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Conference Report

Abstracts of the 3rd International Conference of Scientific Committee on Occupational Medicine (SCOM)

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Abstract: The event is organized by the Scientific Committee on Occupational Medicine (SCOM) of the International Commission on Occupational Health (ICOH) and the National Secretariat of Perú. The objective of this event is to promote the update on emerging occupational diseases, their impact on the population and prevention strategies, adopting a comprehensive approach that addresses medical, management and legal perspectives. The event is aimed at occupational physicians and occupational safety and health (OSH) professionals from Peru, neighboring countries and other regions of the world. The main thematic axes were Diagnosis and management of occupational diseases, risk exposure, cancer and work, emerging diseases at work, disability, Occupational health for informal sector and small-scale enterprises, ergonomics, toxicology, legislation in OSH, and others. The presentations were delivered by international and national experts. Each presentation included an overview, statistics from different regions, good practices in OSH in different sectors, cases management and proposals for improving prevention measures and medical surveillance with a global vision. As result, the future and opportunities for Occupational Medicine and Occupational Health professionals was positioned in Latin-America, being Peru the venue for the global networking and potential collaboration to promote research in OSH and improving medical surveillance for workers, including informal sector which is so relevant in Latin-America

Keywords: occupational medicine; opportunities; emerging diseases; medical surveillance; risk management; Perú

1. Welcome Remarks

Gogillan Sevaratnam

Chair, ICOH Scientific Committee on Occupational Medicine (SCOM)

Welcome to the 3rd International Conference of Scientific Committee on Occupational Medicine in Lima, Peru!

We are excited to invite you to join the 3rd International Conference of Scientific Committee on Occupational Medicine in collaboration with National Secretary of ICOH Peru which is happening from December 11th–13th, 2025 in the vibrant and historic city of Lima, Peru.

This conference brings together experts, researchers, and professionals from the field of Occupational Medicine to discuss the latest advancements, share insights, and exchange ideas on promoting health and safety in the workplace. Whether you're a seasoned professional or a newcomer, this event offers something for everyone.

The conference will feature a diverse range of sessions, including Keynote and Semi-plenary talks, where leading figures in Occupational Medicine will present the latest research and practical solutions to some of the most

pressing issues facing the field today. Additionally, Special Sessions will provide deep dives into emerging trends and developments, allowing participants to broaden their knowledge and engage in thought-provoking discussions.

One of the highlights of the conference will be the opportunity for participants to take part in oral and poster presentations. This is a great chance to showcase your research, share your findings with a global audience, and receive valuable feedback from colleagues and experts in the field. With attendees from around the world, this is an excellent opportunity to meet new collaborators, exchange ideas, and build lasting professional relationships. The conference will be a space for fruitful dialogue and collaboration, helping to push the boundaries of what we know and understand in Occupational Medicine.

In addition to the cutting-edge scientific discussions, Lima offers an unforgettable experience for all participants. Known for its rich history, vibrant culture, and exceptional cuisine, Lima is the perfect backdrop for a memorable conference experience. Participants can explore the city's historic sites, such as Plaza Mayor, the Cathedral of Lima, and the Museum of the Nation, as well as indulge in the world-renowned flavours of Peruvian food.

For those seeking more adventure, Peru offers a treasure trove of natural beauty and cultural landmarks. From the mystical Machu Picchu to the breath-taking Nazca Lines and the serene beauty of Lake Titicaca, Peru's diverse landscapes will captivate your heart and enrich your conference experience.

We extend a warm invitation to all professionals in the field of Occupational Medicine to attend and participate in this exciting event.

Let's advance the science of Occupational Medicine together while enjoying the beauty of Peru!

2. ICOH SCOM LIMA 2025: A Milestone in Occupational and Environmental Medicine in Perú

Norvil Antonio Mera Chu

National Secretary for Perú, International Commission on Occupational Health (ICOH)

On behalf of the ICOH National Secretary of Perú, we are delighted to welcome all of you to the 3rd International Conference of the Scientific Committee on Occupational Medicine.

This Academic event is a joint effort between the Scientific Committee on Occupational Medicine (SCOM) in collaboration with the National Secretary of ICOH Peru. For the very first time, SCOM arrives in Latin America, being Lima as the venue for this milestone in the history of Occupational and Environmental Medicine in Perú.

Specialists, Researchers, practitioners, policy makers, and OHS professionals will join this conference to focus on the "Future and opportunities for the Occupational Medicine". Private and Public sector, the Academia and the main OHS scientific societies will participate in the different activities we have been working on during the last year. With a holistic approach, speakers and panellists will discuss about the emerging problems related to workers 'health in different sectors (including the informal sector, which is very relevant to Latin America) and will propose alternative solutions and strategies for the future.

International experts and national OHS Leaders will deliver keynotes and semi-plenary sessions but also will join special sessions (roundtable type) along with Peruvian and Latin-American scientific societies. OHS researchers will present their projects and results in the oral and poster sessions. The content and abstracts accepted will be included in the publication of the Journal Work and Health.

We hope this event offers a platform for sharing experiences and research in OEM in different countries, and also to build networking and future cooperation between colleagues and researchers, not only from Latin America but worldwide.

Peru has a lot of places, traditions, culture, arts and, of course, food to welcome all of you. Our three regions (Coast, the Highlands and the Jungle) are beautiful, culturally diverse and unforgettable. You can not lose the opportunity to live this ICOH SCOM experience in such a wonderful place, which is modern yet steeped in history.

We invite all the OEM physicians, OHS professionals and passionate students to join us in the ICOH SCOM LIMA2025 Event!

Let's build together the Future of Occupational Medicine and take the opportunities for improving workers' health!

3. ICOH Pre-Conference—Peru 2025

Thematic Block: Addressing Occupational Diseases in Peru: normative, institutional, and scientific challenges for effective prevention and worker protection

Date and Time: December 9, 7:30 PM
Total Duration: 1 h 45 min

Format: Virtual—Panel with three speakers
Moderation: Elizabeth Barba

General Objective: To strengthen a comprehensive approach to occupational diseases in Peru, promoting coordination between normative, technical-scientific, and public management approaches, in line with ILO and WHO international standards, to move towards a more predictive, coherent, and protective preventive system for workers' health.

