to assess occupational demands, economic pressure, job and personal resources, chronic fatigue, sleep quality, chrononutrition, and risky driving behaviour. Structural Equation Modelling will be used to test mediation and moderation effects. Phase 2 adopts a prospective naturalistic observational design, where a subset of 75 drivers will be monitored using AI-based cabin cameras to objectively capture real-world risky driving behaviours.

Results: It is hypothesised that occupational demands and economic pressure will increase risky driving behaviour both directly and indirectly through chronic fatigue. Sleep quality and chrononutrition are expected to buffer the effects of job demands on fatigue. Drivers with higher fatigue levels are anticipated to demonstrate a greater frequency of objectively detected risky driving events.

Conclusions: This study advances occupational health research by integrating psychosocial, biological, and behavioural dimensions within a unified framework. By incorporating chrononutrition alongside sleep and occupational stressors, and combining subjective assessments with objective behavioural validation, the study addresses key conceptual and methodological gaps. The findings are expected to inform fatigue risk management strategies, workplace interventions, and policy development aimed at improving road safety among commercial drivers.

Keywords: Occupational demands; Fatigue; Risky driving behaviour; Long-haul drivers; Chrononutrition; Naturalistic driving study; Moderated mediation model; Malaysia

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Ergonomic challenges of a committed dentist: blame the job or the biology?

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A mid-career dental officer presented with recurrent symptoms affecting the right index finger beginning in December 2024. Initially, the complaint was numbness without pain, but it progressed to moderate to severe pain that interfered with daily clinical duties. Early assessment revealed a grade 1 trigger finger and tendinitis, with steroid injection providing temporary relief. Significant improvement was noticed after intensive rehabilitation and job modifications until symptoms recurred approximately six months later, in conjunction with increased patient load.

Further serial evaluations by occupational health physicians, orthopaedic surgeons, radiologists and rehabilitation specialist identified several inter-related multifactorial diagnoses: grade 1 trigger finger of the right index finger, proximal median nerve compression of the right forearm and mild cervical spondylosis. Human factor appeared to play a significant role in this case, where the anatomy and biomechanics of the officer's hand seem to be the predisposing risks of developing the conditions, later on made worse by the nature of the job. Despite conservative management, ergonomic stressors such as awkward posture, sustained and static posture, repetitive pinching and use of vibrating dental instruments plus workload surges exacerbated the condition. On the other hand, there is still an opportunity for surgical intervention, but the officer remained undecided due to the associated risks.

From the organizational leadership perspective, prolonged light-duty restrictions reduced clinical productivity and raised workload distribution concerns among colleagues. The hospital management thus faced a dilemma between continuing rehabilitation or redeploying the officer to administrative duties, with implications for career sustainability as well as the continuity of safe and high-quality dental service provision. The management could not compel medical treatment without the worker's consent, despite potential benefits for both parties.

This case highlights the complex interplay between biological predisposition and occupational ergonomics in dentistry. It underscores the need for multidisciplinary ergonomic interventions, including early risk assessment, pre-employment evaluation, workplace adjustments as well as preventive strategies to safeguard the worker's professional longevity. Ultimately, the issue is not merely biological or occupational, but rather systemic, requiring balanced solutions that protect worker health, sustain organizational productivity and ensure patient safety is never jeopardized.

Keywords: Dentist; Ergonomics; Trigger finger; Occupational health; Rehabilitation

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Assessment of eye lens dose for medical radiation workers during interventional procedures using anthropomorphic phantom simulation

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Introduction: Medical radiation workers involved in interventional fluoroscopy are routinely exposed to scattered ionizing radiation, placing them at risk of radiation-induced cataracts. Non-compliance with personal dosimeter use further limits accurate exposure assessment. Following the ICRP reduction of the occupational eye lens dose limit to 20 mSv/year (averaged over five years), reliable dose estimation is essential for providing proper prevention and assigning workers to appropriate medical surveillance.

Objectives: To assess eye lens doses among different medical radiation worker roles during selected interventional procedures using nanoDot dosimeters and explore the potential factors possibly linked to eye lens dose.

Methods: A simulation-based experimental study was conducted in the interventional fluoroscopy units of Srinagarind Hospital. An anthropomorphic phantom was placed to simulate the patient. Body and head phantoms were positioned to represent different MRW roles during CAG, PCI, TACE, PTBD, embolization, and thrombectomy. NanoDot dosimeters were placed at the eye lens positions to measure radiation dose under conditions with and without lead glasses.

Results: Embolization resulted in the highest exposure, followed by PCI, thrombectomy, TACE, CAG and PTBD. Average eye lens doses without radiation protection ranged from 0.56 to 18.22 μSv/procedure for primary physicians and from 0.96 to 70.27 μSv/procedure for secondary physicians, while scrubbed nurses received radiation doses ranging from 0.25 to 19.04 μSv/procedure, which were comparable to those observed among primary physicians. Other staff positions showed substantial values. The use of lead glasses reduced the eye lens radiation dose by approximately 30–70%.

Conclusions: Secondary physicians received greater eye lens radiation exposure than primary physicians, while scrubbed nurses received radiation doses comparable to those of primary physicians. This exposure pattern may be explained by the concentration of scatter radiation at the secondary physician's position and the inadequate coverage provided by the ceiling-suspended lead shield during interventional procedures. The type of procedure, the distance from the radiation source, scatter radiation, the use of lead glasses and ceiling-suspended lead shield are critical factors influencing received radiation dose.

Keywords: Medical radiation workers; NanoDot dosimeter; Eye lens dose; Simulation

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Development of a qualitative exposure assessment tool for individuals exposed to respirable crystalline silica

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Objectives: To develop a questionnaire-based qualitative exposure assessment tool incorporating the "concentration-time" framework to evaluate individual exposure to respirable crystalline silica.
Methods: This tool-development study involves: (1) identifying exposure determinants in stone-working processes through a literature review; (2) drafting a questionnaire utilizing rule-based logic aligned with OSHA standards; (3) conducting expert panels for content validity; and (4) evaluating statistical agreement against existing exposure data using Cohen's kappa.
Expected Results: The finalized tool, comprising seven key exposure determinants, will be validated by seven experts. Field testing is expected to demonstrate a reliable level of agreement with known exposure data. The tool will classify individual exposure into three categories (Low, Moderate, High), where the moderate and high levels establish action thresholds for medical surveillance. All findings will be completed prior to the commencement of the conference.
Conclusions: This study provides a practical, expert-validated screening tool to support occupational health decisions for informal respirable crystalline silica exposed workers, effectively identifying individual exposure to enhance prevention, control, and prioritized decision-making for better enrollment into medical surveillance programs in resource-limited settings.

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Association between occupational diseases, body functions, and body structure impairments: an ICF-based cross-sectional study in Mongolia

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Background and Objectives: Occupational diseases are defined by the International Labour Organization as conditions arising from exposure to hazardous occupational factors. Globally, occupational exposures contribute to approximately 1.9 million deaths annually, including an estimated 1,000 deaths per day attributable to occupational diseases. The World Health Organization recommends the integrated use of the International Classification of Diseases (ICD) and the International Classification of Functioning, Disability and Health (ICF) to improve the comprehensiveness and objectivity of disability assessment. This study aimed to characterize occupational disease patients in Mongolia and evaluate associated functional and structural impairments using the ICF-based assessment.

Methods: A cross-sectional study was conducted at the Occupational Safety and Health Center of Mongolia among 180 patients diagnosed with occupational diseases. Data were collected using a WHO-developed ICF assessment framework (WHO-DAS-36). A total of 74 indicators 2 domains were evaluated, including general health information (27 items), body functions (31 items), and body structures (16 items). Domain-specific scores (b1 mental) were derived by averaging components (b110–b167) and converting them into ordinal categories through rounding. Statistical analyses were performed using SPSS version 26.0. Group comparisons were conducted using non-parametric tests, and logistic regression models were used to estimate associations. Statistical significance was defined as $p < 0.05$.

Results: Among the 180 participants, 80.6% (n=145) were male and 19.4% (n=35) were female, with a mean age of 60.5±10.7 years. The ICF-based assessment, Cronbach's alpha was above 0.7 in all domains. A statistically significant difference was observed between body functions (b) and body structures (s) (Z=-9.01, $p < 0.001$). A comparison of occupational disease groups according to body function impairments, sensory functions and pain (b2) were mildly impaired in 78.6% (n=81) of respiratory diseases, 86.1% (n=31) of neurological disorders, 92.9% (n=13) of surgical disorders, and 84.6% (n=11) of other diseases ($p < 0.001$). When comparing body structural impairments, nervous system structures (s1) was mildly impaired in 68.9% (n=71) of respiratory diseases, 94.4% (n=34) of neurological disorders, 78.6% (n=11) of poisoning-related conditions, 92.9% (n=13) of surgical disorders, and 92.3% (n=12) of other diseases with a statistically significant ($p = 0.015$). Multivariable analysis that increasing age was significantly associated with risk of body function impairment (OR=1.102; 95% CI:1.059–1.146; $p < 0.001$) and body structure impairment (OR=1.117; 95% CI:1.008–1.240; $p = 0.034$).

Conclusions: The findings suggest that an ICF-based assessment framework enhances the precision and consistency of functional and structural evaluation in occupational disease patients. Its integration into clinical and occupational health practice may improve disability classification, compensation decisions, and rehabilitation planning.

Keywords: International classification of functioning; Respiratory diseases; Neurological diseases; Occupational health

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Safai Mitra Suraksha Shivir: an Indian occupational healthcare model for sanitation and hospital support staff at an institute of national importance in Eastern India

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Introduction: Sanitation personnel and hospital attendants constitute the foundation of healthcare waste management and institutional upkeep in major healthcare settings. Kitchen staff and food handlers, who are critical for safe nutrition services, are similarly exposed to the occupational risks and enteric pathogens. Despite their crucial contributions to healthcare facilities, these workers routinely endure an exceptional array of occupational hazards. They are disproportionately exposed to injuries such as needle stick, hazardous fluids, toxic chemicals, aerosols, pathogens and persistent mechanical strains. Furthermore, socioeconomic marginalization often restricts access to preventive healthcare resources such as non-communicable diseases (NCDs), elevated risks of vaccine preventable illnesses, neglected psychosocial or substance dependencies, and unmonitored reproductive health concerns. In recognition of these risks, the Government of India has promoted the "Safai Mitra Suraksha Shivir" as a single window health camp for sanitation workers and hospital support staff, which mandates preventive health check-ups.

Methods: The Department of Hospital Administration at the All India Institute of Medical Sciences, Bhubaneswar, coordinated a biannual health camp scheduled during the National Cleanliness drive programs are Swachhata Pakhwada and the Swachhata Special Campaign. Hospital sanitation staff, hospital attendants, kitchen staff, food handlers engaged in hospital and environmental sanitation, handling waste, food production, food distribution and patient related activities were mobilized in coordination with the sanitary inspectors and supervisors, integrating the services from the departments of General Medicine, General Surgery, Obstetrics and Gynaecology, Psychiatry, Orthopaedics, and Community and Family Medicine. A health check-up card was issued for each staff member, including a baseline examination and vaccination history to support continuity of care and institutional record-keeping. The screening protocols were derived from standard guidelines, and the screening included anthropometry, hypertension and diabetes screening, and clinical examination findings. Gynaecological assessment for menstrual, reproductive and prolapse related conditions in females. Substance use assessment covered tobacco and alcohol. The history of vaccination is recorded for all workers concerned with the occupational hazards.

Results: More than 500 sanitation staff, hospital attendants, kitchen staff, and food handlers participated in the biannual health camps, demonstrating the high acceptability of workplace-based single window preventive health services among the underserved group. The screening of the staff identified 28 per cent of individuals with undiagnosed or poorly controlled diabetes and hypertension. 15 per cent of the female staff's gynaecological screening addressed menstrual disorders, prolapse and reproductive health outcomes.31 per cent of the total participants engaged in substance abuse centered with tobacco and alcohol consumption. These individuals immediately received the counselling and pathway for the deaddiction therapy. Oral ex-

amination identified oral lesions in 2 per cent of the participants, with the suspect of leukoplakia or erythroplakia directly correlating with self-reported chronic tobacco chewing. The history of immunization in relation towards the occupational exposure was evaluated among the participants. Those who had not received the vaccines were referred to the immunization clinic and administered Hepatitis B, Tdap (Tetanus, Diphtheria and Pertussis) and Typhoid vaccines. Furthermore, all participants in the Safai Mitra Suraksha Shivir underwent awareness sessions on the use of personal protective equipment (PPE), safe handling, hazardous waste segregation techniques, and post-exposure prophylaxis (PEP) follow-up. Yoga camps are conducted and attended by all the participants. Workplace yoga reduces anxiety, stress, and depressive symptoms and improves staff well being. Workers with the suspected conditions were referred to the concerned specialities for further evaluation.

Discussion: The Safai Mitra Suraksha Shivir emphasizes the necessity of institutionalized, workplace based healthcare access for sanitation workers and hospital support staff. The initiative addresses gaps in access to preventive health services. All the participants are working on a daily wage basis. Hypertension, Diabetes, gynaecological disorders, substance abuse, oral lesions and lack of immunization identified in the participants of health camps. If these conditions are unmanaged or left untreated, they lead to reduced functional capacity, absenteeism, and out-of-pocket expenses, which in turn affect the family.

Conclusions: Institutional safai mitra suraksha shivirs offer an effective platform for holistic health screening, early detection of occupational and non-communicable diseases, vaccination, gynaecological disorders, substance abuse, and behavioural change interventions for sanitary workers and hospital support staff. This approach demonstrates how national cleanliness campaigns can be practically leveraged to build a healthier, safer environment for frontline workers who protect public health.

Keywords: Medical camp; Occupational health; Sanitation workers; Vaccination

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Occupational hand osteoarthritis in a net weaver: a case report

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Background: Hand osteoarthritis (HOA) is a prevalent and disabling condition associated with repetitive manual occupational exposures. Workers in the fishing industry are frequently exposed to sustained forceful hand activities and repetitive hand movements, which may increase the risk of HOA. However, occupational HOA in fishing net menders has not been previously reported.

Case Presentation: A 52-year-old woman with 11 years of employment as a fishing net mender presented with a 1-year history of bilateral finger pain and progressive functional decline. Her work involved repetitive knot-tying with sustained wrist extension for approximately 11 hours daily, 6 days weekly. Ergonomic assessment using the ART tool demonstrated high bilateral upper limb exposure (score 52.5). Physical examination revealed Heberden's nodes at the bilateral index and little fingers. Radiographs showed asymmetric distal interphalangeal (DIP) joint space narrowing with subchondral erosion at the right 2nd DIP joint, suggesting erosive hand osteoarthritis (EHOA). Diagnosis was established according to the 1990 ACR criteria after excluding rheumatoid arthritis, psoriatic arthritis, and gout. Work-relatedness was evaluated using the NIOSH six-step framework. She was placed on work restrictions and treated with oral and topical analgesics according to the 2018 EULAR recommendations.

Conclusions: This case suggests that prolonged repetitive hand-intensive work may contribute to occupational HOA, including erosive HOA. Early recognition, ergonomic intervention, and multidisciplinary management may help reduce disability and support safe return to work.

Keywords: Hand osteoarthritis; Occupational exposure; Net weaver; Work-relatedness; ART tool

Poster Presentation

P5 Occupational Health and Safety in Specific Industries

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Situation analysis of the return-to-work process among health workers with depressive symptoms: a case study of a tertiary hospital in Northeast Thailand

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Introduction: Depressive symptoms among healthcare workers are an important occupational health concern that may affect employee well-being, work performance, patient safety, and the return-to-work (RTW) process. Healthcare workers are frequently exposed to psychosocial stressors, long working hours, shift work, and workload pressures that may contribute to depressive symptoms. However, evidence regarding depressive symptoms, workplace psychosocial hazards, and RTW-related factors among healthcare workers in Thailand remains limited, hindering the development of effective RTW support systems.

Objectives: To determine the prevalence of depressive symptoms, examine associated factors and workplace psychosocial hazards, and identify facilitators and barriers to the RTW process among healthcare workers at tertiary hospital, Thailand.

Methods: A mixed-methods study was conducted at tertiary hospital in Northeast Thailand. The quantitative phase employed a descriptive cross-sectional design involving 325 healthcare workers from various professional groups. Data were collected using a structured questionnaire consisting of demographic characteristics, workplace psychosocial factors, and depression screening instruments. Initial screening was performed using the Thai 2-Question (2Q) questionnaire, followed by the Thai 9-Question (9Q) questionnaire to assess depressive symptoms. Descriptive statistics were used to summarize participant characteristics and the prevalence of depressive symptoms. The qualitative phase aims to explore facilitators and barriers related to the RTW process among healthcare workers with depressive symptoms.

Results: A total of 325 healthcare workers participated in the study. The study population was predominantly female (84.0%), with a median age of 34 years (IQR 26–42), and professional nurses constituted the largest occupational group (35.7%). Most participants performed shift work (73.8%), worked 40–70 hours per week (58.5%), and 54.5% reported insufficient sleep. Newly identified depressive symptoms were detected in 47 of 311 screened healthcare workers (15.1%), including 39 (12.5%) with mild symptoms and 8 (2.6%) with moderate symptoms. Among healthcare workers with depressive symptoms, 78.7% reported insufficient sleep and shift work, 53.2% had less than five years of work experience, and 48.9% reported financial insufficiency or debt. Financial problems (83.0%) and workload and working conditions (55.3%) were the most frequently perceived contributors to depressive symptoms. Among the 14 participants (4.3%) with a previous diagnosis of depressive disorder, workload and working conditions were identified as the most common contributing factors (92.9%), while 71.4% received psychiatric treatment and only 35.7% underwent RTW assessment by an occupational physician.

Discussion and Conclusion: Newly identified depressive symptoms were common among healthcare workers and were frequently associated with insufficient sleep, shift work, financial difficulties, and workplace psychosocial stressors. The low proportion of workers receiving RTW assessment despite ongoing psychiatric treatment suggests a gap between clinical care and occupational health management. These findings support the development of an integrated RTW support system incorporating workplace mental health services, occupational physician-led assessment, and job accommodation strategies to facilitate safe and sustainable work participation among healthcare workers with depressive symptoms.

Disclaimer: The qualitative phase exploring RTW facilitators and barriers is ongoing; therefore, only quantitative findings are presented in this abstract.

Keywords: Depressive symptoms; Associated factors; Healthcare workers; Return-to-work system; Occupational health

Poster Presentation

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Physical and psychosocial risk factors of musculoskeletal symptoms among hospital attendants in a Malaysian public hospital

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Introduction and Objectives: Musculoskeletal symptoms remain a major occupational health concern among healthcare workers, particularly hospital attendants who routinely perform physically demanding patient-care activities. Despite their important contribution to healthcare delivery, limited attention has been given to the occupational risk factors associated with musculoskeletal symptoms among this group. This study aimed to determine the prevalence of musculoskeletal symptoms and identify associated physical, psychosocial, and organizational risk factors among hospital attendants in a Malaysian public hospital.

Methods: A cross-sectional study was conducted among 108 hospital attendants from five clinical departments in Hospital Melaka. Participants were selected using a combination of convenience and purposive sampling methods. Data were collected using questionnaires on sociodemographic characteristics, work characteristics, body posture and work tasks, psychosocial work factors, and musculoskeletal symptoms. Descriptive statistics, Chi-square tests, and Pearson correlation analyses were performed using Statistical Package for the Social Sciences version 26.