Presentation 1—Regulatory Perspective and Legal Challenges

Title: "Recognition, Classification, and Certification of Occupational Diseases of Workers Insured under the SCTR in Peru: Challenges and Labor Protection."
Speaker: Lawyer Melissa Chuquillanqui Sernaque
Duration: 30 min

Presentation 2—Business Perspective and Preventive Management

Title: "Business Impact of Occupational Diseases: Risk Management, Hidden Costs, and Organizational Sustainability."
Suggested Speaker: Lawyer Mirella Lourdes Bernal Suárez
Duration: 30 min

Presentation 3—Clinical and Scientific-Epidemiological Perspective

Title: "Scientific Evidence and Clinical Challenges in the Diagnosis, Monitoring, and Attribution of Occupational Diseases: From the Medical Consultation to the Social Protection System."
Suggested Speaker: Dr. Raúl Jesús Gomero Cuadra
Duration: 30 min

Final Q&A: 15 min

Closing message

"Occupational diseases are not just a legal matter nor exclusively a clinical one. They affect the worker's life, strain the capabilities of the state, and challenge the sustainability of companies. True protection arises when regulations are evidence-based, public management is coordinated, and the employer invests in prevention as a strategy for productivity, well-being, and social justice."

4. Abstracts

4.1. Long-Term Impacts of Occupational Exposure to Neurotoxicants: Use of Omics as Effect Biomarkers

Roberto Lucchini [1,2], Somaiyeh Azmoun [1] and Freeman Lewis [1]

[1] Environmental Health Sciences, Florida International University
[2] Occupational Medicine, University of Modena & Reggio Emilia, Italy

Introduction. Occupational exposures are a major yet under-recognized driver of the life-course exposome.

Methods. Building on long-term epidemiological work in the highly industrialized province of Brescia (Italy), our program integrates exposure assessment, neuroimaging, biomonitoring, and multi-omics to investigate how chronic manganese (Mn)–dominated mixtures contribute to Parkinsonian disorders and cognitive decline in workers and nearby communities. Conventional exposure and effect indicators are combined with novel proteomic, metabolomic, lipidomic, and autoantibody profiling, plus lifetime occupational histories coded to ISCO and linked to job-exposure matrices for multiple chemical agents.

Results. In a nested pilot study of ferroalloy workers with more than 30 years of exposure, higher Mn levels were associated with increased β-amyloid (Aβ) deposition on brain PET scans and altered plasma markers of neurodegeneration. Multi-omics profiling in this cohort showed perturbations in mitochondrial energy metabolism, biogenic amines, olfactory and transmembrane signaling, and membrane lipid turnover, as well as other networks relevant to Alzheimer's Disease and Related Dementias (ADRD). Proteomic and autoantibody analyses revealed elevated autoantibodies against Aβ, GFAP, cytoskeletal proteins, and neuronal and immune markers, indicating early neuroinflammatory and amyloidogenic processes in clinically active workers.

Complementary evidence is provided by a multi-omics case–control study in the same region, stratified by Parkinsonism diagnosis and residential exposure to metal emissions. Disease determinants included both exposure to metals, especially occupational, and genetic alpha-synuclein vulnerability, significantly higher in Parkinsonian cases than controls and associated with increased disease odds. Untargeted UHPLC–MS profiling identified distinct metabolite and lipid signatures that distinguished cases from controls and high- from low-exposure groups. Pathway analyses highlighted disruption of ferroptosis and iron handling, endocannabinoid signaling, vitamin B6 and glucose metabolism, and sphingolipid pathways as key nodes influenced by both exposure and disease status.

Discussion. Across these studies, converging multi-omics signatures emerge from metal-exposed workers with subclinical cognitive and amyloid changes and from Parkinsonian cases residing in metal-contaminated areas. Both studies point to shared patterns of mitochondrial dysfunction, disturbed lipid and membrane metabolism, ferroptosis and oxidative/iron-driven stress, altered amino-acid and glucose homeostasis, and immune activation/autoimmunity. These molecular patterns align with mixture-based epidemiologic analyses that implicate Mn–copper (Cu)–dominated mixtures, rather than isolated single-metal effects, in Parkinsonian risk. Overall, the data support a Mn-centered, mixture-influenced neurodegenerative continuum linking occupational and environmental exposure histories to Parkinsonian and ADRD-like processes.

This integrated evidence base argues strongly for: (i) systematic inclusion of occupational exposures in life-course studies of neurodegeneration; (ii) regulatory and preventive frameworks addressing interacting metal mixtures rather than single agents; and (iii) wider adoption of multi-omics profiling as a next-generation tool for early effect biomarkers, mechanistic translation, and identification of high-risk, highly exposed worker and community subgroups in occupational and environmental health.

4.2. Beyond the Red Itch: Understanding Complex Occupational Skin Conditions

Moazzam Zaidi and Aiggan Tamene Kitila

Department of Public Health, Dunedin School of Medicine, University of Otago, PO Box 56, Dunedin 9054, New Zealand

Introduction. Occupational skin diseases (OSDs) represent one of the most prevalent categories of work-related illnesses, affecting workers across a broad spectrum of industries globally. Despite their high incidence, OSDs remain frequently underdiagnosed and inadequately managed.

Methods. This narrative review synthesises the current knowledge on the anatomy and physiology of skin as the body's primary biological barrier, the spectrum of occupational exposures responsible for skin pathology, and the clinical entities that arise from such exposures.

Results. We examined high-risk occupational groups, described common diagnostic approaches, and outlined evidence-based management strategies. Emerging issues, including the rising burden of acrylate sensitisation in the beauty industry, nanoparticle exposures, and pandemic-driven overuse of disinfectants, are also discussed.

Discussion. Preventive strategies are outlined in line with the hierarchy of controls.

4.3. Occupational Exposure to Asbestos and Silica: Early Changes in the Plasma and Exhaled Breath Condensate

Debraj Mukhopadhyay [1], Pierluigi Cocco [2], Roberto Cherchi [3], Roberto Cusano [4] and Sara De Matteis [5]

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Introduction. Dysregulation of the microRNA profile in the bloodstream or other biological fluids has been associated with chronic diseases, including cancer. Whether specific microRNAs (miRNA) or their profile might serve as early biomarkers of asbestos- and silica-related disease is a promising avenue of research.

Objectives. The Asbestos-Related Respiratory Diseases in Industrial Areas (A.R.R.D.I.A.) is a 3-year follow-up study, currently in the field in Sardinia, Italy, aiming to detect the miRNA expression profile in the plasma and the exhaled breath condensate (EBC) of 200 workers with past exposure to asbestos, 25 cases of lung

cancer, 10 cases of pleural mesothelioma, 15 cases of interstitial lung disease (ILD), and 200 healthy volunteers recruited among the general population of the study area.

Methods. We utilised a Next Generation Sequencing platform (HiSeq3000™, San Diego, CA, USA) to evaluate the correspondence between miRNA expression in plasma and EBC in six subjects with no history of occupational asbestos exposure, using Bland-Altman plots.1 In a pilot study to test the standard operative procedures adopted in a large prospective trial, we also performed non-parametric Mann-Whitney tests between 9 ILD-free workers formerly exposed to asbestos vs. 10 workers formerly exposed to asbestos with ILD and 10 unexposed controls, and Spearman's correlation analysis to assess the correlation between EBC e counts and quantitative estimates of cumulative asbestos exposure. Also, for the most promising miRNAs, we used the area under the ROC Curves (AUC) to estimate their diagnostic accuracy.

Results. The Bland-Altman plots suggest a symmetric distribution of the miRNA count differences between plasma and EBC samples around the line of zero difference. Also, in all instances, more than 95% of the individual measurements lie within the 95% confidence interval. Several plasma miRNAs had a good discriminating power between ILD-free subjects formerly exposed to asbestos and a group of formerly exposed subjects who developed ILD. let 7f-5p, and miR-574-5p in particular, showed striking AUC values of 0.92 (95% CI 0.76–1.00) and 0.89 (95% CI 0.73–1.00), respectively. EBC miRNA counts did not vary significantly between unexposed subjects, ILD-free subjects formerly exposed to asbestos, and subjects with asbestos-related ILD. Consistent with other studies, we did not observe a correlation between miRNA counts in the EBC or plasma and cumulative asbestos exposure. Fewer studies have explored the microRNA profile in workers affected by silicosis, with promising Results. It is our intention to extend our projects to workers exposed to silica.

Discussion. Our results suggest that microRNA expression in the plasma might discriminate subjects with past exposure to asbestos and ILD patients from healthy, unexposed donors. At this moment, several challenges raise uncertainty about the feasibility of using the EBC miRNA profile as an early biomarker of effect in subjects formerly exposed to asbestos. Further studies will also investigate the microRNA profile in silica workers.

4.4. Occupational Health in the Oil and Gas Industry: Addressing High-Risk Worker Profiles Through Strategic Interventions

Ade Mutiara

Indonesia Special Task Force of Upstream Oil and Gas

Introduction. The oil and gas industry operates in complex environments with multiple occupational hazards, including chemical exposure, extreme physical conditions, ergonomic stressors, and demanding work schedules. Effective occupational health (OH) systems are therefore essential to ensure worker protection, operational continuity, and long-term sustainability.

Methods. Strategic OH interventions for high-risk worker profiles are provided using a narrative review of global frameworks, industry guidelines, and recent literature (2021–2025). Key focus areas include risk assessment, medical surveillance, digital health technologies, and integrated wellbeing programs.

Results. Oil and Gas workers are mainly exposed to hydrocarbons, noise, vibration, heat stress, and fatigue associated with shift and rotation work. Climate change further amplifies the risk of heat-related illness, particularly in outdoor operations, especially in tropical countries. Emerging technologies, such as wearable sensors on the field and personal protective equipment (PPE), artificial intelligence, and telemedicine, enhance real-time monitoring and early detection of health risks. Frameworks such as the International Association of Oil and Gas Producers (IOGP)'s Health Performance Indicators support standardized evaluation of the implementation of Occupational Health programs.

Discussion. Integrated approaches combining risk management, surveillance, and health promotion can reduce disease burden and improve productivity. Strengthening collaboration between regulatory frameworks, industry practices, and digital innovation is essential to address evolving occupational risks.

4.5. Musculoskeletal Health in the Workplace: Identifying Risks and Implementing Solutions

Juan Ignacio Rincón Sarmiento

Occupational Doctor and Ergonomist, Colombia

Introduction. A constant concern in Occupational Health and Safety is the prevention of occupational disease, whose main cause in Colombia continues to be impairment of the musculoskeletal system, despite multiple technological developments and preventive approaches.

Objective. The time changes in the acknowledgement of occupational diseases of the musculoskeletal system, and the current and emerging preventive approaches will be described. New integrative strategies in managing musculoskeletal disease related to occupational exposure will be proposed.

Results. Several different aspects may explain this phenomenon, which requires multiple complementary preventive interventions, including public health and ergonomics interventions in their physical, cognitive, and organizational domains.

Discussion. Care of the musculoskeletal system requires complementary, lifelong interventions, beginning in childhood. During working life, preventive efforts must also address non-occupational factors, while integrating ergonomics more robustly across its physical, cognitive, and organizational domains.

4.6. Occupational Health Management in a Mining Company: Experiences from Perú

Jackelene Patricia Orué Romero

Minera Chinalco Perù SA, Perù

Introduction. Health management in Peruvian mining has evolved significantly over the past decade, establishing itself as a successful experience based on prevention, innovation, and active worker participation.

Methods. This presentation describes the comprehensive occupational health systems developed within the Peruvian mining sector. These systems integrate specialized medical surveillance, advanced industrial hygiene, and structured wellness programs, with a focus on risks inherent to mining activities, including exposure to chemical agents, noise, vibration, and work at high altitude.