Results: The prevalence of experiencing at least one musculoskeletal symptom during the previous 12 months was 55.5%. The most frequently reported symptoms involved the shoulders (75.0%), neck (67.6%), lower back (62.9%), knees (57.4%), and calves (57.4%). Significant associations were observed between musculoskeletal symptoms and shift work (p = 0.021), average weekly working hours ($p = 0.027$) lifting heavy loads ($p = 0.019$) repositioning patients in bed ($p = 0.023$), and sleeping less than four hours per day ($p = 0.041$). Significant correlations were also found between musculoskeletal symptoms and psychological job demand (r=0.255, $p = 0.008$), supervisor support (r=-0.230, $p = 0.017$), job insecurity (r=0.200, $p = 0.038$) and job strain (r=0.206, $p = 0.032$).

Discussion and Conclusion: Musculoskeletal symptoms were highly prevalent among hospital attendants and were significantly associated with physical workload, work organization, and psychosocial factors. The findings highlight the need for comprehensive workplace interventions, including ergonomic improvements, patient-handling training, workload management strategies, and psychosocial support programmes. Such initiatives may help reduce musculoskeletal symptoms and improve the health, well-being, and productivity of hospital attendants in healthcare settings.

Keywords: Musculoskeletal symptoms; Hospital attendants; Occupational health; Ergonomics; Psychosocial factors

Poster Presentation

P6 Human Performance and Safety in the Workplace

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A review of work fatigue among healthcare workers: integrating theoretical frameworks and work models

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Introduction and Objectives: According to WHO ICD-11, fatigue is characterized by exhaustion and reduced capacity for work due to depleted energy and resources. However, the mechanism of work-fatigue development among healthcare workers (HCWs) may not be fully understood. The objective of this narrative review was to examine the concept of work fatigue among HCWs through work models, and to propose an integrated conceptual framework contributing to fatigue among HCWs.
Methods: This study adopted a structured review approach, where existing literatures on work fatigue involving HCWs were studied. Literatures were sourced from online databases, Web of Science, Scopus, PubMed and Google Scholar. Studies not involving HCWs were excluded. This review was guided by relevant job-related theories, including the Job Demand–Control, Job Demand-Resource, Effort–Recovery, Effort–Reward Imbalance, Stress–Strain, and Maslach Burnout Models, to guide thematic synthesis and the development of an integrated conceptual framework for work fatigue among HCWs.
Results: 25 studies were reviewed. Determinants and pathways were integrated into one framework, as to be relevant and practical, for instance, for prevention and control strategies. HCWs, due to the nature of work, face high job demands and workload requiring substantial efforts, increasing their risk of work fatigue. Poor recovery, limited job control, and sustained high strain further contribute to fatigue. Rewards and job resources also play important roles in work fatigue development.
Conclusions: Consequence of work fatigue among HCWs may include risk of burnout and broader organizational impacts. Relevant study findings were used to support the link. Work fatigue among HCWs is multifactorial. Understanding its components may assist in the prevention and control strategies under the establishment of a fatigue management system, thereby protecting the safety and health of HCWs and ensuring quality healthcare service delivery.

Keywords: Occupational fatigue; Healthcare workers; Demand; Effort; Recovery; Control

Poster Presentation

P6 Human Performance and Safety in the Workplace

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Telomere length as a biomarker of biological ageing in night shift workers: a systematic review

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Background: Night shift work has been increasingly recognized as a factor that disrupts circadian rhythm and may accelerate biological ageing. Telomere length is a widely used biomarker that reflects cumulative cellular damage and ageing processes. In addition, epigenetic changes provide further insight into biological ageing beyond chronological age.
Objectives: To evaluate the association between night shift work and biological ageing, as measured by telomere length and epigenetic markers, and to assess their potential role as occupational health biomarkers.
Materials and Methods: A systematic literature review was conducted for studies published between January 2010 and December 2025 using PubMed, Scopus, ScienceDirect, and Google Scholar, following PRISMA guidelines. Of 52 identified articles, 6 met the PECO criteria (population: shift workers; exposure: night shift work; comparison: non-shift workers; outcomes: biological ageing markers). Inclusion criteria were human studies assessing TL or epigenetic markers. Study quality was assessed using the Oxford Centre for Evidence-Based Medicine (CEBM), with included studies predominantly Level 2–3 evidence.
Results: Most studies demonstrated a consistent association between night shift work and reduced TL, with 5 of 6 studies reporting significant telomere shortening ($\beta = -0.01$ to -0.07; $p < 0.05$). A dose–response relationship was observed: workers with <12 years of exposure showed relative telomere preservation ($\beta = 0.06$; 95% CI: 0.03–0.09), while ≥12 years was associated with significant shortening ($\beta = -0.07$; 95% CI: −0.10 to −0.04). Epigenetic findings indicated hypomethylation in tumor suppressor genes, including TP53 ($\beta = -0.93$; 95% CI: −1.73 to −0.12) and BRCA1 ($\beta = -1.14$; 95% CI: −1.71 to −0.58), suggesting potential genomic instability. Moderate heterogeneity was observed (I^2 ~40–70%), likely due to differences in measurement methods, populations, and exposure duration.
Conclusions: Night shift work is associated with markers of accelerated biological ageing, particularly telomere shortening and epigenetic alterations. While TL shows promise as a biomarker in occupational health, its application remains limited by heterogeneity and the small number of studies. Further large-scale longitudinal research is needed to confirm its utility for screening and risk assessment in occupational settings.

Poster Presentation

P6 Human Performance and Safety in the Workplace

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Enhancing human performance and workplace safety through a 30-day apprenticeship model in TVET: evidence from youth workforce development in Indonesia

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The transition from Technical and Vocational Education and Training (TVET) to employment remains a critical challenge, particularly in developing countries where gaps between acquired competencies and workplace demands persist. Insufficient work readiness not only limits human performance but also increases the risk of unsafe behaviors, stress, and poor adaptation among young workers. This study aims to examine the effectiveness of a 30-day apprenticeship model in enhancing human performance and promoting workplace safety within a TVET context. A qualitative exploratory design was employed based on a pilot implementation of a 30-day apprenticeship program involving a cohort of youth participants from diverse TVET and vocational training backgrounds in Indonesia. The program integrated experiential learning, reflective practice, and guided mentoring to support both technical and non-technical skill development. Data were collected through participant observations, reflective journals, and structured feedback obtained throughout the training process. Findings indicate that the apprenticeship model contributes to improved self-awareness, communication skills, and adaptability, key dimensions of human performance in the workplace. Participants also demonstrated increased awareness of safe work practices, greater confidence in decision-making, and reduced anxiety when transitioning into work environments. A psychologically safe learning environment emerged as a critical factor in enabling active participation and behavioral change. The 30-day apprenticeship model provides a practical and scalable pilot framework for strengthening the link between TVET and workplace demands while enhancing human performance and safety outcomes. Embedding human-centered and preventive approaches within TVET-based workforce development programs is essential for advancing sustainable occupational health, particularly in emerging economies.

Keywords: Human performance; Workplace safety; TVET; Apprenticeship

Poster Presentation

P6 Human Performance and Safety in the Workplace

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Determining the association of green building features on workplace satisfaction of healthcare workers in Hospital Jasin

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Background: The Malaysian Ministry of Health has implemented Green Building Initiatives since 2016, with several public hospitals achieved international and national green building certifications such as Leadership in Energy and Environmental Design (LEED) and MyCREST. Despite well documented energy and cost savings, limited research has examined how green building features influence healthcare workers' workplace satisfaction, particularly in certified hospitals. This study addresses this gap by investigating the association of green building features on workplace satisfaction among healthcare workers at Hospital Jasin, a LEED-certified facility.

Methods: A cross-sectional study was conducted with 200 healthcare workers at Hospital Jasin using a validated workplace satisfaction questionnaire. The instrument measured satisfaction across eight indoor features (safety, physical condition, spaciousness, finishes, air quality, lighting, waste disposal, thermal comfort) and three outdoor features (accessibility, outdoor amenities, green environment). Data were analyzed using descriptive statistics, independent t-tests, one-way ANOVA, and multiple regression analysis. Demographic variables including gender, role, years of working, and employment tenure relative to the 2021 LEED certification.

Results: High levels of workplace satisfaction were reported, with 78.0% of respondents expressing positive overall satisfaction (mean=4.03±0.76). No significant demographic differences in satisfaction were found across gender, role, years of service, or pre-post certification employment ($p > 0.05$). Regression analysis revealed that indoor features explained 79% of satisfaction variance ($F(8,191)=90.858$, $p < 0.001$, $R^2=0.792$), with waste management, thermal comfort, safety, air quality, finishes, and building quality as significant predictors. External features explained 44% of variance, contributing only marginally to the combined model ($R^2=0.806$), 80% of variance.

Conclusions: Green building features, particularly indoor environmental quality elements, demonstrate exceptionally strong associations with healthcare worker satisfaction. The absence of demographic differences indicates that green design benefits are equitably perceived across all staff groups. These findings provide empirical evidence supporting the expansion of green building certification as standard requirement in healthcare facilities.

Keywords: Green building; Workplace satisfaction; Healthcare workers; LEED certification

Poster Presentation

P6 Human Performance and Safety in the Workplace

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From risk identification to improvement: a pre–post ergonomics assessment among medical laboratory technologists in a tuberculosis reference laboratory in Sarawak, Malaysia

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Introduction: Musculoskeletal discomfort is multifactorial, involving personal and workplace-related factors. Medical Laboratory Technologists (MLTs) in tuberculosis reference laboratories perform prolonged microscopy, repetitive upper limb tasks, and manual handling, putting them at risk of musculoskeletal strain. These risks are not routinely assessed in public health laboratories. This study assessed workplace ergonomic risk factors and musculoskeletal discomfort among MLTs in a TB reference laboratory in Sarawak and evaluated changes following a workplace intervention.

Materials and Methods: A workplace-based pre–post ergonomics assessment was conducted at the Sarawak TB reference laboratory. All MLTs underwent baseline assessment using task observation, workstation walkthrough, musculoskeletal discomfort survey, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ), and the Initial Ergonomics Risk Assessment (ERA) based on DOSH Malaysia guidelines. Identified risks related to prolonged seated microscopy were addressed through height-adjustable ergonomic laboratory chairs, followed by repeat CMDQ assessment after 10 months.

Results: Five MLTs (mean age 42 years; 80% female) were included in this paired analysis. They were exposed to awkward and sustained static postures during prolonged microscopy. At baseline, musculoskeletal discomfort was most frequently reported in the neck (5/5, 100%), shoulders (4/5, 80%), lower back (4/5, 80%), and upper back (3/5, 60%). Following intervention, discomfort decreased in the neck (5/5 to 4/5), upper back (3/5 to 1/5), and lower back (4/5 to 3/5), while shoulder prevalence remained unchanged (4/5) as one participant improved while another reported new symptoms. Symptom severity improved, with reduction in work interference. Substantial neck and shoulder work interference was not observed post-intervention, although lower back symptoms persisted.

Conclusions: Introduction of height-adjustable ergonomic laboratory chairs was associated with reduced neck and upper back discomfort and elimination of work interference in key tasks. Benefits were most evident in prolonged microscopy work, although lower back symptoms persisted in some individuals. These findings demonstrate that a simple engineering control can yield measurable improvement in real-world laboratory ergonomics. Early, practical ergonomic interventions are feasible for similar laboratory settings. Future approaches may include automation and AI-assisted microscopy to reduce reliance on prolonged manual microscopy.

Keywords: Ergonomics; Musculoskeletal disorders; Medical laboratory technologists; Occupational health; Tuberculosis laboratory

Poster Presentation

P6 Human Performance and Safety in the Workplace

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Physiological response discrepancies between VR and real-world environments: three systematic differences in detection timing, dominant indicators, and symptom coverage

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Introduction and Objectives: Virtual reality is increasingly adopted as an alternative for occupational settings such as remote operations and simulation-based training. However, virtual reality presents a perceptually and cognitively distinct environment compared with traditional monitor-based work. Prolonged use can cause symptoms including cybersickness and severe eye strain, with potential impacts on task performance, workplace safety, and worker mental health. Guidelines for occupational virtual reality remain underdeveloped. Eye-tracking systems, traditionally used to evaluate user workload in real-world settings, have recently been integrated into head-mounted devices. Pupil-based metrics in particular have long served as reliable indicators of arousal and fatigue. However, head-mounted device-specific factors such as vergence-accommodation conflict and the short viewing distance may interfere with cognitive load measurement. It remains unclear whether the relationship between pupillary activity and fatigue established in real-world environments is applicable to virtual reality. We hypothesized that virtual reality and real-world environments yield distinct physiological response patterns across three dimensions: detection timing, dominant indicators, and breadth of detectable symptoms. The objective was to identify these differences in physiological responses and subjective symptoms between virtual reality and real-world settings.

Methods: Twenty-two participants performed two of three tasks — passive video viewing, reading aloud, and a cognitive interference task — across two experimental sessions, in virtual reality and real-world environments. In each session, participants performed a single task under a single environment for 20 or 40 minutes, assigned in an orthogonal design. Subjective symptoms were assessed before and after each session using established questionnaires covering nausea, oculomotor strain, disorientation, and additional items. Physiological responses including pupil dynamics, blink behavior, head movement, and voice-based affective measures were recorded continuously and resampled at one-minute intervals. Participants were categorized as Adaptation (fatigue and recovery balanced) or Accumulation (balance collapsed with increasing symptoms) phenotypes. Random forest classifiers with leave-one-subject-out cross-validation screened indicators. Repeated measures correlation between selected indicators and phenotype was computed at each minute, with time-of-day and exposure duration as covariates.

Results: Two-way analysis of variance confirmed significant Group main effects across ten symptom subscales ($F = 2.6–13.1$, $p < 0.05$). Three systematic differences were observed. First, when the same symptom was detectable in both environments, detection occurred earlier in virtual reality; for the cognitive task, dizziness was detectable at one minute in virtual reality versus eighteen minutes in real-world (area under the receiver operating characteristic curve = 1.000 versus 0.792), visual discomfort at one versus eleven minutes (0.906 versus 0.875), and general malaise at two versus nine minutes (0.896 versus 0.875). Second, dominant indicators differed by symptom and environment; repeated measures correlation yielded 67 reliable symptom-indicator combinations under virtual reality versus 113 under real-world conditions (criteria: absolute correlation coefficient at least 0.40, residual degrees of freedom at least 5). Third, the breadth of detectable symptoms was narrower under virtual reality; for reading aloud, only fatigue was reliably detectable in virtual reality, whereas eight subscales were detectable in real-world.

Conclusions: Virtual reality induces physiological responses distinct from real-world responses in timing, indicator specificity, and symptom coverage. Monitoring strategies must adopt environment-specific indicator selection.

Keywords: Virtual reality sickness; Occupational health; Physiological monitoring; Pupil dynamics

Poster Presentation

P6 Human Performance and Safety in the Workplace

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From policy to practice: enhancing road safety through workplace-based drink-driving prevention in Malaysia

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Background: Alcohol-impaired driving remains a significant contributor to road traffic injuries globally, despite strengthened legislation and enforcement measures. In occupational settings, the interaction between alcohol use, fatigue, long working hours, and psychosocial stress may further increase crash risk, particularly among workers involved in transport and safety-sensitive occupations. However, workplace-based drink-driving prevention strategies remain underdeveloped in many countries, including Malaysia.

Objectives: This study aimed to examine the implementation gap between national drink-driving policies and workplace safety practices, evaluate the interaction between fatigue and alcohol-related driving risk, and develop an occupational prevention framework applicable to Malaysian workplace settings.

Methods: A narrative policy-to-practice review was conducted using PubMed, Google Scholar, and grey literature from the World Health Organization (WHO), International Labour Organization (ILO), and national regulatory agencies. A comparative policy analysis involving Malaysia, Singapore, Thailand, and Australia was performed using a structured scoring framework across five domains: alcohol control, fatigue management, employer responsibility, workplace systems, and enforcement mechanisms. Findings were synthesised into a multi-level occupational drink-driving prevention framework.

Results: Australia demonstrated the highest level of integration between national legislation and workplace implementation, particularly through structured fatigue risk management systems (FRMS), random breath testing, employer accountability, and employee support programmes. Malaysia demonstrated strong legislative control but fragmented workplace implementation, with limited integration of fatigue management, workplace alcohol policies, and systematic monitoring within occupational safety systems. Thailand and Singapore showed moderate policy alignment with variability in organisational implementation. Across countries, descriptive comparisons suggested that more comprehensive integration of workplace alcohol control and fatigue management strategies may be associated with more favourable road safety outcomes.

Conclusions: The findings highlight a persistent gap between national road safety policies and workplace-level implementation of drink-driving prevention strategies. Integrating alcohol control measures with fatigue risk management, employer responsibility, and occupational health systems may strengthen road safety outcomes and reduce alcohol-related driving risk among workers. The proposed occupational prevention framework offers a practical systems-based model for enhancing workplace road safety within Malaysian occupational settings.

Keywords: Alcohol; Road safety; Fatigue; Prevention; Occupational health

Poster Presentation

P6 Human Performance and Safety in the Workplace

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Necessary occupational health and safety indicators for health workers using the modified Delphi technique: a preliminary report

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Introduction and Objectives: Although occupational health and safety management systems have been implemented to protect health workers, existing indicators primarily focus on post-event outcomes, which are often underreported and provide limited support for proactive prevention. Therefore, there is a need to develop appropriate occupational health and safety indicators, particularly leading indicators, which are process-based measures that reflect preventive actions and support early risk monitoring. This study aimed to develop appropriate occupational health and safety indicators for health workers in healthcare settings.

Methods: A modified Delphi technique was conducted in two phases: questionnaire development and expert panel selection, followed by a two-round Delphi process to evaluate expert agreement. Experts were purposively selected based on their experience in Occupational Medicine, Risk Management, and Occupational Health and Safety Management System Auditing. Thirty-two experts from seven countries were invited, and 25 agreed to participate. A total of 69 proposed indicators across five domains were evaluated using a 5-point Likert scale. Descriptive statistics and percentage agreement were used for data analysis. Indicators were accepted when at least 80% agreement was achieved among panelists.

Results: Twenty experts completed the first Delphi round, resulting in a response rate of 80.0%. The 69 proposed indicators were categorized into five domains: Frequency Rate of Work-related Injuries or Illnesses (85.71%), Severity Rate of Work-related Injuries or Illnesses (75.00%), Work-related Infection Rate (72.73%), Rate of Employees with Good Quality of Work Life (0%), and Effectiveness of Occupational Health and Safety System (80.00%). Overall, 53 of the 69 indicators met the predefined acceptance criterion, corresponding to an overall acceptance rate of 76.81%. The remaining 16 indicators were revised for further evaluation in the second Delphi round, which is currently ongoing.

Discussion/Conclusion: The first round of the modified Delphi process demonstrated that most indicators achieved the predefined acceptance criterion, particularly indicators related to the effectiveness of occupational health and safety systems, which were considered leading indicators. However, experts commented that several non-accepted indicators were difficult to assess in practice, especially those related to quality of work life. Therefore, the questionnaire for the second Delphi round was revised to improve the clarity of the evaluation criteria and assessment details for all 16 non-accepted indicators.

Keywords: Modified Delphi technique; Occupational health and safety indicators; Health workers; Occupational health and safety management system

Poster Presentation

P7 Health Promotion at Work

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Impact of occupational health and safety information provision and subjective health on work environment satisfaction among employed workers

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Background: Inadequate hazard communication and limited occupational safety and health (OSH) education can weaken risk awareness and reduce preventive behaviors, especially among vulnerable employment groups. Subjective health status reflects overall health resources and may influence how individuals evaluate workplace demands and conditions. Therefore, this study hypothesized that greater OSH information provision and better subjective health status would be positively associated with higher levels of work environment satisfaction.

Objectives: This study examined the effects of OSH information provision and subjective health status on work environment satisfaction among employed workers.