Results. A key pillar has been the adoption of real-time monitoring technologies, which allow for measuring environmental conditions, fatigue, and ergonomic factors, facilitating a preventive and timely response. Likewise, continuous training and health promotion campaigns have been strengthened, incorporating mental health, nutrition, and physical activity as essential components of sustainable performance.

Partnerships between companies, medical providers, and authorities have made it possible to standardize practices, while joint committees have helped consolidate a culture of self-care and prevention.

Discussion. Thanks to these efforts, Peruvian mining has managed to reduce occupational diseases, improve well-being indicators, and position itself as a regional benchmark in occupational health management, demonstrating that integrated prevention generates social and productive value.

4.7. Adaptation to the Loss of the Daily Light/Dark Alternation in the Workplaces

Pierluigi Cocco

Centre for Occupational and Environmental Health, Division of Population Health, Healthcare Research & Primary Care, University of Manchester, UK

Introduction. The circadian rhythm of body functions is the organism's adaptation to the light/dark alternation due to the daily rotation of the Earth around its axis. The loss of such regular alternation, such as in the polar regions, or during intercontinental flights, or because of its mismatch with human activity, such as in nightshift workers, imposes a period of adaptation. Adaptation requires a variable time depending on the clock gene polymorphisms and the individuals' age, sex, and chronotype. Continuous desynchronization of the sleep/wake rhythm leads to sleep loss, fatigue, psychological distress, social conflicts, immune depression, and probably cancer.

Methods. Using a narrative review approach, the relative prevalence of the chronotypes and their changes by job and age will be described. The various types of shift work rotation schedules will also be highlighted, and the results of a few studies on shift workers will be presented.

Results. Individuals tend to prefer jobs that match their chronotype: for instance, drivers are more frequently matutine. When shifts alternate, subjects with a definite matutine or serotine chronotype might find it more difficult to adapt. Female nurses working night shifts tend to sleep less than their male colleagues. Longer hours on shift are also associated with sleep loss. Monitoring the rhythm of salivary melatonin might be useful in identifying nightshift workers with greater difficulty in adapting to circadian changes, and therefore, most susceptible to the detrimental effects of night shift work.

Conclusion. Selecting the most tolerable type of shift work rotation and monitoring the rhythm of salivary melatonin might help prevent the adverse health outcomes of circadian disruption in nightshift workers. Special care should be dedicated to female night shift workers.

4.8. Cancer and Work Capabilities: Navigating Challenges and Opportunities in Occupational Medicine

Gogillan Sevaratnam

Chair for ICOH SC Occupational Medicine; Occupational Physician, Malaysia

Introduction. The intersection of cancer and the workplace is a growing challenge for occupational medicine. As treatments improve and survival rates rise, the focus must shift toward maintaining and restoring work capabilities. Work capabilities in the context of cancer are defined by the physical impact (fatigue, pain, stamina), cognitive changes (concentration and memory challenges), and emotional well-being required to navigate professional responsibilities.

Methods. A few case studies on workplace reintegration of cancer patients will be illustrated to describe cancer treatment side effects and their workplace impact, as well as key accommodation strategies.

Results. Different treatment modalities impose unique burdens on employees.

- Chemotherapy: Often leads to "chemo brain" (cognitive impairment), nausea, and peripheral neuropathy, which compromises manual dexterity and processing speed.
- Radiation Therapy: Can cause localised fatigue, fibrosis, and mobility limitations that restrict physical job demands.
- Immunotherapy & Hormonal Therapy: These may result in inflammatory effects, joint pain, and unpredictable mood fluctuations, requiring high levels of temporal flexibility.

Three case studies in workplace reintegration are presented herein. Case 1- cognitive impairment: A financial analyst utilised flexible hours (9:30 am–4:30 pm) and task restructuring to manage afternoon fatigue and concentration lapses. Case 2- physical and environmental needs: A sales manager with a stoma required desk relocation near private facilities and a reduction in frequent travel. Case 3- safety and manual tasks: A factory worker with neuropathy was reassigned to a seated quality control role with ergonomic support to mitigate injury risk.

Successful return-to-work outcomes rely on five main categories of support:

1. Temporal Flexibility: Phased returns and modified hours.
2. Environmental Changes: Quiet spaces and ergonomic equipment.
3. Task Modification: Restructuring responsibilities to focus on peak performance periods.
4. Psychosocial Support: Access to Employee Assistance Programs (EAP) and regular check-ins.
5. Policy Protection: Ensuring legal compliance and insurance continuity.

Discussion. Occupational physicians play a pivotal role in leveraging medical expertise to guide return-to-work strategies. Supporting colleagues with cancer requires a proactive, multidisciplinary approach involving HR and management to ensure that legal obligations are met and that accommodations are personalized to the individual's changing needs.

4.9. Implementing ISO 45001: A Path to Enhanced Occupational Health & Safety

Anantha Kumar Rajendran [1,†], Roszita Binti Ibrahim [2,†], Azimatun Noor Binti Aizuddin [2,†] and Menaka Dharshinii Selvaraj [3,†]

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† These authors contributed equally to this work.

Introduction. We conducted a comprehensive overview of the implementation of ISO 45001:2018 as a strategic framework for strengthening Occupational Health and Safety Management Systems (OHSMS). The presentation addressed the theme "Future and Opportunities for Occupational Medicine" and highlighted ISO 45001 as a critical response to the persistent global and regional burden of occupational injuries and diseases.

Methods. ISO 45001 is contextualized within current global statistics reported by the International Labour Organization, noting approximately 2.78 million annual work-related deaths and 374 million non-fatal occupational injuries worldwide, alongside significant regional challenges in Southeast Asia, including work-related musculoskeletal disorders, chemical exposures, and noise-induced hearing loss. ISO 45001 was positioned not merely as a compliance tool, but as a preventive, risk-based, leadership-driven management system aimed at eliminating hazards, minimising occupational risks, and fostering a sustainable safety culture.

Results. Key elements of the standard include organisational context analysis (Clause 4), leadership and worker participation, hazard identification and risk assessment, operational control through the hierarchy of controls, emergency preparedness, contractor management, and performance evaluation using audits and key performance indicators. The Plan–Do–Check–Act (PDCA) cycle was emphasized as the core mechanism for integrating occupational health and safety into organisational governance and ensuring continual improvement.