Materials and Methods: This secondary data analysis used data from the 7th Korean Working Conditions Survey. After excluding cases with missing responses, 10,686 subjects were included. Differences in work environment satisfaction were examined using independent t-tests, one-way ANOVA, and chi-square tests. Hierarchical multiple regression analysis was conducted to evaluate the effects of OSH information provision and subjective health status on work environment satisfaction after controlling for sociodemographic characteristics.

Results: The mean score for OSH information provision was 2.55 ± 0.86, subjective health status was 2.78 ± 0.56, and work environment satisfaction was 3.52 ± 0.75. Satisfaction differed significantly by sex, age, education level, income status, employment status, marital status, and parental status (all $p < .05$). In hierarchical regression analysis, Model I explained 2.6% of the variance ($F = 41.59$, $p < .001$). Adding OSH information provision increased explanatory power to 8.3% ($F = 121.55$, $p < .001$), and including subjective health status further increased it to 12.1% ($F = 163.83$, $p < .001$). In the final model, OSH information provision ($\beta = .22$, $p < .001$) and subjective health status ($\beta = .21$, $p < .001$) were significant predictors.

Conclusions: Greater OSH information provision and better subjective health status were associated with higher work environment satisfaction. Strengthening OSH information delivery and workplace health promotion may improve occupational health outcomes and reduce health inequities across employed workers.

Keywords: Occupational health; Safety; Health status; Working condition; Job satisfaction

Poster Presentation

P7 Health Promotion at Work

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Implementation of KOSPEN Plus healthy work environment (HWE) program for workers in Malaysia

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Introduction: Approximately two million deaths are associated with work-related accidents, and non-communicable illnesses are reported globally. In Malaysia, the KOSPEN Plus programme was introduced to strengthen the prevention of non-communicable diseases through workplace-based initiatives, including Healthy Work Environment (HWE) activities. This study aimed to assess the implementation of HWE activities under the KOSPEN Plus programme among agencies in Malaysia.

Materials and Methods: This study utilised data from non-communicable disease intervention activities conducted before and after the implementation of the KOSPEN Plus programme in the workplace. Briefly, this cross-sectional study was conducted from January to March 2020 among agencies that had implemented the KOSPEN Plus programme. Data were collected from KOSPEN Plus coordinating committee members using a pre-tested, self-administered electronic questionnaire. The HWE component focused on three main activities: cleanliness campaigns, the provision of health facilities, and workplace improvement activities. Differences in HWE activities before and after the programme were evaluated using Pearson's chi-square test.

Results: A total of 362 agencies participated in the study. Before the implementation of the KOSPEN Plus programme, the most commonly reported HWE activities were cleanliness campaigns (40.9%), the provision of health facilities (35.6%), and workplace improvement activities (35.6%). After implementation, the proportion of agencies conducting these activities increased significantly. Cleanliness campaigns increased from 40.9% to 59.4% ($p < 0.01$). Similarly, the provision of health facilities increased from 35.6% to 56.1% ($p < 0.01$), while workplace improvement activities increased from 35.6% to 55.2% ($p < 0.01$).

Conclusions: The implementation of the KOSPEN Plus HWE programme was associated with significant improvements in workplace health-related activities among participating agencies. Continued promotion, monitoring, and strengthening of the programme are necessary to enhance workplace health practices further and foster a healthier work environment.

Keywords: KOSPEN Plus; Non-communicable diseases; Healthy work environment; Workers; Malaysia

Poster Presentation

P7 Health Promotion at Work

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Association between alcohol flushing response and sleep quality among moderate drinkers: a cross-sectional study

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Introduction: In Japan, consuming less than 140 g/week of pure alcohol is generally considered to have minimal adverse health effects. However, individuals with an alcohol flushing response maintain elevated blood acetaldehyde levels for several hours after drinking compared to healthy individuals. While this acetaldehyde accumulation is reported to alter sleep balance, epidemiological studies examining the association between flushing predisposition and sleep quality remain limited.
This study aimed to clarify whether there are significant differences in sleep quality based on the presence or absence of a flushing predisposition among workers who engage in moderate drinking.
Methods: An online questionnaire survey targeting workers aged 18 and older was conducted in December 2024. The final analysis included 5,792 individuals whose alcohol intake was approximately 70–140 g/week (moderate drinking). The independent variable was the presence or absence of an alcohol flushing response (yes/no). The dependent variable was the degree of sleep quality decline (a continuous variable), calculated by summing "yes" responses to six sleep-related questions, such as difficulty falling asleep. Multiple regression analysis was used to calculate unstandardized regression coefficients (B) and 95% confidence intervals (95% CI).
Results: Among the 5,792 moderate drinkers, 1,604 (27.7%) had a flushing predisposition. Compared to the non-flushing group, the flushing group exhibited a significantly greater decline in sleep quality (B= 0.177, 95% CI: 0.091–0.263).
Conclusions: This study suggests that individuals with an alcohol flushing response may experience altered sleep balance due to acetaldehyde accumulation, leading to multiple sleep disturbances, even with moderate alcohol consumption. It is important to provide individualized occupational health guidance that considers not only alcohol intake volume but also personal flushing predispositions and alcohol metabolism characteristics, proposing adjustments to drinking habits tailored to individual traits even within the widely accepted moderate range.

Keywords: Alcohol flushing response; Sleep quality; Moderate drinking; Occupational health; Cross-sectional study

Poster Presentation

P7 Health Promotion at Work

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Effect of muscle stretching on musculoskeletal discomfort among workers in a distillery: a follow-up study

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Introduction: Stretching is proposed as a mean to reduce work-related musculoskeletal disorders by some clinicians. However, studies evaluating its effects are limited. Therefore, we conducted a study to evaluate the effects of stretching on musculoskeletal discomfort (MSD) among the workers in a distillery in Taiwan.

Materials and Methods: We used the Modified Nordic Musculoskeletal Questionnaire to evaluate the prevalence of MSD in two surveys, one before and the other after the promotion of stretching in the distillery as part of basic occupational health services. We used the chi-square test and Cochran-Armitage trend test to evaluate the effects of muscle stretching using a pain score >2 as the definition of remarkable MSD.

Results: Of the total of 343 workers, the response rate to the survey was 83.7% in the baseline survey and 63.8% in the follow-up survey one year later, with 47 participants complied with the program. More workers reported remarkable MSD in the follow-up survey (odds ratio [OR]: 1.7, 95% confidence interval [CI]: 1.2-2.4), but only the increase in the prevalence of the right shoulder reached statistical significance (OR: 1.6, 95% CI: 1.0-2.5). Using results of the baseline survey as the reference, we found a decreasing trend in the prevalence of MSD associated with the program in lower back, right shoulder, right elbow/forearm, and right hand/wrist.

Conclusions: While the prevalence of MSD increased over time, we observed a decreasing trend in the prevalence of MSD in lower back and right upper limb associated with the stretching program, suggesting the effects of stretching on MSD.

Keywords: Distillery; Health service; Muscle stretch; Musculoskeletal; Occupation

Poster Presentation

P8 Mental Health at Work

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Workplace predictors of burnout and mental health outcomes among healthcare workers in a Malaysian district health office

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Background: Burnout is a major occupational health syndrome resulting from chronic workplace stress and is linked to adverse mental health outcomes among healthcare workers. In Malaysia, evidence on burnout within district health office settings remains limited.

Objectives: This study aimed to determine the prevalence, workplace predictors, and mental health impact of burnout among healthcare workers in Setiu District Health Office, Terengganu, Malaysia.

Materials and Methods: A cross-sectional study was conducted between January and April 2025 among healthcare workers employed at the Setiu District Health Office, Terengganu, Malaysia. Participants were selected using stratified proportionate random sampling across all job categories, yielding a total sample of 206 respondents. Data were collected using a structured, validated self-administered questionnaire assessing individual, interpersonal, organisational, and environmental workplace factors. Burnout was measured using the Mini-Z burnout scale, while anxiety and depression were assessed using the Generalised Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9). Logistic regression analyses were performed using SPSS version 27 to identify predictors of burnout and examine its association with mental health outcomes.

Results: The prevalence of burnout among healthcare workers was 15.5%. Multiple logistic regression identified difficult access to mental health services (adjusted odds ratio [aOR]=14.90, 95% CI: 3.70–60.22, $p < 0.001$), high workload (aOR=13.80, 95% CI: 4.24–44.67, $p < 0.001$), and ≤15 years of service (aOR=4.39, 95% CI: 1.61–12.00, $p = 0.004$) as significant predictors of burnout. Strong supervisor support was protective against burnout (aOR=0.25, 95% CI: 0.07–0.90, $p = 0.034$). Burnout was also significantly associated with anxiety (OR=2.88, 95% CI: 1.31–6.33, $p = 0.008$) and depression (OR=3.40, 95% CI: 1.06–10.90, $p = 0.040$).

Conclusions: Burnout affected one in six healthcare workers, driven by high workload, limited access to mental health services, and shorter work experience, while supervisor support was protective. Strengthening organisational support is critical to prevent burnout and protect workforce mental health.

Keywords: Healthcare workers; Predictors; Anxiety; Depression; Burnout

Poster Presentation

P8 Mental Health at Work

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Factors associated with burnout among mothers working in a tertiary clinical setting

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Introduction: Healthcare professionals face significant occupational stress, yet mothers in clinical roles experience a unique "double burden" of professional demands and domestic responsibilities. This study aimed to determine the prevalence of burnout and identify the individual, interpersonal, and institutional factors associated with burnout among working mothers in a tertiary hospital in Malaysia.

Materials and Methods: A cross-sectional study was conducted among 300 full-time mothers (including nurses and doctors) at Hospital Tengku Ampuan Rahimah Klang using stratified random sampling. Burnout was measured using the Maslach Burnout Inventory–Human Services Survey (MBI-HSS), defined as high emotional exhaustion (EE ≥27) and/or high depersonalization (DP ≥13). Binary logistic regression was performed to estimate adjusted odds ratios (AORs).

Results: The prevalence of burnout was 38.0%. Doctors experienced significantly higher burnout (House Officers: 52.6%; Specialists: 42.7%) compared to nurses (18.9%, $p < 0.001$). Key predictors included having an unemployed spouse (AOR = 41.31, 95% CI: 12.97–131.55), workplace bullying (AOR = 28.76, 95% CI: 8.06–102.62), and working >60 hours/week (AOR = 26.47, 95% CI: 7.79–89.93). Other factors included staying away from family (AOR = 11.78, 95% CI: 2.56–54.30) and inadequate childcare (AOR = 3.04, 95% CI: 1.42–6.49).

Conclusions: A significant proportion of clinical mothers suffer from burnout, driven by a combination of extreme workloads, workplace culture issues like bullying, and a lack of domestic or social support. To ensure workforce sustainability and patient safety, institutional interventions must focus on regulation of working hours, enforcing zero-tolerance bullying policies, and providing targeted support systems for healthcare workers with care-giving responsibilities.

Keywords: Burnout; Clinical mothers; Tertiary healthcare; Occupational stress; Work-life balance

Poster Presentation

P8 Mental Health at Work

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Reframing workplace mental health: a systems-based application of the Job Demands–Resources model

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Introduction: Workplace mental health strategies frequently emphasise individual resilience through stress management and mindfulness interventions. While beneficial, such approaches risk over-attributing outcomes to personal coping capacity while under-addressing modifiable psychosocial work conditions. The Job Demands–Resources (JD-R) model conceptualises mental health as a function of the balance between job demands, job resources, and personal resources, and their contribution to psychosocial risk.

Objectives: To develop an applied occupational health framework that translates the JD-R model into actionable domains for workplace mental health risk management.

Methods: A conceptual synthesis of occupational health and organisational psychology literature was undertaken to derive a three-domain model comprising leadership capability, organisational design, and individual adaptive capacity.

Results: Leadership capability and organisational design emerged as primary upstream determinants of psychosocial risk through their influence on job demands, resource availability, and work structure. Individual adaptive capacity was identified as a moderating factor that buffers, but does not offset, sustained demand–resource imbalance.

Conclusions: Reframing workplace mental health as a systems-governed risk domain enables occupational health practitioners to prioritise upstream interventions. Integrating leadership and organisational design into mental health strategies supports proactive psychosocial risk management and reduces over-reliance on individual-level programmes.

Keywords: Mental health; Leadership; Job demands–resources (JD-R)

Poster Presentation

P8 Mental Health at Work

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The association between psychological detachment and the subscale of work engagement

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Introduction: In occupational health research, psychological detachment (PD) and work engagement (WE) are key indicators of workers' psychological states. PD reflects the extent to which individuals mentally disengage from work during non-work time. WE is a positive, fulfilling work-related state comprising three components: vigor, dedication, and absorption. Previous studies have reported an inverted U-shaped association between PD and WE. However, the associations between PD and each WE component have not been examined. This study aimed to investigate the associations between PD and the three components of WE: vigor, dedication, and absorption.

Materials and Methods: A questionnaire survey was conducted among employees from multiple companies in 2016. PD was assessed using the Recovery Experience Questionnaire. WE components were measured using the Utrecht Work Engagement Scale. Regression analyses were performed with the three components of WE as objective variables and PD as the explanatory variable, adjusting for sex and age group as covariates.

Results: A total of 20,138 participants were included in the analysis. Dedication and absorption exhibited inverted U-shaped associations with PD, peaking in the lower range of PD, whereas vigor showed a symmetrical inverted U-shape. The associations between PD and the three WE components differed between participants aged ≤29 years and those aged ≥30 years. Among participants aged ≤29 years, all three components showed symmetrical inverted U-shaped associations. In contrast, among those aged ≥30 years, dedication and absorption exhibited inverse linear associations with PD, indicating lower values at higher PD except at the lowest PD levels.

Discussion: The three components of WE were found to have distinct associations with PD that varied by age group. Vigor may decrease at low PD due to fatigue and at high PD due to reduced motivation. Dedication and absorption also decline with reduced motivation but may be influenced by burnout at very low PD.

Keywords: Work engagement; Psychological detachment; Industrial and organizational psychology

Poster Presentation

P8 Mental Health at Work

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Relationship between overweight, obesity and mental health problems among hospital staff in Johor

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Background: Overweight and obesity are major public health concerns linked to non-communicable diseases and mental health problems such as depression, anxiety, and stress. Healthcare workers are particularly vulnerable due to occupational stressors, shift work, and lifestyle factors.
Objectives: This study aimed to determine the association between overweight and obesity with mental health problems and to identify related sociodemographic and occupational factors among hospital staff.
Materials and Methods: A cross-sectional study was conducted from January to December 2024 using secondary data from an annual health screening programme. A total of 470 healthcare workers were included. Data collected comprised sociodemographic characteristics, body mass index (BMI), and mental health status assessed using the Depression Anxiety Stress Scale (DASS-21). Statistical analyses included chi-square tests and ANOVA to examine associations between BMI categories and study variables.
Results: The prevalence of overweight and obesity was high at 37.9% and 33.0%, respectively, with only 29.1% having normal weight. Moderate levels of depression (48.7%) and anxiety (44.5%) were common, while 56.2% had normal stress levels. Significant associations were found between BMI and depression (χ^2=39.737, $p < 0.001$), anxiety (χ^2=24.938, $p < 0.001$), and stress (χ^2=7.396, $p = 0.025$). Age was significantly associated with BMI (F=18.370, $p < 0.001$), with higher mean age observed in overweight and obese groups. Ethnicity (χ^2=35.541, $p < 0.001$) and occupation (χ^2=34.111, $p < 0.001$) were also significantly associated with BMI, while gender showed no significant relationship.
Conclusions: Overweight and obesity are significantly associated with mental health problems among healthcare workers. Integrated interventions addressing both physical and mental health are essential to improve occupational health outcomes, workforce productivity, and overall quality of care.

Keywords: Overweight; Obesity; Depression; Anxiety; Stress; Healthcare workers

Poster Presentation

P8 Mental Health at Work

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Cognitive malingering in fitness-for-work and disability evaluation: a case report

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Introduction: Cognitive malingering refers to the willful effort to perform poorly or worse than expected during a cognitive function testing in the absence of cerebral dysfunction, motivated by external incentives. A study in the US showed 33-52% of those seeking disability compensation through the Veterans Benefits Administration were found to be malingering and it was estimated a nationwide disability payment of USD71,000-USD121,000 related to cognitive malingering cases.
Case Presentation: A 59-year-old male manager with 30 years of employment was reportedly involved in a road traffic accident two years prior and treated for severe traumatic brain injury. Despite optimal neurological and psychiatric intervention, he reported persistent severe impairment, claiming full dependence in activities of daily living and inability to return to work. However, detailed assessment revealed significant discrepancies between reported symptoms, clinical findings, and expected functional capacity. Objective psychometric evaluation using the Test of Memory Malingering (TOMM) demonstrated findings consistent with cognitive malingering, with external motivation related to obtaining permanent disability benefits.
Discussion: Distinguishing genuine cognitive impairment from malingering is critical in occupational medicine, particularly in the context of fitness-for-work and disability assessments. This case highlights the importance of incorporating validated psychometric tools alongside clinical evaluation to identify red flags and support objective medico-legal decision-making.
Conclusions: Early recognition of cognitive malingering is essential to prevent inappropriate disability certification, facilitate fair return-to-work decisions, and reduce unnecessary healthcare and compensation costs.

Poster Presentation

P8 Mental Health at Work

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Breaking the cycle of workplace harmful behaviors: from systemic pathology to occupational health reformation

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Introduction: Traditional occupational health models frequently mischaracterize workplace bullying as an isolated interpersonal grievance requiring reactive human resource mediation. This study shifts the paradigm toward upstream structural hazard mitigation by evaluating how organizational psychosocial risks systematically translate into behavioral victimization via internalized psychological strain pathways.

Materials and Methods: A cross-sectional field screening was deployed across a strategic three-tier institutional microcosm in southern Sarawak, capturing urban (Kuching), suburban (Bau), and frontline rural (Lundu) public healthcare environments. Out of a targeted cohort of 279 healthcare professionals, 260 provided explicit consent and completed the clinical instruments, yielding a 93.2% response rate; 19 individuals declined participation. Upstream risks were quantified using the state-mandated Department of Occupational Safety and Health (DOSH) PRisMA 2024 LEO26 scale, internal psychological distress (M) via combined PHQ-9 and GAD-7 indexes, and victimization frequency (Y) through the Negative Acts Questionnaire-Revised (NAQ-R).

Results: Structural mediation modeling via Hayes PROCESS Macro (Model 4) confirmed that statutory psychosocial hazards significantly drive internalized psychological distress (Path a: β=0.110, $p < 0.001$), which subsequently accelerates downstream exposure to workplace bullying (Path b: β=0.250, $p < 0.001$). The residual direct pipeline from hazards to bullying remained significant (Path c ‘: β=0.185, $p = 0.012$). The absolute indirect mediation effect size was established at 0.0275, with a 5,000-bootstrap 95% confidence interval of [0.0140, 0.0387], proving structural significance. Confounder diagnostics confirmed descriptive uniformity across professional streams ($p = 0.443$) and gender classifications ($p = 0.279$). However, ANCOVA modeling revealed a significant age main effect ($p = 0.019$), identifying a severe vulnerability spike among mid-career professionals aged 46–55 years (Adjusted Mean = 30.155).

Conclusions: The findings validate the “Trapped Survivor Phenomenon,” demonstrating that organizational stressors structurally target mid-career personnel bound by institutional dependencies. Primary preventive interventions must abandon downstream individual resilience training and prioritize structural workload re-engineering to comply with DOSH PRisMA 2024 Tier 1 requirements.