Discussion. An implementation roadmap is proposed, outlining phased progression from gap analysis and system development to operational implementation, evaluation, and certification readiness. Drawing on practical experience from a tertiary healthcare setting, the presentation underscored the importance of leadership commitment, worker empowerment, and evidence-based decision-making. In conclusion, ISO 45001 was framed as a strategic investment in human capital, organisational resilience, and operational excellence, with a strong call for institutions to adopt structured, preventive approaches to occupational health and safety management.

4.10. Climate, Toxic Exposures and Work: Linking the Amazon, Africa, and Southern Europe

Roberto G Lucchini [1,2], Sila Apurina [3], Alexandra Almeida [4], Silvana Andreescu [5], Paulo Cesar Basta [6], Maria Elena Crespo Lopez [7], Gabriela de Paula Fonseca Arrifano [7], Alok Deoraj [1], Enatfenta Sewmehone Endalew [8], Carlos Espinal [9], Quentin Felty [1], Luis Fernandez [10,11], Maria Del Carmen Gastañaga [12], Luca Lombroso [13], Stefanny Magaly Moncada Barbosa [14], Ebba Malqvist [15], Desalew Meseret Moges [16], Cristina O'Callaghan-Gordo [17,18], Jesús Olivero-Verbel [19], Luciana Pitta [1], Claudia Vega [11], Kunihiko Yoshida [20] and Kurt Straif [18]

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Introduction. Climate change, toxic pollution, and social inequities are converging to create new risks for workers and communities, particularly in the Global South. Yet occupational and environmental health research and policy still tend to address these stressors in isolation, not considering their interactions.

Objectives. To synthesize the main messages of the COP30 side event, "Amazon and Heat: Community-First Climate–Environment–Health Action from the Amazon Basin to Africa and Europe", presented in the context of the LIMA2025 Conference on Occupational Medicine, and to propose a framework for integrated climate–environment–health action in work and community settings.

Methods. A narrative synthesis of presentations and discussions delivered by researchers, Indigenous leaders, occupational health practitioners and civil society organizations from the Amazon Basin, Africa and Europe. Contributions were grouped into thematic domains: (1) climate and toxic exposures in the Amazon; (2) work and heat in African and Southern European settings; and (3) cross-cutting challenges and policy opportunities. The analysis followed a qualitative thematic approach.

Results. Across the international regions, participants described intersecting exposures to heat, chemicals, air pollution, deforestation and psychosocial stress, disproportionately affecting workers, Indigenous peoples, traditional populations, pregnant women and children. Evidence from cohort studies, intervention projects, and remote-sensing analyses highlighted: (i) elevated mercury exposure, climate-sensitive food-system vulnerabilities,

and increasing microplastics and diesel contamination in Amazonian communities, with disproportionate impacts on Indigenous peoples, traditional populations, pregnant women and children; (ii) growing heat-related health risks among children and pregnant women in African cities; and (iii) kidney and cardiometabolic risks among agricultural and construction workers in Southern Europe. Cross-cutting themes included exposure mixtures approaches, inequitable access to care and justice, data gaps, and the need for locally owned technologies, capacity building, and sustainable solutions.

Conclusions. The side event catalyzed the development of an Amazon Climate–Environment–Health Consortium and a shared policy agenda. Integrated, equity-focused action on heat, toxic exposures, and work is essential for a just climate transition. A detailed policy brief is provided as a Supplementary Document.

4.11. Digital Intervention for Weight Loss Program: A Retrospective Cohort Study from a Multi-Site Geothermal Company in Indonesia

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Introduction. Overweight and obesity are key risk factors for chronic diseases that impair employee health and productivity. This study assessed the association between a digital weight-loss program and Body Mass Index (BMI) change among overweight and obese employees at a geotermal company in Indonesia.

Methods. A 12-week retrospective cohort study was conducted among 142 geothermal company employees across four sites (February–May 2025). Chi-square tests and logistic regression were used to assess the association between app utilization and gamification with BMI improvement.

Results. Mean age was 39.7 ± 8.2 years old, BMI was 29.0 ± 4.3 kg/m^2; 87% were male. At baseline, 83% were obese and 17% overweight. High engagement increased the likelihood of BMI improvement sevenfold (OR = 7.1; 95% CI: 2.7–18.9; $p < 0.001$), while moderate gamification scores increased likelihood ninefold (OR = 9.0; 95% CI: 3.3–24.4) compared to low. Participants without BMI improvement were less likely to have moderate than high engagement (OR = 0.3; 95% CI: 0.1–0.7; $p < 0.001$).

Discussion. Findings align with prior evidence that digital therapeutics with gamification enhance adherence and weight outcomes through motivation and retention. Meta-analyses confirm that such features are effective in workplace and community settings. This study extends evidence to industrial employees in Indonesia, demonstrating feasibility and immediate impacts of digital health programs.

Conclusion. This study may represent the role of application use and gamification in improving BMI among geothermal company employees in multi-site digital weight-loss programs.

4.12. Factors Associated with Disabling Occupational Injuries Among Hospital Personnel: A Cross-Sectional Study

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Introduction. Disabling occupational accidents among hospital personnel pose a significant challenge to occupational health, compromising continuity of care, institutional productivity, and employee well-being. Occupational medicine plays a pivotal role in identifying risk factors and implementing preventive measures to reduce incidence and facilitate a safe and timely return to work.

Methods. We conducted an observational, analytical, cross-sectional, and retrospective study at the National Hospital Edgardo Rebagliati Martins, Peru, from 2023 to 2024. The study included 195 workers who experienced occupational accidents resulting in documented medical leave. Data were extracted from medical records and institutional databases. Variables analyzed included professional group, work shift (day/night), work area, job tenure, accident location and mechanism, body part affected (categorized and subcategorized), and duration of medical leave. Descriptive statistics and inferential analyses (chi-square test, non-parametric tests, and logistic regression) were performed using STATA 11.1, with statistical significance set at $p < 0.05$.

Results. We anticipate that night shift work, technical occupations, shorter job tenure, and employment in critical care units will be significantly associated with prolonged work incapacity. Falls, overexertion, and contact with sharp objects are expected to be the most common injury mechanisms.

Discussion and Conclusion. The findings will contribute to the identification of specific occupational risk profiles, enabling the design of targeted interventions within occupational medicine, including task redesign, ergonomic adaptation, and structured educational programs. This study will provide evidence-based recommendations to strengthen hospital occupational risk prevention and management systems, aiming to reduce disability duration and foster safer, more sustainable work environments.

4.13. Defining the Basis: Key Biomarkers for Occupational Health Prediction in High-Altitude Workers

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Introduction. Workers in high-altitude (HA) mining in Chile face elevated cardiometabolic risk from chronic hypoxia. Traditional fitness-for-work (FFW) assessments often evaluate biomarkers in isolation, overlooking key health patterns. In Chile, FFW is governed by national standards with periodic reviews and homologation through technical and political consensus, ensuring uniform practice. This study aims to identify key biomarkers associated with FFW status in HA workers using machine learning (ML) models, with emphasis on the co-dependence and synergistic effects among variables.

Methods. A retrospective cohort of 439,291 workers undergoing pre-employment evaluations (2021–2024) was considered. More than 20 clinical, physiological, and laboratory variables were assessed. Workers' health status was classified as compatible or non-compatible per national guidelines. Supervised ML models—including random forests (RF), support vector machines, k-nearest neighbors, and decision trees—were applied to identify FFW predictors. Logistic regression quantified associations between biomarkers and outcomes.

Results. A total of 420,966 workers were analyzed. In 8% of workers, an incompatible health status was stated. Principal predictors included body mass index, glucose, triglycerides, and systolic blood pressure. The RF model achieved the best performance, with a precision of 0.90 (95% CI: 0.89–0.92), a sensitivity of 0.93, and a specificity of 0.88.

Discussion. BMI, glucose, triglycerides, and systolic blood pressure were key predictors of non-compatible FFW in HA environments. RF outperformed other algorithms. Multivariate analysis revealed synergistic biomarker effects not captured by univariate Methods. Results align with Chile's periodically reviewed regulation and the homologated national technical standard, supporting risk-based and permanent monitoring of vulnerable workers.

Conclusions. ML models effectively identify indicators linked to an incompatible FFW in HA settings. These tools can strengthen occupational assessments and inform preventive decisions.

4.14. Saving the Future: Early Cardiovascular Detection for Safer Work Environments

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Introduction. Cardiovascular disease is the leading global cause of death. Conventional cardiovascular risk (CVR) tools often underperform in miners due to their demanding work conditions. Tracking transitions in body mass index (BMI) and blood glucose (BG) provides insight into cumulative risk beyond single measurements. This study applies machine learning (ML) to longitudinal occupational health data to predict CVR progression using simple, routinely collected markers.

Methods. Data were obtained from 439,291 pre-employment examinations performed in Chilean workers. Successive medical visits enabled the tracking of temporal changes in BMI and BG. Risk scenarios were defined according to transitions into higher categories. Logistic regression (LR), random forest (RF), and extreme gradient boosting (XGB) models were developed and evaluated through train–test partitioning, cross-validation, and

undersampling techniques. Performance was assessed using area under the curve (AUC), accuracy, consistency, and generalization.

Results. The analyzed cohort included 418,699 Chilean miners. Males presented higher BMI (28.5 vs. 28.0 kg/m^2) and BG (95.8 vs. 91.5 mg/dL), reflecting elevated CVR. ML models demonstrated strong performance in predicting BMI transitions, with XGB achieving an AUC of 0.95 (95%CI:0.93–0.97) and 91% accuracy. Predictions for BG transitions were less accurate (AUC 0.83; 95%CI:0.81–0.85). No evidence of overfitting was observed.

Discussion. ML-based temporal modeling outperformed conventional CVR scores that underestimate risk in miners. Stronger performance for BMI reflects its longitudinal stability, while glucose variability limited accuracy.

Conclusion. ML-driven monitoring of BMI and BG transitions enhances CVR assessment and supports targeted preventive strategies in high-risk occupational groups.

4.15. The Time Factor: Assessing Temporal Health Risks in the National Workforce

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Introduction: Cardiometabolic disorders are major drivers of morbidity and work disability, particularly among workers in metabolically stressful environments such as high-altitude mining in Chile. Early detection of health risks is therefore essential. Yet, conventional fitness-for-work assessments often overlook variable interactions, reducing predictive accuracy, and the regulatory emphasis on fitness-for-duty is longstanding. This study aims to predict temporal trajectories and assess risk using an extensive pre-occupational dataset from Chilean workers.

Methods: A retrospective cohort study analyzed 439,291 workers who underwent preemployment examinations between 2021–2024. To evaluate temporal behavior, at least two pre-occupational assessments per worker were required. Workers's health status was classified as compatible or incompatible according to national regulations. Cox regression and Kaplan–Meier methods assessed temporal and survival risks.

Results: A total of 420,966 workers were analyzed; 402,641 (95.6%) were men, and for 18,523 (4.4%), the health status was deemed as incompatible. Body mass index (BMI), blood glucose, and age were critical determinants. Significant inverse associations with a non-compatible status were observed for an elevated BMI [overweight (HR: 0.38), obesity (HR: 0.08], especially if associated with aging [41–55 years: HR: 0.87 ($p < 0.001$), >55 years: HR: 0.75], and blood glucose (prediabetes: HR: 0.62, diabetes: HR: 0.48).

Discussion: Cox and Kaplan–Meier analyses detect early health risks with greater precision than traditional approaches. BMI emerged as the most stable predictor, while glucose showed higher variability. These findings highlight the value of temporal analyses to inform occupational health policies.

Conclusions: The survival model effectively identified temporal risk factors, confirming its utility in enhancing preemployment assessments and guiding preventive strategies for high-risk workers.