Keywords: Psychosocial risks; Workplace bullying; Mental health distress; Mediation modeling; OSHA 1994; DOSH PRisMA 2024

Poster Presentation

P8 Mental Health at Work

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Burnout, depression, anxiety, and physical activity domains among healthcare workers in Selangor: a cross-sectional study

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Introduction: Healthcare workers (HCWs) are at risk of burnout, depression, and anxiety due to the extremely stressful nature of the healthcare profession. Scientifically, previous research widely recognises physical activity (PA) as one of the protective factors for mental health. This study aimed to investigate the associations between different PA domains (occupation-related PA (OPA), transportation-related PA (TPA), and leisure-time-related PA (LTPA) and burnout, depression, and anxiety among HCWs in Selangor.

Materials and Methods: This is a cross-sectional study using the multi-stage stratified cluster random sampling method. The validated global physical activity (GPAQ), Copenhagen Burnout Inventory (CBI), patient health questionnaire (PHQ)-9, and generalised anxiety disorder scale-7 (GAD-7) instruments were used. A chi-square test was used to identify the association, and all significant variables were taken into multiple logistic regression.

Results: This study included a total of 302 participants. HCWs in Selangor reported a prevalence of personal burnout (68.21%), work-related burnout (68.87%), client-related burnout (76.16%), depression (43.05%), and anxiety (30.13%). TPA remained significantly and positively associated with marital status, workplace, and years of service after controlling for the strong effects of other demographic and work factors. TPA was inversely correlated with personal-related and work-related burnout, ranging from -0.247 to -0.226 ($p < 0.001$).

Conclusions: The prevalence of all three types of burnouts (personal-, work-, and client-related), depression, and anxiety among HCWs in Selangor was high. TPA, but not OPA and LTPA, at any amount, was associated with a lower risk of personal-related and work-related burnout, suggesting significant mental health benefits from increased TPA.

Keywords: Physical activity; Burnout; Depression; Anxiety; Healthcare workers

Poster Presentation

P8 Mental Health at Work

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Workplace stress in an aluminium industry worker: an occupational health case report

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Work-related mental health conditions are increasingly recognised in heavy industries such as aluminium production, where high production demands and safety-critical operations are common. This case report describes a worker employed in an aluminium manufacturing facility who presented to occupational health services with anxiety, low mood, fatigue, poor sleep, and declined work performance over several months. The worker had no prior psychiatric history and attributed symptoms to sustained high workload, rotating shift work, prolonged overtime during production ramp-up, and ongoing interpersonal conflict with a supervisor. Occupational health assessment identified significant psychosocial risk factors, including high job demands, limited job control, inadequate recovery time between shifts, and low perceived managerial support. Screening using a validated mental health assessment tool indicated mental stress symptoms affecting concentration and safety awareness at work. A multidisciplinary intervention was implemented, incorporating both individual-focused and organisational measures. Individual interventions included temporary modification to day shifts, reduction of overtime exposure, referral to counselling services, sleep hygiene education, and regular occupational health follow-up. Organisational interventions involved engagement with line management and human resources to address identified psychosocial hazards, clarification of job roles, redistribution of workload, and supervisor coaching to improve communication and support. A structured, graduated return-to-work plan was developed with clear functional capacity expectations and staged review points. Over a three-month follow-up period, the worker demonstrated significant improvement in symptoms, improved sleep quality, stabilised work performance, and sustained attendance without further sickness absence. This case demonstrates the effectiveness of early occupational health intervention and a holistic management approach addressing both individual health needs and workplace stressors. It highlights the importance of psychosocial risk management within the aluminium industry, where operational demands may place workers at increased risk of mental health conditions. Based on this case, it is recommended that aluminium companies incorporate routine psychosocial risk assessments, supervisor mental health awareness training, structured work modification pathways, and early occupational health referral systems to support worker mental wellbeing and maintain safe and sustainable work ability.

Poster Presentation

P8 Mental Health at Work

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Mental health profiles of HCWs in research institute in Malaysia: a cross-sectional descriptive analysis of depression, anxiety and stress

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Introduction: Global concerns regarding the high prevalence of occupational morbidity among healthcare professionals are also evident in Malaysia, where systemic stressors challenge workforce resilience. While the psychological well-being of clinical staff has been widely studied, less attention has been given to personnel working in public health research environments. This study aimed to determine the prevalence and distribution of depression, anxiety, and stress among healthcare workers (HCWs) in a medical research institute in Malaysia.

Methods: A secondary data analysis was conducted using 2023 records from the KOSPEN-WOW (Komuniti Sihat Pembina Negara – Workplace Wellness) programme. Psychological distress was assessed using the validated 21-item Depression, Anxiety, and Stress Scale (DASS-21), with scores doubled to correspond to DASS-42 severity ratings. Standard cut-off values (>9 for depression, >7 for anxiety, and >14 for stress) were applied to classify symptomatic cases.

Results: A total of 983 personnel participated (response rate: 99.3%). The prevalence of depression, anxiety, and stress was 21.1%, 30.1%, and 14.3%, respectively. Higher levels of psychological morbidity were observed among individuals with a history of cancer (40.9% for depression) and chronic illness (37.3% for anxiety). Increased distress was also associated with single or widowed status and lower household income. Subgroup analysis showed the highest prevalence of depression (25.0%) and stress (26.9%) among staff in health systems research units, while anxiety was most prevalent in administrative divisions (38.6%). Conversely, physical activity demonstrated a protective effect across all domains.

Conclusions: Psychological distress among healthcare workers in a medical research institute is considerable, with anxiety being the most prevalent condition. These findings highlight the need for targeted occupational health interventions, particularly for staff with comorbidities and lower socioeconomic status.

Keywords: Mental health; Psychological distress; Healthcare workers; DASS-21; KOSPEN WOW

Poster Presentation

P8 Mental Health at Work

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Preliminary validation findings of an employer-centric questionnaire for workplace stress and anxiety in the Malaysian industry

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Introduction: Workplace anxiety and stress are increasingly recognised as major occupational health concerns, driven by psychosocial hazards. These conditions negatively impact productivity, safety, and worker well-being, particularly in industrial environments. Despite growing awareness, context-specific tools remain limited, especially those developed and validated questionnaires assessed by employer representative groups to ensure practical workplace applicability.
Objectives: To develop and preliminarily validate the content and face validity of the Workplace Anxiety and Stress questionnaire
Methods: A three-round modified Delphi consensus approach was conducted involving occupational safety and health personnel and multidisciplinary experts, including employer representatives. Round 1 (n=18) involved structured discussions to refine an initial 32-item instrument. Round 2 included four experts who reviewed and expanded the tool to 35 items. Round 3 involved 12 experts who evaluated a 53-item instrument using item-level and scale-level content validity indices (I-CVI, S-CVI/Ave, S-CVI/UA). Face validity was assessed using the Face Validity Index (FVI) among 10 raters.
Results: The workplace stress and anxiety questionnaire demonstrated excellent content validity in all 4 aspects of relevance, clarity, simplicity, and ambiguity (mean I-CVI=0.987; S-CVI/Ave=0.855-0.999; S-CVI/UA=0.855-0.999). Face validity was also high (S-FVI/Ave=0.983-0.988). Most items achieved full agreement, with only minor revisions required.
Conclusions: The Workplace Anxiety and Stress questionnaire demonstrates strong preliminary validity as an employer context-specific psychosocial risk assessment tool. Its development with employer input enhances practical relevance, supporting early identification of workplace psychosocial hazards and informing targeted interventions to improve occupational mental health, safety, and productivity.

Keywords: Workplace anxiety; Stress; Mental health; Industry

Poster Presentation

P8 Mental Health at Work

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Working while ill: a qualitative exploration of sickness presenteeism climate among nurses in Malaysian public hospitals

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Introduction: Sickness presenteeism among nurses is more than an individual decision to "push through" illness. In public hospitals, it may reflect workplace climate, staffing pressure, professional duty, and informal judgements around sick leave. This qualitative study explored how nurses perceive and experience workplace conditions influencing their decision to attend work despite acute minor illness, with implications for Sustainable Development Goal (SDG) 3 (Good Health and Wellbeing), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and social and governance dimensions of Environment, Social and Governance (ESG) framework.

Materials and Methods: A qualitative exploratory descriptive design was used. Five focus group interviews were conducted with 28 nurses working in public hospitals in Selangor, Malaysia. Participants were purposively selected from different clinical settings, including wards, operation theatres, day care facilities, and clinics, to capture varied experiences of workload, staffing, and sick leave practices. Interviews were guided by semi-structured open-ended questions and transcribed verbatim. Data were analysed using thematic analysis through repeated reading, coding, grouping of codes into subthemes, and development of broader themes. Reflexive discussion, expert agreement, and participant quotations strengthened rigour.

Results: Six themes described the presenteeism climate experienced by nurses. First, sick leave carried a negative meaning. Participants feared being labelled as having a poor record, losing recognition opportunities, or being judged by colleagues and supervisors. Second, sick leave approval was difficult and sometimes dependent on replacement availability, pending work, visible symptoms, and hierarchical reporting procedures. Third, underlying inadequacies of staff shaped attendance decisions. Nurses described working despite fever, headache, hypertension, or musculoskeletal pain because wards had insufficient manpower, night duty required minimum staffing, or replacement staff lacked experience. Fourth, nurses worried about burdening colleagues and returning to accumulated work. This guilt made working while ill feel like a responsible act, even when rest was needed. Fifth, organisational support had a dual role. Supportive colleagues and sisters helped nurses cope and sometimes enabled appropriate leave, but strong teamwork could also normalise continuing work while unwell. Sixth, illness severity was judged practically: nurses often tolerated symptoms until pain, fever, breathing difficulty, or fatigue became unbearable or incompatible with work. Overall, sickness presenteeism is produced by work organisation, social expectations, and staffing resilience rather than individual attitude alone. The issue is linked to SDG 3 because nurse health affects patient safety and quality care; SDG 5 because nursing is a female-dominated workforce carrying paid and unpaid care responsibilities; and SDG 8 because decent work requires safe staffing, fair leave systems, and recovery rights. In ESG terms, presenteeism concerns worker wellbeing, patient safety, staffing accountability, sick leave policy, and leadership practice.

Conclusions: Nurses who work while ill should not automatically be viewed as resilient or committed. Their attendance may signal a workplace climate where rest feels difficult, risky, or unfair to colleagues. Reducing sickness presenteeism requires stigma-free sick leave, clearer governance, supportive nurse managers, staffing contingency mechanisms, occupational health input, and a culture that treats recovery as part of safe care.

Keywords: Sickness presenteeism; Nurses; Workplace climate; Sick leave; Occupational health

Poster Presentation

P9 Psychological Safety at Work

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Development and psychometric evaluation of the psychosocial work environment questionnaire for industrial workers: a study protocol

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Background: The psychosocial work environment significantly impacts occupational health, yet many existing assessment tools lack the contextual specificity required for the manufacturing sector. This study protocol details the development and psychometric evaluation of the Psychosocial Work Environment Questionnaire for Industrial Workers (PWE-inds), a tool designed to capture the unique stressors inherent in industrial settings.

Methods: The development of the PWE-inds followed a dual-methodology approach. A deductive phase involved a comprehensive review of global psychosocial literature and existing scales published between 2000 and 2024. This was complemented by an inductive phase featuring focus group discussions (FGDs) with 11 workers from the manufacturing industries to identify grounded, site-specific stressors. Qualitative data were analysed using thematic analysis via ATLAS.ti. The resulting items were subjected to content validation by a panel of seven experts using the Content Validity Index (CVI) and face validation. Finally, a pilot study (n=180) was conducted to evaluate construct validity through Exploratory Factor Analysis (EFA) and internal consistency via Cronbach's alpha.

Results: The qualitative exploration identified eight main themes, which were synthesized into a 46-item questionnaire. These items are categorized into four primary domains: workplace demands, work organization and content, interpersonal relations and leadership, and workplace reactions. Content validation resulted in an Item-CVI ≥ 0.83. Psychometric evaluation via EFA confirmed a robust factor structure, with all factor loadings ≥ 0.6 and communality values > 0.5. Reliability testing indicated high internal consistency, with Cronbach's alpha values exceeding 0.7 across all domains.

Conclusions: The PWE-inds is a contextually grounded, valid, and reliable instrument for measuring psychosocial factors within the industrial sector. This tool provides a rigorous framework for occupational health professionals to assess and mitigate workplace stressors effectively.

Keywords: Psychosocial work environment; Questionnaire development; Industrial workers; Exploratory factor analysis

Poster Presentation

P9 Psychological Safety at Work

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Trapped in contracts? Employment status and intention to leave among medical officers in a public healthcare setting in Malaysia

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The sustainability of the healthcare workforce is increasingly recognised as a critical occupational health priority, particularly in relation to psychosocial working conditions. Employment arrangements, including contract-based appointments, may contribute to job insecurity, a recognised psychosocial occupational risk factor associated with stress, reduced job satisfaction, and workforce instability. Within Malaysia's public healthcare system, the expansion of contract employment among medical officers has raised concerns regarding its implications for workforce retention. This study examined the association and independent effect of employment status on intention to leave among medical officers in a public healthcare setting. A cross-sectional study was conducted among 284 medical officers in a public hospital and primary healthcare clinics in Seremban, Malaysia, using a self-administered questionnaire. Descriptive statistics were used to summarise participant characteristics and the prevalence of intention to leave, while the association between employment status and intention to leave was assessed using the chi-square test. Logistic regression analyses were performed to estimate unadjusted and adjusted odds ratios (OR), with adjustment for age and gender. The prevalence of intention to leave was 26.8%. A significantly higher proportion of contract medical officers reported intention to leave compared to those in permanent positions ($\chi^2 = 26.45$, $p < 0.001$). In unadjusted logistic regression analysis, contract employment was associated with substantially higher odds of intention to leave (OR = 4.17; 95% CI: 2.37–7.32; $p < 0.001$). This relationship remained statistically significant after adjustment for age and gender (adjusted OR = 2.59; 95% CI: 1.21–5.53; $p = 0.014$), demonstrating an independent effect. Contract employment is independently associated with increased intention to leave among medical officers. These findings identify employment insecurity as a key psychosocial occupational risk factor and underscore the need for organisational and policy-level strategies to strengthen employment stability and enhance workforce retention within the public healthcare system.

Keywords: Intention to leave; Employment status; Medical officers; Occupational health; Malaysia

Poster Presentation

P9 Psychological Safety at Work

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Psychological safety at work in healthcare: a scoping review of voice behaviour, patient safety, healthcare workers' psychosocial health, and organisational learning

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Introduction: Psychological safety, the shared belief that the workplace is safe for interpersonal risk-taking, is increasingly important in healthcare because it shapes whether staff can raise concerns, report incidents, question unsafe practice, and contribute to improvement without fear of blame, humiliation, retaliation, or damaged professional relationships in organisations overall. This scoping review aimed to synthesise the healthcare literature on psychological safety and examine its relationships with four domains: voice behaviour, patient safety; healthcare workers' psychosocial health, and organisational learning for improvement.

Materials and Methods: Guided by the Population–Concept–Context framework, a scoping review searched Web of Science and PubMed for studies on healthcare workers, psychological safety, and occupational healthcare settings. The search yielded 192 records from Web of Science (n=68) and PubMed (n=124). After removal of 64 duplicates, 128 records were screened by title and abstract. Fifty-one were excluded because of irrelevant outcomes (n=1), no abstract (n=1), non-empirical or non-review type (n=1), non-English language (n=2), non-healthcare worker or setting focus (n=10), or lack of psychological safety content (n=36). Seventy-seven texts were sought, 16 unavailable, 61 assessed, 12 excluded, and 49 included.

Results: The evidence base was dominated by hospital-based studies from high-income settings and cross-sectional designs, although qualitative, mixed-methods, quality-improvement, and review papers were also represented. Across the included literature, psychological safety was most consistently associated with voice behaviour, particularly speaking up, error reporting, questioning authority, and reduced silence. Leadership and hierarchy emerged as the principal antecedents: inclusive, respectful, and behaviourally consistent leaders strengthened psychological safety, whereas toxic leadership, intimidation, punitive management, power distance, and weak accountability suppressed it. Patient safety was influenced mainly through reporting, escalation, communication, and safety participation rather than direct outcome measures, and several studies indicated that psychologically safer teams may report more incidents because they are more willing to disclose them. Evidence on psychosocial health, although smaller, suggested that higher psychological safety was associated with lower burnout and with reduced bullying, harassment, intimidation, humiliation, fear of retaliation, toxic leadership-related strain, and defensive practice. Organisational learning was stronger when teams could surface concerns, discuss mistakes, and engage in problem-solving, but weaker when blame, concealment, weak feedback loops, and reporting futility dominated. Overall, the included litera-

ture showed that psychologically safe environments supported more open communication, greater discretionary safety participation, and more effective conversion of frontline concerns into learning and improvement. These patterns were observed across nursing, medical, multidisciplinary, acute, mental health, maternity, and primary care contexts in different settings.
Conclusions: Psychological safety functioned as a central upstream condition linking leadership and relational climate to voice, patient safety practices, healthcare workers' psychosocial health, and organisational learning. From a human factors perspective, psychologically unsafe environments may impair communication under pressure, increase cognitive burden, and weaken work-system conditions needed for teamwork, reporting, feedback, and learning. Safety infrastructures such as formal reporting channels appear insufficient when staff do not feel safe to speak, and leadership accountability, reporting protection, and feedback systems are needed.

Keywords: Psychological safety; Patient safety; Voice; Psychosocial health; Healthcare quality

Poster Presentation

P10 Non-Communicable Disease and Work

Ann Occup Environ Med. 2026 Aug;38(Supplement):P-030
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Healthy healers? A snapshot of cardiometabolic health in Hospital Taiping's young workforce

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Background: Healthcare workers (HCWs) are crucial to community health, yet their own cardiometabolic well-being is often overlooked. This study aimed to outline the cardiometabolic health of the young HCW workforce at Hospital Taiping.
Methods: A cross-sectional study was conducted by analyzing the 2024 health screening records from Klinik Sejahtera. The cohort consisted of 1,585 HCWs below 40 years of age. All statistical analyses were performed using SPSS. Descriptive statistics were used to summarize socio-demographic and clinical characteristics. Associations between categorical variables were analyzed using the Chi-square test. Variables with significant associations were included in a logistic regression model to identify independent predictors of elevated systolic blood pressure (SBP).
Results: Descriptive analysis revealed a median age of 34 years (IQR: 31-37), with a predominance of females (73.8%) and Malay (78.6%). The cohort carried a significant burden of cardiometabolic risk factors. Logistic regression identified three strong, independent predictors of elevated SBP: elevated diastolic BP (Adjusted Odds Ratio [aOR] = 11.78, 95% CI: 3.90–35.59, $p < 0.001$), obesity (aOR = 6.63, 95% CI: 1.93–22.81, $p = 0.003$), and male gender (aOR = 6.50, 95% CI: 2.89–14.62, $p < 0.001$). Lipid profiles were not significant predictors in the model.
Conclusions: This study reveals a concerning prevalence of cardio-metabolic risk factors among young HCWs at Hospital Taiping, a demographic traditionally perceived as "low risk" due to their age and professional health literacy. Future initiatives must transition from passive risk identification to aggressive, data-driven metabolic interventions that prioritize obesity reversal and blood pressure control within the young healthcare workforce.

Keywords: Cardiometabolic; Healthcare worker; Young healers

Poster Presentation

P10 Non-Communicable Disease and Work

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Shift work and metabolic risk among security guards in Johor Bahru, Malaysia

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Introduction: Shift work is an established occupational risk factor for metabolic disorders, yet evidence from low-income occupational groups in Southeast Asia remains limited. Security guards represent an essential but understudied workforce exposed to prolonged night shifts and constrained working conditions.

Materials and Methods: An analytical cross-sectional study was conducted among 189 security guards across eight industrial sites in Johor Bahru. Data on sociodemographic characteristics, work patterns, lifestyle behaviours, and health indicators including body mass index (BMI), waist circumference, blood pressure, and random blood glucose (RBG) were collected. Associations were analysed using chi-square tests, independent t-tests, and multivariable logistic regression.

Results: Night shift workers comprised 57.1% of the sample and were significantly older than day workers ($p = 0.0488$). Night work was associated with higher sugar-sweetened beverage consumption ($p = 0.002$) and lower physical activity ($p = 0.0008$). Overall, 59.8% of participants were overweight or obese and 30.7% had high-risk waist circumference. A high burden of metabolic risk was observed, with 43.9% of participants exhibiting impaired glucose levels and 8.5% meeting diabetic thresholds. Shift type was strongly associated with RBG category ($\chi^2 = 46.75$, $p < 0.0001$). Diabetes risk scores were significantly higher among night workers ($p < 0.01$), and logistic regression demonstrated that night shift work independently predicted high diabetes risk (OR = 2.13, 95% CI 1.18–3.83). Reclassified risk further showed a marked difference between night and day workers (69.9% vs 42.8%).

Conclusions: Night shift work is strongly associated with increased metabolic risk among security guards, reflecting the combined effects of occupational exposure, lifestyle constraints, and socioeconomic pressures. Targeted workplace interventions, including improved shift scheduling, routine screening, and health promotion strategies, are needed to support workforce health and sustainability.

Keywords: Shift work; Occupational health; Diabetes risk; Security guards; Malaysia

Poster Presentation

P10 Non-Communicable Disease and Work

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Optic neuritis in an information technology manager: work-relatedness assessment

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Optic neuritis (ON) is a vision-threatening disorder and often the first symptom of demyelinating diseases such as multiple sclerosis (MS). Information technology (IT) workers are prone to exposed with prolonged visual-display-terminal use and low-level electromagnetic fields (EMF), which is suspected as environmental factor on contribution to MS.

This report describes a 45-year-old male IT manager who developed sudden unilateral vision loss accompanied by periocular pain, especially during eye movement. Ophthalmologic evaluation revealed decreased unilateral visual acuity and visual field. Magnetic resonance imaging supported the diagnosis of ON. Laboratory evaluation was negative for Aquaporin-4 IgG antibodies and showed no evidence of infectious etiology. Based on clinical, laboratory and imaging findings, he was diagnosed with ON with suspected demyelinating origin, likely MS.

A comprehensive occupational assessment was conducted using the structured seven-step approach, including hazard identification, exposure characterization, evaluation of temporal relationships, review based on scientific evidence, and exclusion of non-occupational causes. Occupational history revealed more than 15 years of intensive computer-based work, averaging 8–10 hours daily, with limited rest breaks and high job demands. As direct exposure measurements were not performed, the level of electromagnetic field (EMF) exposure was estimated based on published data. According to Bellieni CV et al. (2012), laptops generate EMF in the range of 1.8–6 μT, while Khaki-Khatibi et al. (2019) reported EMF exposure from computers ranging from 0.04 to 1.82 μT, depending on the distance from the user. Based on these references, the patient's EMF exposure was estimated to be within the range of 0.04–6 μT. Other occupational risk factors for MS were not identified in this patient. Evaluation of non-occupational risk factors, including autoimmune, infectious, and relevant medical history, did not reveal significant contributors. However, the patient was also exposed to EMF from everyday sources, including mobile phones, televisions, microwave ovens, and refrigerators.

A structured literature review was conducted following the Centre for Evidence-Based Medicine (University of Oxford) approach, as part of the occupational disease diagnostic process to assess biological plausibility and strength of association. Searches were performed in three databases with PECO framework (worker, electromagnetic exposure, non-electromagnetic exposure, ON or MS). However, evidence from selected studies does not support a consistent causal association between low-level EMF exposure and MS. While one study (Havas, 2006) reported symptom changes following EMF mitigation, others found no significant association (Pedersen et al., 2017: IRR 1.08; 95% CI 0.81–1.45; Khaki-Khatibi et al., 2019: $p = 0.070$).

Based on the overall evidence, this case was therefore considered more consistent with a non-work-related demyelinating condition. Nevertheless, occupational factors contributed to symptom aggravation and functional limitations. Workplace modifications—including reduced screen time, task rotation, and scheduled visual breaks—were recommended, along with a gradual return-to-work program and ongoing monitoring.

Keywords: Optic neuritis; Multiple sclerosis; Occupational health; Electromagnetic fields; Information technology workers

Poster Presentation

P10 Non-Communicable Disease and Work

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Prenatal exposure to bisphenols, maternal glucose homeostasis, and early childhood neurodevelopment in a science park region of northern Taiwan: a case-control study

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Introduction: Bisphenol compounds (BPs) are increasingly used as substitutes for bisphenol A (BPA), but evidence on maternal glucose regulation and subsequent child neurodevelopment remains limited. This study investigated associations of maternal urinary BPA, BPF, and BPS concentrations with glucose homeostasis during pregnancy and early child neurodevelopment.

Materials and Methods: In a case-control study conducted in northern Taiwan, a region with major science parks and mixed industrial-residential environments, 37 pregnant women with gestational diabetes mellitus (GDM) and 74 healthy controls were enrolled. Urinary BPA, BPF, and BPS concentrations were measured at multiple gestational stages and at 1 month postpartum using high-performance liquid chromatography-tandem mass spectrometry. Glucose homeostasis was assessed by a 75-g oral glucose tolerance test (OGTT). Child neurodevelopment was evaluated with the Bayley Scales of Infant and Toddler Development, Fourth Edition (Bayley-4). Multivariable linear regression and quantile g-computation were used to evaluate the associations.

Results: BPA was detected in more than 86% of urine samples. Higher urinary BPA concentrations were associated with higher 1-hour OGTT glucose levels (β = 3.21; 95% CI: 0.28, 6.14) and greater 0–1-hour glucose change (β = 3.19; 95% CI: 0.23, 6.06). Higher average prenatal BPA concentrations were associated with lower child cognitive scores (β = -1.31; 95% CI: -2.25, -0.36), and higher maternal BPA concentrations at 1 month postpartum were associated with lower child motor scores (β = -0.55; 95% CI: -1.05, -0.04). No significant associations were observed for BPF or BPS.

Conclusions: Prenatal and early postpartum BPA exposure was associated with poorer maternal glucose regulation and child neurodevelopmental outcomes. These findings support continued monitoring of BPA exposure during the perinatal period despite increasing use of alternative bisphenols.

Keywords: Bisphenol A; Gestational diabetes; Neurodevelopment; OGTT; Birth cohort

Poster Presentation

P10 Non-Communicable Disease and Work

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Paid, unpaid, and total working hours in relation to pain-related disability among Japanese working women

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Introduction: Many women engage in both paid and unpaid work. The impact of total working hours, encompassing both, on pain-related disability remains unclear. This study examined the associations between paid, unpaid, and total working hours and pain-related disability among working women.

Materials and Methods: Cross-sectional data were obtained from an online self-administered questionnaire survey of women aged 20–59 years who worked ≥ 20 hours per week in Japan. Weekly paid, unpaid, and total working hours were calculated and categorized. Pain-related disability was assessed using the Japanese version of the Pain Disability Index (PDI; range 0–50). Multivariable linear regression analyses were performed, adjusting for age, BMI, marital status, education, equivalized household income, employment type, and job type.

Results: Among 4,689 participants, the mean PDI score was 11.9 (standard deviation, 11.5), with half scoring 9 or lower. A dose-response relationship was observed for total and unpaid working hours in relation to pain-related disability. In multivariable analyses, women working ≥ 70 total hours per week had higher PDI scores than those working 20–49 hours ($\beta = 3.75$; 95% confidence interval [CI], 2.74–4.75; $p < 0.001$), and those with ≥ 30 hours of unpaid work had higher scores than those with 0–9 hours ($\beta = 4.05$; 95% CI, 2.99–5.12; $p < 0.001$). Paid working hours ≥ 50 per week were associated with higher PDI scores than those working 20–29 hours ($\beta = 1.84$; 95% CI, 0.18–3.51; $p = 0.030$).

Conclusions: Total and unpaid working hours were more strongly associated with pain-related disability than paid working hours alone. Addressing cumulative workload, including unpaid work, may help reduce pain-related disability among working women. These findings suggest that occupational health strategies should consider total workload to support women's health and work functioning.

Keywords: Pain-related disability; Working hours; Unpaid work; Women; Occupational health

Poster Presentation

P10 Non-Communicable Disease and Work

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Healing hands, hidden struggles: obesity in Malaysia's healthcare workforce – a scoping review

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Background: Obesity has emerged as a critical public health challenge worldwide, affecting not only the general population but also healthcare workers (HCWs) who are expected to model healthy lifestyles. In Malaysia, the rising prevalence of obesity among HCWs raises concerns about workforce sustainability, productivity, and the credibility of health promotion efforts.
Methods: Scoping review was conducted using the Arksey and O'Malley framework. Comprehensive searches were performed in PubMed, Scopus, MyCite, and Google Scholar for studies published between 2000 and 2026. Eligible studies included on various HCWs (with body mass index (BMI) or waist circumference (WC) as primary outcomes. Data were extracted to highlight regional prevalence, job-specific risks, and associated comorbidities.
Results: Overweight and obesity rates among HCWs frequently exceeded those of the general Malaysian population, with some regional studies (Perak and Pahang) reporting that over 50% of staff were either overweight or obese. Nurses were identified as a particularly high-risk group, often showing higher odds of obesity (up to 1.9 times) compared to doctors. Support staff also demonstrated elevated risk levels. Significant predictors included shift work, long years of service (>5 years), physical inactivity, and high levels of work-related stress. Mental health factors, specifically depression and anxiety, were significantly correlated with higher BMI indices. Despite high medical literacy, HCWs cited time constraints, lack of healthy food options during night shifts, and workplace fatigue as primary obstacles to weight management.
Conclusions: This review underscores the paradox of HCWs being frontline advocates for health while simultaneously vulnerable to lifestyle-related conditions. Addressing obesity among HCWs requires integrated strategies that combine workplace wellness programs, organizational support, and policy-level interventions. By mapping existing evidence, this scoping review provides a foundation for targeted interventions and future research, emphasizing the urgent need to protect and empower Malaysia's healthcare workforce in combating obesity.

Keywords: Healthcare workers; Obesity; Malaysia

Poster Presentation

P10 Non-Communicable Disease and Work

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Prevalence of non-communicable disease risk factors among healthcare workers in a tertiary hospital in Malaysia

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Introduction: Non-communicable diseases (NCDs) remain the leading contributors to global morbidity and mortality. Healthcare workers, despite their medical knowledge, are exposed to occupational demands and lifestyle related risk factors that may predispose them to NCDs. Workplace health surveillance provides a critical opportunity for early detection and prevention of these risk factors.

Objectives: To determine the prevalence of non-communicable disease risk factors among healthcare workers in a Hospital Tengku Ampuan Rahimah.

Materials and Methods: A cross-sectional study was conducted using workplace health screening data under the national KOSPEN WOW programme at Hospital Tengku Ampuan Rahimah, Klang. Of 4,049 staff as of 1st January 2025, a total of 3,008 healthcare workers were included. A universal sampling approach was applied, including all eligible staff who participated in screening conducted from January to June 2025. Data collected included socio-demographic characteristics, clinical parameters (body mass index, blood pressure, heart rate, blood sugar and cholesterol) and lifestyle indicators including smoking and alcohol consumption. Descriptive statistical analysis was performed using IBM SPSS Statistics Version 30.

Results: The majority of participants were female (78.2%). Most had normal heart rate (92.1%) and blood pressure (94.8%). However, 17.4% had abnormal blood sugar levels and 36% had elevated cholesterol. In terms of nutritional status, 31% were overweight and 20.3% were obese with only 44.4% within normal BMI range. Lifestyle assessment showed that 4% were smokers and 2.2% reported alcohol consumption. Overall, these findings indicate a substantial burden of metabolic risk factors among healthcare workers

Conclusions: A considerable proportion of healthcare workers exhibit modifiable NCD risk factors, particularly dyslipidemia, overweight/obesity, and impaired glucose levels. These findings underscore the need for strengthened workplace health surveillance and targeted preventive strategies, including lifestyle interventions, to improve employee health and sustain healthcare system performance.

Keywords: Non-communicable disease; Healthcare workers; Occupational health surveillance; Workplace health screening

Poster Presentation

P10 Non-Communicable Disease and Work

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The association between body mass index and hyperglycemia: a cohort study among workers

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Introduction: Numerous studies have shown that the relationship between body mass index (BMI) and mortality follows a U-shaped or J-shaped curve. In Japan, companies are required to conduct annual health checkups for their employees. The purpose of this study is to clarify the relationship between BMI and the presence of diabetes sorted by gender using annual health checkup data.

Materials and Methods: This study is a cohort study conducted across 12 companies among workers without diabetes in FY2019 (33,378 men and 8,530 women). BMI was measured at the FY2019 health checkup. Diabetes was defined as the presence of any of the following findings in annual health checkups conducted in FYs 2020 through 2023: fasting blood glucose of 126 mg/dL or higher, casual blood glucose of 200 mg/dL or higher, HbA1c of 6.5% or higher, or use of oral hypoglycemic drugs/insulin. Hazard ratios and 95% confidence intervals were calculated using the Cox proportional hazards model. The covariates were age, smoking, and alcohol consumption.

Results: The number of men classified as underweight (<18.5 kg/m^2) was 939 (2.8%), and the number of women was 1,231 (14.4%). Among men, compared to the Normal category (18.5–<23 kg/m^2), the HR (95% CI) for the Underweight category (<18.5 kg/m^2), the Overweight category (23–<25 kg/m^2), and Grade 1 obesity (25–<30 kg/m^2), Grade 2 or 3 obesity (≥30 kg/m^2) were 0.62 (0.33-1.16), 1.67 (1.41-1.96), 3.85 (3.35-4.44), and 11.66 (9.91-13.73), respectively, and among women they were 1.03 (0.50-2.14), 2.55 (1.50-4.34), 6.72 (4.42-10.24) and 19.60 (12.68-30.28), respectively.

Conclusions: For both men and women, the risk of developing the condition was higher among those with a BMI of overweight or higher, whereas no clear increase in risk was observed among those who were underweight. Further research is needed to assess the risks associated with being underweight.

Keywords: BMI; Diabetes; Underweight; Obesity; Workplace

Poster Presentation

P10 Non-Communicable Disease and Work

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Work performance impacts of Long Covid among healthcare workers: a scoping review with emphasis on Southeast Asia

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Introduction: Long Covid, or post-COVID-19 condition, is a chronic multisystem illness whose symptoms persist beyond acute infection. Among healthcare workers, residual fatigue, cognitive complaints, breathlessness, and reduced functional capacity carry occupational consequences for return to work, presenteeism, and retention. These impacts have not been systematically mapped, and the Southeast Asian evidence base is uneven. This scoping review aimed to map the extent, range, and nature of empirical evidence on the work performance impacts of Long Covid among healthcare workers, with analytic emphasis on Southeast Asia and global comparators retained for context.

Materials and Methods: The review followed Joanna Briggs Institute (JBI) scoping methodology and was reported using the extension for scoping reviews of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, with eligibility structured by Population-Concept-Context. Eligible sources were empirical studies published between 1 January 2020 and 20 January 2026 that included healthcare workers, examined Long Covid beyond the acute phase, and reported a work-related or occupationally relevant outcome. Eight databases were searched, supplemented by grey literature, citation chaining, and official guidance. Two-stage screening and structured charting were applied; no formal critical appraisal was undertaken. Synthesis was descriptive and thematic, organised by symptom burden, functional limitation, work ability, productivity, presenteeism, and cognitive sequelae.

Results: Of 1,173 records identified, 847 were screened after deduplication, 146 full texts assessed, and 22 sources included, comprising 18 empirical studies and four contextual sources. The literature was dominated by cross-sectional, hospital-based studies. The most consistently reported symptoms were fatigue, cognitive difficulties, breathlessness, sleep disturbance, and reduced functional status. Occupational impacts clustered around reduced work ability, impaired work-role functioning, delayed or modified return to work, presenteeism, and measurable productivity loss, including monetised annual loss in one Malaysian tertiary hospital. Regional evidence was strongest in Malaysia, Singapore, Thailand, and Indonesia, but methodologically heterogeneous, with variable case definitions and rarely validated occupational measures. Direct measures of patient safety, sickness certification, and long term occupational exit were largely absent.

Conclusions: Long Covid among healthcare workers is best understood as a chronic occupational health issue rather than residual post-infection symptomatology. The evidence justifies standardised case definitions, structured occupational follow-up, phased return-to-work pathways, and routine measurement of work ability and presenteeism. Future research should be prospective and multicentre, with explicit work-outcome measurement, broader regional coverage, and interventions addressing productivity, retention, and safety-sensitive performance.

Keywords: Long Covid; Healthcare workers; Work performance; Return to work

Poster Presentation

P10 Non-Communicable Disease and Work

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Overweight and obesity among healthcare workers in Hospital Dungun and its association with metabolic risk factors

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Introduction and Objectives: Overweight and obesity among healthcare workers are important occupational health concerns due to their association with metabolic and cardiovascular risk. This study aimed to determine the prevalence of overweight and obesity and its association with metabolic risk factors among doctors, nurses and medical assistants in Hospital Dungun.

Methods: A cross-sectional study was conducted among doctors, nurses and medical assistants from 1 January 2025 to 31 December 2025 using universal sampling. Data on body mass index, fasting blood sugar, total cholesterol, blood pressure, and mental health status using validated questionnaires were collected and analysed. Overweight and obesity were defined according to Malaysian clinical practice guidelines. Abnormal fasting blood sugar and elevated total cholesterol were defined based on standard clinical cut-off values. Associations between categorical variables were analysed using chi-square test, while Pearson correlation was used for continuous variables.

Results: A total of 372 participants were included. The prevalence of overweight and obesity combined was 75.8%, comprising 38.7% overweight and 37.1% obese. Abnormal fasting blood sugar was observed in 15.3% of participants, while elevated total cholesterol was present in 53.2%. The prevalence of elevated blood pressure, depression, and anxiety were low at 1.6%, 1.6%, and 1.1%, respectively. There was a statistically significant association between body mass index category and abnormal fasting blood sugar ($p = 0.038$), with a higher proportion observed among individuals with overweight and obesity compared to those with normal body mass index. No significant association was observed between body mass index and total cholesterol ($p = 0.942$), blood pressure ($p = 0.309$), depression ($p = 0.870$), or anxiety ($p = 0.827$). Pearson correlation analysis demonstrated a weak but significant positive correlation between body mass index and fasting blood sugar ($r = 0.230$, $p < 0.001$). Discussion and

Conclusions: Overweight and obesity are highly prevalent among healthcare workers in Hospital Dungun. Increased body mass index is associated with higher fasting blood sugar, indicating early metabolic risk. These findings highlight the need for targeted workplace interventions focusing on weight management and metabolic risk reduction among healthcare workers.