4.16. Hands at Risk: Prevalence of Work-Related Musculoskeletal Disorders and Their Associated Ergonomic Risk Factors in Malaysia's Glove Manufacturing Industry

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Introduction. Work-related musculoskeletal disorders (WRMSD) are a significant occupational health concern in the glove manufacturing sector. Despite its prominence, WRMSD prevalence in this sector remains unexplored. This study aims to determine the prevalence and associated risk factors of WRMSD among glove manufacturing workers in Malaysia. The objective is to determine the prevalence of WRMSD and its associated ergonomic risk factors among glove manufacturing industry workers in Malaysia.

Methods. A cross-sectional study of 750 glove production workers (Jan–Jun 2024) examined work-related musculoskeletal disorders. Secondary data included CMDQ, DASS-21, medical records, and REBA. WRMSD

was analysed against ergonomic risk, posture, overtime, demographics, task repetition, and mental health using SPSS v.28 with descriptive, chi-square, and logistic regression analyses.

Results. The prevalence of WRMSD was 79.2%, with the wrist (35.9%), neck (22.7%), and shoulder (12.1%) being the most affected regions. Significant associated factors included smoking (aOR = 1.34,95% CI [1.21–1.64]), awkward postures (aOR = 23.66,95% CI [14.28–38.94]), repetitive movements (aOR = 13.06,95% CI [12.03–14.11]), task duration (aOR = 1.08,95% CI [1.01–1.15]), stress (aOR = 1.61, 95% CI [1.10–2.35]) and anxiety (aOR 1.51, 95% CI [1.42–1.88]).

Discussion. The exceptionally high WRMSD prevalence reflects substantial ergonomic strain in glove manufacturing, driven primarily by awkward and repetitive postures, prolonged task duration, and psychosocial stressors. These findings align with global evidence linking manual, repetitive industrial work to musculoskeletal burden and highlight the combined influence of physical and mental factors on worker health.

Conclusion. The study reveals a high prevalence of WRMSDs in Malaysia's glove industry, highlighting public health and economic impacts. It underscores the need for ergonomic interventions, task rotation, manual handling training, and mental health support, providing a basis for policy, workplace improvements, and future research on intervention effectiveness.

4.17. Six Sigma Breaks Bottlenecks: Streamlining and Process Optimisation in the Occupational Health Clinic at Sarawak General Hospital

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Introduction. Lengthy patient processing times and high documentation error rates at Sarawak General Hospital's Occupational Health Clinic (OHC) were compromising service quality and staff efficiency. The objective is to evaluate the impact of a Six Sigma DMAIC (Define–Measure–Analyze–Improve–Control) intervention on patient health screening workflow efficiency, accuracy, and satisfaction.

Methods. A 16-week prospective quality-improvement study was conducted at the OHC. Baseline data on total patient time (TPT), documentation errors, and satisfaction were collected over four weeks. Root-cause analyses informed targeted interventions, including an online pre-registration portal, digital queue management, a unified screening checklist, and cross-training. Post-implementation data were compared using paired t-tests and chi-square analysis.

Results. Among 1580 patient encounters, mean TPT decreased from 55 ± 19 to 19 ± 20 min (−38%; $p < 0.001$). Documentation error rate dropped from 18% to 4% ($p < 0.001$), and screening capacity rose by 57%. Patient satisfaction improved from 3.1 to 4.2 on a 5-point Likert scale ($p < 0.001$). Staff-reported burnout declined by 15%.

Discussion. The DMAIC intervention markedly improved workflow speed, documentation accuracy, satisfaction, and reduced burnout, demonstrating strong impact in a resource-constrained setting. Digital tools and standardization effectively addressed root-cause inefficiencies. It is recommended to sustain improvements through SOP enforcement, regular audits, cross-training, and expansion of digital systems to other clinical services.

Conclusion. Six Sigma implementation produced substantial, measurable improvements in operational efficiency, documentation accuracy, and patient satisfaction, while reducing staff stress. These findings support broader adoption of structured, data-driven quality methodologies to enhance service delivery in resource-constrained public healthcare settings.

4.18. Balancing Risk and Duty: An Occupational Health Case Study of Hepatitis C in a High-Risk Setting

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Introduction. Blood-borne viral (BBV) infections in healthcare workers (HCW) present significant occupational health challenges, requiring a balance between patient safety and HCW rights, particularly in high-risk settings like haemodialysis units. This study details the occupational health incident of a 31-year-old Healthcare Assistant (PPK) diagnosed with Hepatitis C (HCV), initiated to determine fitness for work and the necessity of job modification.

Methods. The investigation employed a formal methodology including staff and employer interviews, job process analysis, Clinical Risk Management (CRM) analysis, and a review of national regulations, primarily the Guideline on Management of Healthcare Workers Infected with HIV, Hep B, Hep C, Ministry of Health Malaysia 2007.

Results. Physical examination shows no signs and symptoms of liver failure. The blood investigation confirmed a non-occupational HCV infection, with viral load (HCV RNA 8,420,000 IU/mL), and normal hepatobiliary ultrasound.

Discussion. PPK was an ex IVDU and was admitted to the Rehabilitation Centre. No preplacement screening was done for the unit. The blood test was identified during blood donation drive when he became a blood donor for the first time. The PPK job scope, including dialyzer reprocessing and priming, was assessed and classified as performing non-exposure-prone procedures (non-EPP). Risk of transmission is low for the PPK. The primary recommendations were to deem the staff fit for his current duties and for the employer to facilitate scheduled follow-up and antiviral treatment. Furthermore, it was recommended that the department implement mandatory annual viral screening and preplacement biohazard screening for all haemodialysis staff as per policy.

Conclusion. The employee was declared fit to continue his current job tasks. This case demonstrates the successful application of national guidelines to manage an HCV-positive HCW, ensuring patient safety while protecting the employee's occupational standing.

4.19. Saving Lives, Straining Spines: Ergonomics in the Heat of CPR and Patient Handling in the Emergency & Trauma Department

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Introduction. An Ergonomics Risk Assessment (ERA) was conducted in the Emergency & Trauma Department (ETD) of Sarawak General Hospital in November 2025 to determine ergonomic risk factors towards healthcare workers in the use of patient beds, patient trolleys and Cardiopulmonary resuscitation (CPR). The objective is to determine ergonomic risk factors towards healthcare workers in the use of patient beds, patient trolleys and performing CPR.