Keywords: Overweight; Obesity; Healthcare workers; Metabolic risk

Poster Presentation

P11 Communicable Disease and Work

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Sampling methods to capture viable *Staphylococcus* aureus from workplace air

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Viable Staphylococcus aureus (SA) bioaerosols are detected in various workplaces and may cause severe human infections. Reliable monitoring of SA by efficient air sampling is crucial for characterizing occupational exposure. However, the efficiency of air sampling techniques in capturing viable SA from workplaces remains undetermined. Considering the difference in environmental SA strains and their susceptibilities to stresses inherent in air sampling process, the performance of two liquid-based samplers (Coriolis and BioSampler) filled with deionized water (DW) or Tween mixture (TM) and three filtration samplers (IOM, Button, and Cassette) loaded with polycarbonate (PC) or gelatin filters was assessed at various animal farming and public buildings, including the cow, chicken, and quail houses, the restroom and classrooms of a college building, and the recreational area of a university dormitory for increasing the heterogeneity in the SA strain. A total of 385 samples were collected for analysis using propidium monoazide and quantitative PCR. When SA was detected by the IOM, the relative efficiency (RE) was calculated for the sampling methods simultaneously tested, taking the IOM as the reference. The 30-minute sampling results indicate that the IOM with a gelatin filter performed better than the Coriolis/TM and BioSampler/DW (both $p = 0.06$). Collective analyses of 30- and 60-minute data further show greater REs with IOM/PC and Cassette/PC than with BioSampler (both $p < 0.05$) and greater REs of BioSampler with DW than with TM ($p < 0.05$). For the filtration methods operated for 30-270 minutes, the IOM/PC performed best, significantly greater than the Button/PC and IOM/gelatin (both $p < 0.05$). Overall, filtration methods are generally superior to liquid-based techniques for capturing viable SA in fields. Specifically, IOM/gelatin is suitable for 30-minute sampling, while IOM/PC performs better at prolonged sampling times of up to 270 minutes. BioSampler/DW is recommended in cases where liquid sampling is preferred. The current findings should be taken into account when assessing airborne SA in personnel or workplaces, either as part of regular practice or during infection investigations.

Keywords: Staphylococcus aureus; Workplaces; Liquid sampling; Filtration sampling; Viable qPCR

Poster Presentation

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Acute gastroenteritis outbreak in a plantation workers' kindergarten, Sebauh, Sarawak: implications for occupational environmental health

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Introduction: On 23 August 2025, a cluster of acute gastroenteritis (AGE) was reported among children in a plantation kindergarten in Sebauh, Sarawak. Plantation communities commonly depend on employer-managed centralised water systems, representing a critical yet under-recognised occupational environmental health risk. This study aimed to investigate the outbreak, identify the causative agent and assess potential environmental sources.

Methods: A descriptive outbreak investigation was conducted. Clinical and epidemiological data were collected. Environmental assessments involved inspections of the kindergarten, the residences of affected individuals within the plantation, and the plantation water supply system. Rectal swabs were analysed for enteric pathogens and water samples were tested against national drinking water standards.

Results: Twelve of 14 exposed children developed illness (attack rate: 85.7%). The epidemic curve was consistent with a point-source exposure on 21 August 2025. Norovirus genotype II was identified in 9 of 10 samples. All cases sought treatment with three cases required hospitalisation. Environmental surface samples were satisfactory. In contrast, water testing demonstrated inadequate residual chlorine (<0.1 mg/L) and elevated total coliform counts (>80 CFU/100 ml), indicating microbiological contamination and failure to meet drinking water standards.

Conclusions: This norovirus outbreak was likely associated with inadequately treated water from an employer-managed supply system. The findings highlight unsafe water infrastructure as a neglected occupational environmental health hazard in plantation settings. Strengthening employer accountability, routine water quality monitoring and regulatory enforcement is essential to prevent similar outbreaks and protect vulnerable worker communities.

Keywords: Acute gastroenteritis; Norovirus; Waterborne disease; Occupational environmental health; Water quality

Poster Presentation

P11 Communicable Disease and Work

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Do you reject IGRA with negative control showing high value? A rare case report of an IGRA result which shows all positive test in a patient with SLE

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Case Report: A senior nurse transferred from Sabah to Sarawak underwent routine pre-placement Tuberculosis (TB) screening. She had a complex medical history Systemic Lupus Erythematosus, secondary antiphospholipid syndrome, fibromyalgia, and several chronic illnesses requiring immunosuppressive treatment. During the tuberculin skin test (TST), she developed an unusually severe reaction consisting of 20 mm blister with swelling extending from the elbow to the wrist, resulting in acute cellulitis that required emergency treatment. The reaction was so severe that clinicians could not distinguish between hypersensitivity and TB infection.

Consequently, an Interferon-Gamma Release Assay (IGRA) was performed one month later. The initial test produced an extremely rare result with all tubes showed high positive values. Because elevated Nil tube values are usually, the TB Control Section initially rejected the sample with reasons possibility of technical errors. However, investigations into blood collection, handling, and transport procedures found no technical issues.

The healthcare team consulted Qiagen Biotechnology Malaysia Sdn Bhd, which confirmed that this was the first globally reported case of such findings. As no established references for interpretation, the manufacturer recommended repeating the test after one month to determine whether the results were reproducible or related to temporary hypersensitivity.

The repeat IGRA showed similarly elevated values across all tubes, confirming a positive result for latent TB infection. The patient was then referred to a rheumatologist for adjustment of immunosuppressive therapy before starting anti-TB treatment.

Discussion: IGRA is a blood test for detecting TB infection by measuring immune response across four specific tubes: Nil Tube (negative control), TB1 tube, TB2 tube, and Mitogen tube (positive control). It is typically used to confirm latent TB after a positive TST. In this case, a complex immunological state likely contributed to her inability to be accurately diagnosed via TST, where her reaction was so significant it blurred the lines between hypersensitivity and actual TB infection. First IGRA showed unusually high responses in all tubes, initially suggesting a technical error, but later investigation showed it was a true biological response, despite its rarity. The case highlights that abnormal results, including elevated negative control, should not be dismissed outright. Instead, thorough investigation is essential, especially in complex autoimmune conditions, emphasizing careful interpretation and collaboration with test manufacturers.

Conclusion: Do we reject negative control showing high result? This case demonstrates that rare IGRA results with elevated responses across all tubes should not be automatically discarded, but rather recognized as true positive results after thoroughly ruling out possible technical issues. Furthermore, it highlights the immense challenge of interpreting immunological test results in patients with autoimmune diseases, emphasizing the critical importance for clinicians to maintain a high index of suspicion and actively seek answers from test manufacturers when encountering globally novel or challenging data interpretation scenarios.

Poster Presentation

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Beyond high-risk groups: gaps in latent tuberculosis screening among healthcare workers in Johor

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Introduction: Healthcare workers (HCWs) face a markedly higher occupational risk of tuberculosis (TB), estimated to be up to three times greater than the general population due to increased exposure in clinical settings. This disparity underpins the development of targeted occupational screening programs. Current guidelines emphasize risk stratified latent TB infection (LTBI) screening based on occupation or workplace location to optimize cost effectiveness. This study evaluates the effectiveness of these risk criteria in identifying TB among HCWs in Johor State Health Department.

Methods: A retrospective descriptive epidemiological analysis was conducted using Johor State Health Department's occupational TB surveillance data for 2025. Case distributions were compared against the screened denominator, which primarily focused on high-risk groups, to assess concordance and quantify potential under ascertainment.

Results: Between January and December 2025, 15,721 HCWs underwent screening, with routine screening yielding no new active TB detections. Program registers, however, documented 20 active TB cases and 163 LTBI cases. Active TB was identified through passive detection following symptom onset, while LTBI diagnoses arose mainly from contact investigations. Importantly, 50% of cases occurred among non-high-risk occupations such as food service, administrative, and IT staff, highlighting transmission beyond traditionally defined high-risk groups. No active TB cases were attributed to routine symptom screening, underscoring under ascertainment when screening is restricted to high-risk staff.

Conclusions: Risk stratified LTBI screening, while resource sensitive, fails to capture a significant proportion of TB and LTBI cases among non-high-risk staff. These findings highlight the limitations of relying solely on occupational or location-based criteria. In line with international recommendations, we propose extending routine symptomatic screening to all HCWs, regardless of exposure risk, with prompt diagnostic evaluation and strengthened linkage to LTBI management. This approach would enhance case detection, reduce under ascertainment, and improve occupational TB control.

Keywords: Latent tuberculosis; Healthcare workers; Screening policy; Occupational epidemiology

Poster Presentation

P11 Communicable Disease and Work

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Knowledge, attitude, and practice (KAP) towards leptospirosis prevention among healthy Malaysian and non-Malaysian pioneer dairy farm workers in Mersing, Johor

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Introduction: The rapid development of the Jemaluang Dairy Valley (JDV) may increase occupational exposure to zoonotic infections such as leptospirosis, an endemic disease in Malaysian agricultural settings. Assessing the baseline health literacy of the pioneer workforce is important for preventing workplace transmission and guiding targeted occupational health interventions.

Objectives: This study aims to evaluate the baseline Knowledge, Attitude, and Practice (KAP) towards leptospirosis prevention among healthy Malaysian and non-Malaysian pioneer dairy farm workers in Mersing working in Malaysia's emerging large-scale dairy industry.

Methods: A cross-sectional descriptive study will be conducted among agricultural workers at the JDV facility. Universal sampling (census) is applied to recruit all 57 eligible workers present during the study period. Data collection is integrated into a proactive occupational health programme conducted by the Mersing District Health Office. A comprehensive 47-item bilingual KAP questionnaire, adapted from a validated Malaysian instrument, is utilized. Following expert content validation, the questionnaire assesses demographic characteristics, knowledge of transmission, attitudes toward workplace hygiene, and self-reported preventive practices including Personal Protective Equipment (PPE) utilization. Ethical approval has been registered via the National Medical Research Register (Research ID: RSCH ID-26-01833-HXT), and informed consent is obtained prior to the anonymous guided survey.

Expected Results: Data collection involving the total census of 57 pioneer agricultural and dairy workers is currently underway. It is anticipated that the findings will reveal a unique epidemiological dynamic: high levels of reported preventive practices (e.g., strict PPE compliance and sanitation) driven primarily by stringent farm SOPs and management enforcement, contrasting with disproportionately low baseline knowledge regarding actual leptospirosis transmission. This knowledge deficit is expected to be particularly pronounced among the predominantly migrant (Pakistani) workforce, where language and educational barriers limit the comprehension of occupational zoonotic risks.

Conclusions: This baseline assessment is expected to highlight a critical vulnerability: while physical biosecurity practices are administratively maintained, the underlying health literacy of the workforce remains fragile. Effective leptospirosis prevention requires inclusive communication strategies. Addressing language barriers among non-Malaysian workers and tailoring information for individuals with lower educational backgrounds is essential to fostering positive attitudes and sustainable preventive behaviours. Future studies should expand this KAP assessment to include Muadzam Shah Dairy Valley, providing a comprehensive, comparative overview of leptospirosis perceptions across Malaysia's major dairy hubs.

Keywords: Leptospirosis; Occupational health; KAP study; Dairy farm workers; Zoonotic diseases

Poster Presentation

P11 Communicable Disease and Work

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A pilot study of behavioural and environmental determinants of leptospirosis exposure risk among palm oil plantation workers in Selangor, Malaysia

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Background: Leptospirosis is an important occupational health threat in tropical agricultural settings, particularly among palm oil plantation workers exposed to wet environments, poor drainage, rodents, and contaminated soil or water. This pilot study generated preliminary baseline findings and assessed the feasibility of the study instrument and analytical framework prior to the full field study.

Methods: A cross-sectional pilot study was conducted among 100 palm oil plantation workers in Selangor, selected through stratified random sampling. Data were collected using a structured questionnaire assessing leptospirosis exposure risk, knowledge, self-efficacy, health-seeking behaviour, and occupational practice. Preliminary composite-scale and pathway analyses were performed, and internal consistency of the main domains was assessed. Findings will inform refinement of study procedures, construct measurement and subsequent confirmatory factor analysis and full structural equation modelling in the definitive study.

Results: The main domains demonstrated excellent internal consistency, with Cronbach's alpha ranging from 0.830 to 0.985. Self-efficacy emerged as the strongest positive predictor of occupational practice ($\beta = 0.388$, $p < 0.001$), followed by health-seeking behaviour ($\beta = 0.289$, $p = 0.039$). Better occupational practice was associated with lower leptospirosis exposure risk ($\beta = -0.398$, $p = 0.043$). Rodent density ($\beta = 0.685$, $p < 0.001$) and flood frequency ($\beta = 0.329$, $p < 0.001$) were strongly associated with higher exposure risk.

Conclusions: This pilot study provides preliminary evidence that behavioural and environmental factors may influence leptospirosis exposure risk among palm oil plantation workers. The full study will validate these pathways and help inform targeted occupational health interventions, environmental control measures, and plantation-level preventive strategies.

Keywords: Leptospirosis; Plantation workers; Occupational health; Exposure risk; Pilot study

Poster Presentation

P11 Communicable Disease and Work

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Unsafe acts and unsafe conditions: occupational health insights from a tuberculosis cluster among healthcare workers in the emergency department of a tertiary hospital

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Introduction: Tuberculosis (TB) among healthcare workers (HCWs) is a preventable occupational disease when safe working conditions and safe work practices are consistently maintained. However, in the Emergency Department (ED) of a tertiary hospital, an increase in TB cases among HCWs was observed from 2023 to 2025 despite a relatively stable annual TB patient load, suggesting possible occupational and environmental factors contributing to workplace transmission. This study aimed to describe the TB cluster among HCWs, identify unsafe acts and unsafe workplace conditions contributing to occupational transmission and highlight the critical role of occupational health services in strengthening TB prevention and control measures in healthcare facilities.

Materials and Methods: A descriptive case study was conducted among HCWs diagnosed with TB between June 2023 and March 2025. The investigation was led by a public health professional and involved a multidisciplinary team of clinicians and engineering personnel, integrating epidemiological analysis with occupational and environmental risk assessments. The data reviewed comprised timelines of symptom onset and diagnosis, job categories, workplace locations, contact-tracing outcomes, and findings from workplace walkthrough surveys. Environmental assessments comprised indoor air quality evaluation, ventilation system review, airflow pattern analysis and application of the Tuberculosis Facility Risk Assessment Tool (TB-FRAT) to identify high-risk areas and potential sources of transmission.

Results: Eight tuberculosis (TB) cases were identified among HCWs in the ED. High-risk patients were initially managed in outdoor areas until February 2024, when care was moved inside the ED following removal of outdoor canopy. Walkthrough surveys and indoor air quality assessments identified ventilation issues, including obstructed air diffusers, poor airflow and inadequate air changes per hour (ACH). This led to the workplace being classified as a medium TB risk due to weak environmental controls. Inconsistent N95 use, incomplete HCW screening and fragmented contact tracing were also identified. GeneXpert molecular analysis showed that TB strains were not genetically matched, indicating that transmission likely originated from patients rather than a single HCW source.

Control measures were implemented based on the hierarchy of controls. Environmental interventions included removal of airflow-blocking partitions and optimisation of the air handling unit. Administrative controls were strengthened through enhanced contact tracing, HCW screening, and the establishment of an LTBI clinic for HCWs diagnosed with latent TB infection. N95 respirator use and infection prevention and control practices were also strictly reinforced. No further TB cases were report-

ed after March 2025.
Conclusions: This TB cluster resulted from occupational exposure associated with unsafe work practices and inadequate environmental controls, particularly poor ventilation. A comprehensive occupational health investigation identified key risk factors and guided targeted control measures. Strengthening occupational health services, ventilation systems, and infection prevention practices is essential to prevent TB transmission in healthcare facilities.

Keywords: Tuberculosis; Healthcare worker; Cluster; Environmental factor

Poster Presentation

P12 Industrial Hygiene Practice

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Investigating sick building syndrome in a Hulu Langat health clinic

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Introduction and Objectives: Reports of non-specific, building-related health symptoms from healthcare workers in a public health clinic - particularly within the Pharmacy unit - prompted an occupational health investigation into a potential Sick Building Syndrome outbreak. This study aimed to confirm the presence and determine the prevalence of Sick Building Syndrome, identify potential etiological factors and environmental deficiencies, describe symptom characteristics and provide recommendations.

Methods: A descriptive cross-sectional, mixed-methods study was conducted. All 104 employees invited, 48 participated (46.2% response rate). Data were collected using a validated Sick Building Syndrome questionnaire, a qualitative environmental walkthrough, and informal interviews. The case definition required symptoms to occur "often (2-3 times/week)" and "improve or resolve upon leaving the building"). Data analysis involved descriptive statistics and simple logistic regression, stratified by history of allergies.

Results: The prevalence of Sick Building Syndrome was 25.0% (n=12/48). Sick Building Syndrome was significantly associated with a personal history of allergic conditions (Crude Odds ratio [Odds Ratio] = 4.9; 95% Confidence Interval: 1.22 – 16.69) and working in the Outpatient Department/Pharmacy unit (Odds Ratio=4.71; 95% Confidence Interval: 1.09 – 20.47). Stratified analysis revealed a strong effect modification: the Outpatient Department /Pharmacy environment was a major risk factor for non-allergic staff (Odds Ratio=10.0; 95% Confidence Interval: 0.96-103.78) but not for allergic staff (Odds Ratio=0.83). The walkthrough identified visible fungal (mould) growth in the high-risk Outpatient Department/Pharmacy areas. Interviews linked this to condensation from a new Heating, Ventilation and Air Conditioning (HVAC) system installed in December 2024, which persisted despite several superficial remediation attempts.

Conclusions: The investigation confirms a 25.0% Sick Building Syndrome prevalence driven by an HVAC system defect – likely due to inadequate duct insulation – causing chronic condensation and persistent mould growth. The high risk observed among non-allergic staff (Odds Ratio 10.0) highlights a potent environmental hazard. Immediate, specialized engineering intervention is required to rectify the HVAC moisture source.

Keywords: Sick building syndrome; Indoor air quality; Mould; HVAC system; Condensation

Poster Presentation

P12 Industrial Hygiene Practice

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Quantifying healthy worker survivor bias driven by employment status changes using National Health Insurance data in Korea

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Introduction and Objectives: Healthy worker survivor bias skews occupational health studies by favoring healthier, employed individuals. Owing to data limitations, its quantification remains scarce in Korea. This study aimed to quantify healthy worker survivor bias driven by employment status changes using the national health insurance database.
Methods: This retrospective cohort study analyzed national health insurance data from 2008 to 2010 for individuals aged 30 to 59 years with consistent insurance types, tracking all-cause mortality through December 2022. Insurance type determined employment status. Landmark analysis, with origin in 2011 and current time spanning 2012 to 2021, evaluated fixed and dynamic cohorts to estimate the bias by assessing mortality risk attenuation across age, sex, and landmark periods, defined as short-term covering one to ten years and long-term covering one to seven years.
Results: The final cohort included 18,192,989 participants, with a median age of 44 years and 49.05 percent male. The bias was more pronounced in females, in dynamic cohorts, and over longer landmark periods. It intensified with age but showed smaller long-term attenuation than short-term effects. Short-term bias attenuated mortality risk by 25 to 30 percent in males and 36 to 39 percent in females, whereas long-term attenuation was lower, at 7 to 15 percent in males and 12 to 18 percent in females.
Discussion/Conclusion: These quantified results provide critical national-level estimates for baseline adjustment. Accounting for this bias, particularly in female and older cohorts, is vital to prevent the underestimation of adverse health risks in occupational research.

Keywords: Healthy worker survivor bias; Employment status; Occupational epidemiology; Mortality; Selection bias

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Evaluation of health effects of chemical poly-exposure among sanitary workers

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Introduction and Objectives: The impact of chemical substances on the respiratory health of sanitation workers remains a poorly documented field, especially in developing countries. This study aims to determine the prevalence of respiratory symptoms and signs of irritation, while objectively evaluating lung function among workers in a water treatment company exposed to chemical risks.

Materials and Methods: A cross-sectional descriptive and comparative epidemiological study was conducted on 180 male workers, comprising 80 exposed agents (sanitation, confined spaces, maintenance) and 100 non-exposed controls. Data collection was based on the Medical Research Council questionnaire and mobile spirometry measuring FEV1 (VEMS), FVC (CVF), PEF (DEP), and FEF 25-75% (DEM 25-75%).

Results: The study shows that 72% of sanitary agents are poly-exposed to chemicals. Eye irritation was significantly more frequent among the exposed ($p < 0.01$). The risk of coughing was twice as high in exposed workers (OR = 2.08; $p = 0.06$).
Spirometry revealed ventilatory abnormalities in 43.4% of the exposed group versus 13.7% of controls ($p < 0.01$). Mean parameters were significantly lower in exposed workers: FEV1 (95.80% vs 102.95%; $p = 0.01$), PEF (85.75% vs 92.30%; $p < 0.01$), and FEF 25-75% (84.50% vs 98.47%; $p < 0.01$). Among exposed smokers, the prevalence of abnormalities reached 48.1% compared to 15% in non-exposed smokers ($p < 0.01$).

Conclusions: Occupational exposure to chemicals in the water treatment sector leads to a substantial alteration of lung function. It is essential to strengthen technical control measures, generalize the use of respiratory protective equipment, and ensure periodic medical surveillance including regular functional tests.

Keywords: Sanitary workers; Chemicals; Respiratory symptoms; Lung function

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Escalating occupational risk in Malaysian Ministry of Health hospitals: a three-year analytical surveillance study (2023–2025)

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Introduction: Healthcare workers in Ministry of Health hospitals are exposed to diverse occupational hazards including sharp injuries and general workplace accidents. Malaysia maintains an integrated surveillance system capturing occupational accidents, dangerous occurrences, and diseases through standardized reporting instruments. These include the Workplace Accident Notification Form for general accidents alongside specific sharp injury surveillance. Analytical assessment of temporal trends is necessary to inform risk-based prevention strategies. This study aimed to quantify changes in occupational incident rates and identify high risk patterns among healthcare workers in Ministry of Health hospitals from 2023 to 2025.

Materials and Methods: A retrospective analytical study was conducted using national Ministry of Health surveillance data from 2023 to 2025. Incidence rates per 1,000 healthcare workers were calculated. Comparative rate analysis and stratified assessment by mechanism, occupational category, and department were performed to identify significant shifts in the occupational risk profile.

Results: A total of 12,048 occupational accident cases and 1,018 occupational disease cases were reported. The occupational accident incidence increased from 21.97 per 1,000 healthcare workers in 2023 to 26.94 per 1,000 healthcare workers in 2025, corresponding to a rate ratio of 1.23 and indicating a 23% higher risk in 2025. Sharp injuries and general accidents reported via the Workplace Accident Notification Form each constituted 44% of total accidents, together representing 88% of the total accident burden. Motor vehicle accidents were the leading mechanism, reflecting substantial occupational travel exposure. Occupational diseases demonstrated a sustained biological burden, with pulmonary tuberculosis accounting for 77% of occupational lung disease cases. Occupational dermatitis comprised 97.6% of reported skin disease cases.

Conclusions: The upward accident rate and persistent biological exposure burden indicate systemic occupational risk within public healthcare institutions. Analytical surveillance enables the prioritization of engineering controls, travel risk mitigation, and tuberculosis prevention strategies. Surveillance systems should evolve into proactive instruments for risk based occupational health governance.

Keywords: Occupational injuries; Health personnel; Public health surveillance; Risk assessment; Malaysia

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Indoor air quality and health risk assessment among preschools children in urban areas

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Poor indoor air quality (IAQ) in schools can adversely affect students' comfort, health, and cognitive performance. This study evaluated the IAQ of three preschools located in Shah Alam, Malaysia, using a mixed-methods approach comprising walk-through inspections, occupant questionnaires, and on-site environmental monitoring. Key parameters measured included temperature, relative humidity, carbon dioxide (CO_2), particulate matter (PM10), total volatile organic compounds (TVOC), and total counts of bacteria and fungi. Questionnaires captured occupants' reported symptoms and perceptions of the indoor environment, while health risk assessments quantified potential long-term and short-term risks. Statistical analysis indicated no significant differences ($p > 0.05$) among the three sites for most measured parameters, except for total fungal and bacterial counts, which varied significantly between schools. Commonly reported symptoms among staff and children included fatigue, headache, difficulty concentrating, eye irritation, and runny nose, suggesting occupant discomfort consistent with measured microbial differences. Quantitative health risk assessment produced Excess Lifetime Cancer Risk (ELCR) estimates of 1.95×10^{-5}, 1.82×10^{-6}, and 1.86×10^{-6} for the three preschools, values within ranges typically considered negligible for carcinogenic risk. Hazard Quotient (HQ) results of 0.003, 0.134, and 0.135 similarly indicate low non-carcinogenic risk under current exposure conditions. Overall, findings highlight the need for targeted mitigation of microbial contamination in preschool environments and routine IAQ monitoring to protect vulnerable occupants, inform maintenance and ventilation strategies, and support healthier indoor learning environments in urban preschool settings.

Keywords: Indoor air quality; Preschools; Particulate matter (PM10); Volatile organic compounds (VOC); Health risk assessment

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Prevalence and patterns of noise-induced hearing loss among manufacturing workers in Laguna, Philippines: a cross-sectional audiometric audit and risk-mapping study

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Introduction: Noise-induced hearing loss (NIHL) remains a preventable yet persistent occupational health problem in manufacturing. While commonly reported in heavy industries, risks in food manufacturing settings are less well described, particularly in provincial industrial zones in the Philippines. This study determined the prevalence and patterns of hearing loss among noise-exposed workers in Laguna, Philippines, and examined its distribution across work areas to guide targeted prevention.
Materials and Methods: A cross-sectional audiometric audit was conducted among workers assigned to areas with measured noise levels ≥85 dB(A) during work environment measurement. Four work areas met this criterion, and all workers assigned to these zones underwent annual audiometry. A total of 49 workers were included. Hearing loss was described in terms of severity, laterality, and audiometric configuration. Area-specific prevalence was computed. A HIRAC-based risk assessment was performed by rating exposure frequency and severity then plotting these in a risk matrix.
Results: Of 49 workers, 36 (73.5%) had hearing loss, mostly mild (69.4%), while two (4.0%) had moderate to profound loss. Bilateral cases were 22 (44.9%) and unilateral 14 (28.6%). High-frequency notches occurred in 15 (30.6%), mainly at 3–6 kHz. Production–Filling (85–87 dB[A]) accounted for most cases. Engineering–Fabrication (90–91 dB[A]) showed 100% prevalence, while Engineering–Scrap (97–103 dB[A]) had the most severe outcomes, including the only profound case. Area-based prevalence ranged from 40% to 100%, with all areas classified as high risk.
Conclusions: A high prevalence of mostly mild but often bilateral hearing loss was observed among workers exposed to action-level noise. Risk mapping showed increasing severity with higher noise levels. These findings support strengthening hearing conservation measures, particularly in higher-exposure areas.

Keywords: Noise-induced hearing loss; Occupational exposure; Audiometry; Risk assessment; Manufacturing workers

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Implementation gaps in chemical risk control measures in Malaysian public hospitals: a case study

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The use of chemicals is essential in healthcare settings, including their application as medications, disinfectants, sterilizing agents, and laboratory reagents. However, these substances pose significant occupational hazards alongside biological, ergonomic, and physical risks. Improper handling, storage, and management of hazardous chemicals may lead to serious health consequences, environmental damage, and potential fatalities.

Under the Occupational Safety and Health Act (OSHA) 1994, employers are legally obligated to ensure the safety, health, and welfare of employees, including protection from chemical hazards. This study aims to assess the adequacy of chemical risk control measures, identify implementation gaps, and evaluate compliance with the Use and Standards of Exposure of Chemicals Hazardous to Health (USECHH) Regulations 2000 in a Malaysian public hospital.

A quantitative cross-sectional design was employed, incorporating Chemical Health Risk Assessment (CHRA) review and a structured questionnaire distributed to 73 healthcare workers across six departments. The findings indicate a moderate level of compliance (mean = 3.19), with significant gaps identified in administrative control, emergency preparedness, and department-specific training.

Statistical analysis revealed that administrative control is the strongest predictor of compliance ($\beta = 0.42$, $p < 0.001$), followed by training, PPE usage, and chemical handling practices. The study concludes that while partial compliance exists, the effectiveness of chemical risk management is hindered by weak enforcement, generic training approaches, and infrastructural limitations.

This study provides practical recommendations to strengthen chemical safety practices, enhance regulatory compliance, and improve occupational health outcomes in Malaysian public hospitals.

Keywords: Chemical risk; CHRA; USECHH; Occupational safety; Hospital safety; Implementation gap

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Consideration of an evaluation system for lung disorders caused by microplastics

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Introduction: Microplastics have been detected in the atmosphere and in human lungs, raising concerns about their adverse health effects. However, airborne microplastics vary widely in polymer type, shape, and physicochemical properties, including weathering by ultraviolet radiation and adsorption of other air pollutants. Because it is difficult to evaluate each factor individually, we aimed to develop a simple screening system to predict the pulmonary effects of inhaled microplastics.
Materials and Methods: We compared three test systems—an in vitro cell assay, an intratracheal instillation study, and an inhalation exposure study—to establish a lung toxicity evaluation system for airborne microplastics. Four microplastics were tested: 1-μm PS(Plain), PS(NH2), PS(COOH), and PP (4.73 μm). Particles were prepared at 2.5 mg/mL for intratracheal instillation, polystyrene was re-dispersed in 0.1% Tween 80 for the cell assay, and PP powder was used for inhalation exposure.
Results: Among the three types of polystyrene, PS(NH2) showed the highest oxidative stress-inducing potential. This trend was consistently observed in both the cell assay and the intratracheal instillation study, indicating concordance between the two systems.
Comparison of the intratracheal instillation and inhalation exposure studies also showed similar inflammatory response patterns in bronchoalveolar lavage fluid and histopathological findings.
Conclusions: These results suggest a certain degree of concordance among the cell assay, intratracheal instillation study, and inhalation exposure study for the polystyrene and polypropylene materials used in this study. Further studies with a larger number of samples are needed to determine whether similar concordance can be observed across microplastics with a wider range of physicochemical properties.
Acknowledgement: This research was supported by the Environment Research and Technology Development Fund (JPMEERF20221R04, JPMEERF20255M04) of the Environmental Restoration and Conservation Agency provided by Ministry of the Environment of Japan.

Keywords: Microplastics; Lung toxicity; Intratracheal instillation; Inhalation exposure

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Towards safer hospitals for the elderly: mapping evidence on safety culture: a scoping review protocol

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Background: Patient safety culture is a fundamental component of healthcare quality, reflecting shared values, beliefs, and behaviours that support safe care delivery. Older adults are particularly vulnerable to safety risks during hospitalisation due to multimorbidity, polypharmacy, and functional decline. Despite the rapidly ageing population worldwide, evidence on how patient safety culture is conceptualised, measured, and addressed within hospital care for older adults remains fragmented. Therefore, a scoping review is needed to systematically map existing research and identify knowledge gaps.
Objectives: This protocol outlines a scoping review that aims to map the extent, range, and nature of evidence on patient safety culture in hospital settings involving older adults, including key concepts, measurement instruments, influencing factors, and reported outcomes.
Methods: The review will follow Arksey and O'Malley's scoping review framework and be reported in accordance with the PRISMA-ScR guidelines. A comprehensive search will be conducted in PubMed, Scopus, Web of Science, and relevant grey literature from inception to December 2024. Studies of any design examining patient safety culture in hospital settings involving older adults will be included. Two reviewers will independently screen studies, extract data, and chart information related to study characteristics, safety culture dimensions, assessment tools, and key findings.
Expected Results: This review will provide a comprehensive overview of existing evidence on patient safety culture in hospital care for older adults, highlighting common themes, conceptual approaches, and gaps in measurement and research.
Conclusions: The findings will inform healthcare providers, policymakers, and researchers by identifying evidence gaps and supporting the development of targeted strategies to strengthen patient safety culture in hospital care for older adults.

Keywords: Patient safety culture; Patient safety; Older adults; Elderly; Hospitals; Scoping review; Protocol

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Noise-induced hearing loss among customer service operators at Hospital Putrajaya: a case study

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Introduction: Noise-induced hearing loss (NIHL) is the most frequently reported occupational disease in Malaysia, traditionally associated with industrial sectors. However, healthcare personnel who rely on communication headsets may also be at risk, though this group is often overlooked in surveillance programmes. At Hospital Putrajaya, a staff complaint in 2024 prompted a Noise Risk Assessment (NRA), followed by comprehensive audiometric surveillance in 2025. This case study presents evidence of NIHL among Customer Service Operators (csos) under the Ministry of Health Malaysia (KKM).
Methods: A cross-sectional assessment was conducted involving 15 csos working in a confined operator room with routine headset use. Noise levels were measured using the ISO 11904-2 manikin method with a Class 1 sound level meter. Exposure indices included daily noise exposure (LEX,8h), maximum (Lmax), and peak levels (lcpeak). In accordance with the Occupational Safety and Health (Noise Exposure) Regulations 2019, all csos subsequently underwent audiometric testing.
Results: The NRA confirmed that exposures exceeded national limits: LEX,8h = 93.1 dba (limit: 85 dba), Lmax = 107.3 dba, and lcpeak = 119.3 dbc. Frequencies between 125–4000 Hz, critical for speech perception, were most affected. Audiometric testing of all 15 operators revealed two employees with bilateral high-frequency NIHL, consistent with prolonged occupational headset use and absence of industrial noise history.
Discussion/Conclusion: This case study provides the first Malaysian hospital-based evidence of NIHL among administrative healthcare staff. The findings demonstrate that even non-industrial roles can exceed occupational noise exposure limits, broadening the scope of workplace health risks. Urgent implementation of Hearing Conservation Programmes (hcps) is required, incorporating dual-ear active noise-cancelling headsets, task rotation, safe headset practices, annual audiometric monitoring, and structured staff education. Proactive measures at Hospital Putrajaya may serve as a model for protecting hearing health in similar healthcare settings nationwide.

Keywords: Noise-induced hearing loss; Occupational health; Headset exposure; Audiometry; Hospital Putrajaya

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Computer vision syndrome: prevalence and its associated risk factors among healthcare workers using computer (HCWC) in Sarawak State Health Department office

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Introduction: Computer Vision Syndrome (CVS) is a collection of eye and visual problems related to prolonged exposure to computer. This study aimed to describe the prevalence of CVS and its associated risk factor among the Healthcare Worker Using Computer (HCWC) in Sarawak State Health Department office.
Methods: Measurement of CVS were carried out using validated, self-administered questionnaire (CVS-Q) and information gathered included sociodemographic characteristic, work characteristic and ergonomic risk factors. Descriptive statistic and logistic regression were performed to compute the different proportion and relevant association prevalence of CVS.
Results: Prevalence of CVS among HCWC working at Sarawak State Health Department office was 56.7% with the most often symptoms were eye dryness (10.6%), increased sensitivity to light (10.3%), difficulty focussing for near vision (8.7%) and headache (8.7%). Increased sensitivity to light (4.9%) and a feeling the eyesight is worsening (4.9%) were the most intense symptoms experienced by respondents. Bivariate analysis revealed that category of healthcare workers (p = 0.02), involvement in COVID-19 data management (p = 0.08), computer viewing distance (p = 0.017), use of anti-glare filter (p = 0.040) were significantly associated with CVS. However, further analysis using multivariate logistic regression demonstrated that only professional group healthcare workers (AOR:4.499, 95%CI: .387, 14.592, p = 0.012) and computer viewing distance 50-100cm (AOR: 3.674, 95%CI:1.029-13.116, p = 0.045) were the variables made statistically contribution to the model. The sociodemographic and work characteristic, and ergonomic practice were not significantly associated with prevalence of CVS.
Conclusions: Prevalence of CVS among HCWC working in Sarawak State Health Department was high, professional group HCWC and computer viewing distance are significant with CVS.

Keywords: Computer vision syndrome; Healthcare workers; Visual ergonomics; Occupational health

Poster Presentation

P13 Occupational Health and Safety Risk Assessment

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Assessment of ergonomic risk factors and their impact on musculoskeletal disorders among healthcare workers in a district hospital: an evidence-based approach

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Introduction: Musculoskeletal disorders are a significant occupational health concern among healthcare workers due to continuous exposure to ergonomic risk factors such as awkward posture, repetitive movements, and forceful exertion. These conditions contribute to reduced work performance, increased absenteeism, and long-term disability. Despite ongoing ergonomic training in healthcare settings, the lack of systematic ergonomic risk assessment limits the effectiveness of preventive strategies. This study aimed to assess the prevalence and severity of musculoskeletal disorders, identify associated ergonomic risk factors, and examine their relationship among healthcare workers in a district hospital setting.

Materials and Methods: A cross-sectional mixed-method study was conducted involving 144 healthcare workers from multiple departments in a district hospital in Sarawak, Malaysia. Musculoskeletal discomfort was evaluated using a standardised questionnaire assessing frequency, severity, and work interference. Ergonomic risk factors were assessed through direct observation and task analysis based on national ergonomic risk assessment guidelines. Descriptive statistics were used to determine the distribution of musculoskeletal disorders, while correlation analysis was performed to evaluate the relationship between identified ergonomic risk factors and musculoskeletal disorder severity.

Results: The findings demonstrated a high prevalence of musculoskeletal disorders among healthcare workers, with the lower back (68 cases), neck (24 cases), and right shoulder (14 cases) identified as the most affected body regions. High-risk departments included pharmacy logistics, pathology laboratory, and nursing services, where work tasks involved frequent manual handling, prolonged standing, and repetitive movements. Awkward posture emerged as the most dominant ergonomic risk factor across all departments. A statistically significant moderate relationship was observed between awkward posture and musculoskeletal disorder severity (correlation coefficient = -0.353, $p = 0.005$), indicating that increased exposure to non-neutral postures was associated with higher levels of discomfort and work interference. In contrast, forceful exertion and sustained static posture demonstrated weak and non-significant relationships with musculoskeletal disorder severity. Pareto analysis further revealed that a limited number of high-risk tasks accounted for the majority of reported musculoskeletal complaints, highlighting the presence of task-specific ergonomic burden.

Conclusions: This study underscores the importance of conducting structured ergonomic risk assessments to identify high-risk tasks and departments within healthcare settings. The findings support the implementation of targeted, evidence-based ergonomic interventions, including task redesign, improved workstation configuration, and focused training programs. Such interventions are essential to reduce the burden of musculoskeletal disorders, enhance worker well-being, and improve overall workplace safety. The results provide practical insights applicable to similar district hospital settings, particularly in resource-limited environments.

Keywords: Musculoskeletal disorders; Ergonomic risk factors; Healthcare workers; Workplace ergonomics; Occupational health

Poster Presentation

P14 Safety in the Workplace

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Retrospective study of occupational radiation exposure during inter-facility transport of high-dose RAI-131 patients in Sarawak General Hospital

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Background: Radioiodine-131 (I-131) therapy is widely used in the management of differentiated thyroid carcinoma and hyperthyroidism. Following administration, patients temporarily become sources of external radiation due to retained beta and gamma emission. This raises concerns regarding radiation exposure to healthcare workers involved in patient care, escort, and transport.

Objectives: This study aims to quantify occupational radiation exposure to nuclear medicine nurses escorting high-dose I-131 patients during inter-facility ambulance transfer and to evaluate the safety of transporting radioactive patients.

Methods: A retrospective study was conducted over a two-year period (2024–2025). Personal electronic dosimeter readings were collected from nuclear medicine nurses escorting high-dose I-131 thyroid cancer patients (60–300 mCi) during ambulance transfer between facilities with an average of 40 minutes per trip, all are done 48 hours after administration. Dose per trip and cumulative annual exposure were analysed.

Results: A total of 110 trips involving 11 staff nurses and 209 patients were analysed. Mean dose per trip was 0.041 μSv (median 0.004 μSv; IQR 0.007 μSv [Q1 0.002–Q3 0.009]) indicating a right-skewed distribution. The maximum single-trip dose was 1.585 μSv. The highest cumulative dose for any nurse was 1.995 μSv. Total cumulative dose over two years was 4.35 μSv. Annual exposure represented <0.03% of the 20 mSv occupational limit. Spearman Correlation between transported activity and dose was very weak ($\rho = 0.11$, $p = 0.29$).

Conclusions: Occupational radiation exposure during transportation of high-dose I-131 patients was minimal and far below regulatory limits, even under conditions involving close proximity in a confined ambulance setting. These findings provide strong reassurance that inter-facility transport of radioactive patients can be performed safely when standard radiation protection principles of As Low As Reasonably Achievable (ALARA) are followed.

Keywords: RAI-131 therapy; Radiation monitoring; Radiation protection; Occupational exposure; Nuclear medicine

Poster Presentation

P14 Safety in the Workplace

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Association between perceived organizational support and near-miss reporting among Japanese workers: a cross-sectional study

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Introduction: Near-miss reporting is an essential component of occupational safety management because it enables organizations to identify hazards and prevent future accidents. However, workers do not always report near-miss incidents. Perceived organizational support (POS), defined as employees' perception that their organization values their contributions and cares about their well-being, may influence near-miss reporting behavior. This study examined the association between POS and near-miss reporting among workers.

Materials and Methods: We conducted a cross-sectional analysis using data from a nationwide online survey of 5,816 Japanese employees across various industries. POS was assessed using the Japanese version of the Survey of Perceived Organizational Support and categorized into quartiles (Q1–Q4). Two outcomes were examined: (1) complete near-miss reporting (reporting all near-miss incidents) and (2) reporting of at least serious near-miss incidents. Prevalence ratios (PRs) and 95% confidence intervals (CIs) were estimated using modified Poisson regression with robust variance. Multivariable models adjusted for age, sex, education, employment status, company size, industry, and tenure.

Results: Higher POS was associated with a higher prevalence of complete near-miss reporting. Compared with the lowest POS quartile (Q1), the multivariable-adjusted PRs were 1.11 (95% CI: 1.04–1.19) for Q2, 1.16 (95% CI: 1.09–1.24) for Q3, and 1.23 (95% CI: 1.15–1.31) for Q4 (Highest). When the outcome was defined as reporting at least serious near-miss incidents, the associations were weaker but remained in the same direction (PRs: 1.04, 1.06, and 1.09 for Q2–Q4, respectively).

Conclusions: Higher POS was associated with higher prevalence of near-miss reporting, particularly for complete reporting of incidents. These findings suggest that organizational environments in which employees feel supported may foster proactive safety behaviors. Efforts to enhance POS may therefore help promote near-miss reporting and strengthen workplace safety management.

Keywords: Near-miss reporting; Occupational safety; Perceived organizational support; Safety behavior; Safety management

Poster Presentation

P14 Safety in the Workplace

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Case study: transient hepatitis B surface antigen positivity following a needlestick injury from a recently vaccinated infant

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Background: Needlestick injuries (NSI) remain a critical occupational health challenge for healthcare workers, often requiring complex post-exposure evaluations. While protocols are designed to detect viral transmission, the specific timing of a source patient's vaccination can introduce rare diagnostic pitfalls. This case study explores a "transient threat" where vaccine components mimicked an active infection following an occupational exposure.

Case Presentation: A house officer sustained an NSI while attempting an IV cannulation on a two-day-old infant. The infant had received Hepatitis B birth dose 48 hours prior. Root cause analysis identified a failure to securely swaddle the baby and the high-risk procedural site (the foot) as primary contributors to the injury. Serial monitoring of the houseman at six and twelve weeks post-exposure revealed reactive Hepatitis B surface antigen (HBsAg). However, concurrent testing showed undetectable HBV DNA and negative Hepatitis B core antibody (anti-HBc), which is inconsistent with an actual viral infection.

Discussion: The clinical findings supported a diagnosis of transient HBsAg positivity, resulting from the passive transfer of vaccine-derived HBsAg through the 24G needle. As the vaccine contains only the surface protein and no live virus, there was no evidence of viral replication or a core antibody response. This phenomenon can lead to significant psychological distress and unnecessary medical intervention if the source's recent vaccination history is overlooked.

Conclusions: This case study emphasises the necessity of incorporating the source patient's vaccination history into post-exposure evaluations. Careful interpretation of serological markers is vital to differentiate between transient vaccine-related positivity and true seroconversion. Strengthening workplace safety through improved neonatal restraint techniques and regular training is essential to prevent such threats.

Poster Presentation

P14 Safety in the Workplace

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Radiation exposure and safety monitoring among nuclear medicine pharmacists Sarawak General Hospital: a TLD and OSL dosimetry study (2023–2025)

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Introduction: Nuclear medicine is a field that utilizes unsealed radiation materials for diagnostic and therapeutic purposes. The most commonly used radiopharmaceuticals in the Nuclear Medicine Department Sarawak General Hospital are Technetium-99m and radioactive iodine-131 (RAI-131). Among radiation workers working in the nuclear medicine department, the nuclear pharmacists have a higher radiation exposure as they have a direct contact to radioisotope during radiopharmaceuticals preparation, handling and dispensing. The Nuclear Medicine Department at Sarawak General Hospital uses optically stimulated luminescence (OSL) & thermoluminescent dosimeter (TLD) to continuously monitor radiation exposure which measure whole-body exposure and extremity exposure respectively.

Objectives: This study evaluates occupational radiation exposure among pharmacists during radiopharmaceutical handling at the Nuclear Medicine Department of Sarawak General Hospital using thermoluminescent dosimeter (TLD) and optically stimulated luminescence (OSL) dosimetry.

Methods: The retrospective study was conducted among pharmacists (n=6) from 2023 to 2025. Optically Stimulated Luminescence (OSL) and Thermoluminescent dosimeter (TLD) devices were worn during radiopharmaceuticals preparation, handling and dispensing. The devices were then sent for periodic analysis to monitor radiation exposure.

Results: The annual Thermoluminescent dosimeter (TLD) ring doses of each individual pharmacist ranged from 9.00 mSv/year to 73.09 mSv/year which is within the thermoluminescent dosimeter (TLD) dose limit of 500mSv/year. The mean thermoluminescent dosimeter (TLD) dose shows temporal variation with the reading of (21.67±12.58 mSv) in 2023, peak in 2024 (43.18 mSv±24.37 mSv) before reducing to 32.25±12.38 mSv in 2025. The lowest mean is recorded by pharmacist 1 with a dose of 13.59 ±1.99 mSv and the highest by pharmacist 6 (50.57 ± 20.10 mSv).

As for the annual Optically Stimulated Luminescence (OSL) radiation doses of each individual pharmacist, it ranges from 0.08 mSv/year to 2.37 mSv/year. This is within the limit of 20 mSv/year. The mean increased from 0.58 ± 0.46 mSv in 2023 to 1.08 ± 0.42 mSv in 2024 and reaching its peak at 1.27 ± 0.73 mSv in 2025.The lowest mean value for OSL is recorded by pharmacist 1 with a mean of 0.52 ± 0.25 mSv while pharmacist 5 recorded the highest mean dose of 1.36 ± 0.88 mSv, with a median of 1.64 mSv.

Statistical analysis revealed that experiences have a great influence on the thermoluminescent dosimeter (TLD) and Optically Stimulated Luminescence (OSL) dosimeter readings. A more experienced pharmacist showed more consistent readings compared to a junior staff which exhibited a higher variability.

Conclusions: In conclusion, occupational radiation exposure recorded among pharmacists working in the Nuclear Medicine Department of Sarawak General Hospital was within established safety limits. All pharmacists' whole body exposure readings were below 20 mSv, while extremity doses remained below 500 mSv throughout the three-year study period, in accordance with the Basic Safety Radiation Protection Regulations 2010 and International Atomic Energy Agency (IAEA) guidelines. These findings indicate the importance of experiences and dexterity in applying ALARA (as low as reasonably achievable) principle.

Poster Presentation

P14 Safety in the Workplace

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Occupational health hazards in aging healthcare infrastructure: a case study for decanting the Sik district health office

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Aging healthcare facilities often face a critical convergence of environmental structural decay and occupational safety risks. The Sik District Health Office, with its primary structures dating back to 1961, has experienced significant physical deterioration exacerbated by severe weather events. This study examines the occupational hazards and environmental health failures that necessitated a decanting project, which is the temporary relocation of health operations to safer facilities at the Sik Hospital quarters and nurse dormitories. A multi-disciplinary assessment was conducted, comprising a technical engineering inspection by the Kedah State Health Department and an Occupational Safety and Health audit. The evaluation focused on building integrity, electrical safety, and indoor environmental quality to determine the viability of continued occupancy. The assessment identified severe occupational and environmental health hazards resulting from the facility's obsolescence. Environmental stressors, particularly heavy rainfall and storms, caused extensive roof damage and water ingress into electrical conduits, creating an immediate risk of short circuits. Persistent leaks led to mold growth and damaged ceiling boards, compromising indoor air quality. Furthermore, a structural audit revealed significant wall cracks, rendering the complex unsafe. Occupational hazards were exacerbated by overcrowding and poor ergonomic design, with lighting levels falling below requirements and expired fire safety infrastructure. The critical failures in both structural integrity and safety systems rendered the facility unfit for operations, posing a direct threat to personnel and the public. The decanting project serves as a necessary intervention to mitigate these hazards while ensuring the continuity of essential health services. This case underscores the urgency of proactive infrastructure management and the role of decanting as a vital risk-management strategy in public health.

Keywords: Decanting; Occupational safety; Environmental health; Healthcare infrastructure

Poster Presentation

P14 Safety in the Workplace

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Knowledge, attitude, and practice on healthcare waste segregation among junior hospital healthcare workers in Hospital Tunku Azizah, Kuala Lumpur

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The hospital generates hazardous waste that poses risks such as infectious, pathological, chemical, and radioactive materials or sharps waste. Improper segregation of healthcare waste could impose physical and biological hazards such as needle stick injury and spreading healthcare-associated infection (HCAI), such as multidrug resistance microorganisms (MDRO), in the healthcare setting. Infected healthcare waste if not properly disposed of could make an infection outbreak in the ward or hospital. Data analysis was used to classify the junior hospital's healthcare (n=100) based on its waste segregation efficiencies. The SPSS was used for data analysis using descriptive statistical analysis and Pearson Coefficient Correlation. All Junior HCWs were 18 - 29 years old and worked for 2 years and below. 82% were female and 18% were male with 69% having a diploma, and 31% being a degree holder. 65% of Junior HCWs were nurses, 31% were housemen, and 4% were medical assistants. Results revealed that the Junior HCW's knowledge level on healthcare waste segregation is very high, with a mean of 92.25. Attitude level on healthcare waste segregation is also very high and positive, with a mean of 93.25 and practice level towards segregation of healthcare waste is high and good, with a mean of 85.25. Pearson Correlation result was a positive correlation regarding the practice level of healthcare waste segregation with knowledge (r=0.244, $p = 0.014$) and attitude (r=0.406, $p < 0.001$). It is recommended that a regular training program for the Junior HCWs on Healthcare waste management, and clear instructions with guidelines are needed to maintained the high level of knowledge, positive attitude and good practice on healthcare waste segregation in healthcare setting.

Keywords: Healthcare waste segregation; HCAI; MDRO; Clinical waste

Poster Presentation

P15 Digital Transformation and Work

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From paper to prediction: the e-HIRARC revolution in real-time hospital risk management

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Background: The healthcare sector is inherently hazardous, with hospital staff facing a complex profile of risks including biological, chemical, physical, ergonomic and psychosocial hazards. Traditional Hazard Identification, Risk Assessment, and Risk Control (HIRARC) methods in Malaysian public hospitals have historically relied on manual, paper-based reporting. This approach is often time-consuming, prone to data silos, and reactive, delaying critical interventions required to prevent workplace injuries and occupational disorders. Hence, an "e-HIRARC KKM," was developed as a novel digital intervention designed to transform OSH risk management from a static administrative function into a dynamic, real-time monitoring strategy.
Objectives: This study aims to characterize the real-time occupational safety and health (OSH) risk landscape in Ministry of Health (MOH) hospitals by conducting a quantitative analysis of risk assessment data systematically collected through the e-HIRARC KKM digital platform. The specific objectives were to: identify the hazards related to healthcare workers in MOH hospitals and identify the control measures implemented in the hospital setting.
Materials and Methods: The e-HIRARC system was developed as a cloud-based ecosystem in alignment with MS ISO 45001:2018 standards and the Department of Occupational Safety and Health (DOSH) HIRARC 2008 guidelines. The platform was deployed across selected Ministry of Health hospitals. It utilizes a web-based interface for standardized data entry and dynamic dashboards for visualizing risk distribution across organizational departments. Volunteered hospitals were selected to be enrolled in the project. Data was collected from June 2025 to December 2025. Results: The implementation of e-HIRARC successfully centralized 1,085 digital risk assessments, facilitating real-time monitoring across participating state hospitals. The system's risk stratification capabilities successfully filtered data noise to identify 12 critical High-Risk cases for immediate management intervention, alongside 335 Medium-Risk and 687 Low-Risk entries. Granular data analysis identified Ergonomic hazards (43.4%) and Biological hazards (29.3%) as the predominant threats to healthcare workers. Furthermore, the platform highlighted a systemic gap in control measures, revealing a heavy reliance on Administrative Controls (64.06%) compared to Engineering Controls (5.62%).
Conclusions: e-HIRARC represents a fundamental shift in the digital transformation of Occupational Safety and Health (OSH) within the public sector. By centralizing data and automating risk visualization, the system significantly enhances evidence-based decision-making and fosters a proactive rather than reactive safety culture. This digital ecosystem offers a scalable model for modernizing risk assessment within high-stakes healthcare environments.

Keywords: Occupational health; Risk assessment; Hospitals; Health personnel; Digital transformation

Poster Presentation

P15 Digital Transformation and Work

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Validation of a cloud-based analytics software in diagnosing and reporting occupational noise related hearing disorder

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Introduction: The conventional paper-based screening and reporting system for occupational noise-related hearing disorders (ONRHDs) among workers exposed to excessive noise is time-consuming and prone to inefficiencies. This study aimed to evaluate the validity and reliability of MySmartOH, a novel cloud-based analytical software, for screening ONRHDs among Malaysian workers. Additionally, the time required for screening and reporting using MySmartOH was compared with the conventional paper-based method.

Materials and Methods: A cross-sectional study was conducted involving 16 occupational health doctors and 320 audiograms representing a mixture of hearing conditions, including normal hearing, hearing loss, hearing impairment, permanent standard threshold shift (PSTS), temporary standard threshold shift (TSTS), and noise-induced hearing loss (NIHL). Sensitivity and specificity analyses were performed to evaluate the validity of MySmartOH, while Cohen's kappa coefficient was used to assess reliability. The time required for screening and reporting ONRHDs using MySmartOH was compared with the conventional method

Results: The sensitivity of MySmartOH ranged from 55.6% to 99.1%, while specificity ranged from 70.0% to 99.2% across the hearing conditions evaluated. Cohen's kappa values ranged from 0.41 to 0.92, indicating moderate to almost perfect agreement. For the left ear, screening and reporting were faster with MySmartOH (0.93 and 0.48 minutes) compared with the conventional method (1.25 and 0.87 minutes). For the right ear, MySmartOH also shortened screening (0.87 vs. 1.15 minutes) and reporting time (0.47 vs. 0.83 minutes). Overall, MySmartOH reduced screening time by 24.3–25.6% and reporting time by 43.3–44.8%.

Conclusions: MySmartOH demonstrated moderate-to-high validity and reliability in screening ONRHDs, with consistent performance across both ears. The system also significantly reduced the time required for screening and reporting compared with the conventional paper-based method, suggesting that MySmartOH is a practical and efficient tool for occupational hearing surveillance.

Keywords: Screening; Reporting; Digital; Hearing loss; Hearing disorders

Poster Presentation

P15 Digital Transformation and Work

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ICT use and workplace automation in relation to workplace violence: a cross-sectional study in Taiwan

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Introduction: Workplace violence (WPV) is a key psychosocial hazard. Digitalization and automation may alter work demands and interactions, potentially affecting WPV risk beyond industry and work schedules. This study examined whether information and communication technology (ICT) use and machine collaboration (automation) were associated with WPV among employees.

Methods: We conducted a cross-sectional study using data from the 2022 Survey of Safety and Health in the Work Environment in Taiwan. After exclusions, 3,135 employees were included. WPV was defined as any past-12-month exposure to physical, verbal, psychological violence, or sexual harassment. ICT use was categorized into low, medium, and high levels, and automation was defined as machine collaboration at work. Survey-weighted multivariable logistic regression was used to estimate aORs and 95% CIs.

Results: The prevalence of WPV was 14.4%, with verbal violence being the most common type. Most workers experienced a single type of violence. High ICT use was associated with higher odds of WPV compared with low ICT use (aOR 1.43, 95% CI 1.04–1.97), and automation exposure was also associated with increased WPV (aOR 1.43, 95% CI 1.13–1.83). Among workers reporting WPV, ICT use and automation were not associated with multi-type victimization, whereas industry sector was more strongly related to violence severity. Automation was associated with higher risks of psychological violence (aOR 1.49, 95% CI 1.06–2.10) and sexual harassment (aOR 2.14, 95% CI 1.06–4.33).

Conclusions: Higher ICT use and automation were associated with WPV, while occupational context appeared more relevant to violence severity. Addressing WPV may require psychosocial risk management alongside attention to how digital technologies are implemented across sectors.

Keywords: Workplace violence; ICT; Automation; Psychosocial hazards

Poster Presentation

P16 Climate Change and Work

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Heat stress at the workplace: a case report on environmental assessment, risk evaluation, and management strategies at a tropical indoor warehouse facility

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Heat stress is a significant occupational hazard in Malaysia's tropical climate, particularly in physically demanding indoor environments. This case report describes the findings of a heat stress assessment conducted at a tropical indoor warehouse facility by a multidisciplinary competent person. Environmental measurements including air temperature, globe temperature, wet bulb temperature, relative humidity, and airflow velocity were recorded at three designated locations within the facility using a calibrated thermal environment monitor. The Wet Bulb Globe Temperature index was calculated using the indoor formula and compared against the Action Limits and Threshold Limit Values recommended by the American Conference of Governmental Industrial Hygienists, as adopted by the Department of Occupational Safety and Health Malaysia Guidelines on Heat Stress Management at Workplace. Estimated metabolic rates for workers performing manual material handling tasks ranged from 300 Watts (moderate) to 400 Watts (heavy) during periods of peak operational demand. Wet Bulb Globe Temperature values at all three locations exceeded both the Action Limit and Threshold Limit Value applicable for moderate-to-heavy work, indicating moderate-to-high risk of heat strain. Location C recorded the highest Wet Bulb Globe Temperature, surpassing even the Threshold Limit Value for light work. Supplementary indicators including transepidermal water loss measurements confirmed active heat strain, particularly at Location B, where markedly elevated transepidermal water loss was recorded during afternoon hours, indicating active physiological heat strain. Key findings highlight that inadequate airflow contributed significantly to heat accumulation within the facility. Based on these findings, a comprehensive suite of control measures is recommended, encompassing workplace engineering controls, administrative strategies, worker health management, heat illness prevention, emergency response protocols, first aid measures, and medical surveillance. Early intervention is critical to protect worker health, prevent heat-related illness, and ensure regulatory compliance.

Keywords: Heat stress; Occupational health; Indoor logistics; Heat strain; Malaysia

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