Methods. The ERA involved a walkthrough survey, briefing, interviews, self-assessments, and health analysis across three work tasks. Tools included video recording, a goniometer, and questionnaires. Ergonomic risks were identified using the DOSH ERA checklist and further analysed with the Rapid Entire Body Assessment (REBA) method.

Results. The tasks of transferring a patient from bed/trolley to canvas, which is placed on the floor and vice versa, implied low ergonomic risk and did not require advanced assessment. Two work tasks required advanced assessment: performing CPR on the floor implied a moderate risk, and performing CPR on the patient's bed implied a low risk. The two ergonomic risk factors identified were awkward posture and static & sustained work posture.

Discussion. The ERA highlighted moderate ergonomic risk when CPR is performed on the floor due to awkward and sustained postures, whereas CPR on beds posed lower risk. Equipment design, height limitations, and task constraints were the main contributors, consistent with known ergonomic hazards in emergency care. It is recommended to ensure the availability of height-adjustable beds, functional wheels, and stable railings; enforce proper positioning techniques; and provide regular ergonomic training. Introduce mechanical aids where feasible and monitor high-risk tasks through periodic reassessment to sustain worker safety.

Conclusion. The study reveals that the work task of performing CPR on the floor conveys a medium risk, while CPR performed on a bed conveys low risk. Improvement measures were taken to ensure beds with adjustable height, adjustable railing and functional wheels are provided to reduce ergonomic risk towards healthcare workers performing the assessed work tasks.

4.20. From Incident to Insight: Impact of a Modular Re-Training Approach in a Histopathology Laboratory of a Category I Hospital in Kuching, Sarawak, Malaysia

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Introduction. Chemical splash injuries are a preventable occupational hazard in histopathology laboratories. Despite regulatory frameworks, including the *Occupational Safety and Health Act 1994* and *Use and Standard of Chemicals Hazardous to Health (USECHH) Regulations 2000*, compliance gaps persist. This study evaluated the impact of a modular re-training programme combined with a structured chemical safety assessment on laboratory safety practices in a Category I hospital in Kuching, Sarawak. The study was prompted by a chemical splash injury to the right eye of a 27-year-old female Medical Laboratory Technologist while handling a femur bone-marrow biopsy specimen fixed in formalin and transferred to Osteosoft (an alkaline decalcifying agent, *corrosive-GHS05*, pH 7.0–7.3). Root-cause analysis identified inadequate personal protective equipment (PPE) use and unsafe container handling.

Methods. A modular re-training programme was implemented, focusing on chemical safety, correct PPE use, safe container handling, emergency response, and legal responsibilities. A nine-domain chemical safety checklist, adapted from institutional resources, assessed documentation, engineering controls, adherence to Standard Operating Procedures (SOP), PPE, handling, storage/waste management, emergency preparedness, training/monitoring, and legal compliance. Each item was scored 0–2 (0 = non-compliant; 1 = partial; 2 = fully compliant), with total compliance categorized as <70% = Unsatisfactory, 70–89% = Acceptable, ≥90% = Good.

Results. Post-training, overall compliance improved from 65.6% (Unsatisfactory) to 100% (Good). Staff achieved full PPE compliance, improved adherence to SOP, enhanced hazard awareness, and no recurrence of incidents over three months.

Discussion. The modular re-training reinforced safe practices through focused, repetitive instruction, while assessment scores enabled objective monitoring and accountability. It is recommended that implement periodic (e.g., quarterly) modular re-training for all histopathology staff focusing on high-risk chemicals, PPE requirements, safe container handling, and emergency response. This ensures continuous reinforcement of safety-critical behaviours.

Conclusion. Combining modular re-training with systematic safety assessment strengthened compliance, fostered a culture of safety, and supported sustained safe chemical handling practices.

4.21. Quantitative and Qualitative Fit Tests for Respirator Use in Healthcare Personnel: A Scoping Review

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Introduction. Respiratory infectious diseases represent a high burden for healthcare personnel, as they cause medical absenteeism, loss of productivity, and expenses associated with prevention, diagnosis, and treatment. The high load of biological contaminants in the healthcare sector makes healthcare workers a vulnerable group for contracting infectious diseases in the hospital environment.

In this context, the quantitative and qualitative fit tests accepted by the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) of the United States evaluate the fit of a respirator on a worker.

Objective. To characterize the available scientific evidence on quantitative and qualitative fit testing for the use of respirators by healthcare personnel. Methodology: A scoping review study was conducted, according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.

A systematic search, selection, and synthesis of relevant studies in English and Spanish from 2015 to 2024, available in full text, was carried out in the databases Scopus, Web of Science, Science Direct, and PubMed, using the following MeSH terms: “N95 Respirators,” “Health Personnel,” and “Occupational Health.” Exclusion criteria included: letters to the editor, conference proceedings, brief reports, and opinion articles.

To assess the risk of bias in the studies, the Systematic Assessment of Quality in Observational Research (SAQOR) was used, which evaluates studies in 6 domains: sample, control group, quality of exposure/outcome measurements, follow-up, confounding influences (control of confounding variables), and data presentation.

Results. Of the 60 articles included in the search, a full reading has been completed for 27, of which 2 were excluded, one for being a protocol and another for being a letter to the editor. Most of the studies conducted in the thematic area of study are cross-sectional and of low evidence level. They were carried out in a situational manner within the framework of the COVID-19 pandemic, without defining a framework and sample size, without including

a control/comparison group, and without controlling for confounding variables, which is why the control of occupational exposure to biological agents capable of causing respiratory infections is an emerging research topic.

Similarly, there is no valid and reliable standardized instrument to assess sociodemographic and occupational aspects, as well as the knowledge and practices of healthcare workers regarding respirators, which may interfere with the facial fit that these respiratory protection devices should provide.

Discussion and Conclusion. More research is needed to identify what factors can interfere with the proper facial fit of respiratory protection devices.

4.22. Data on Medical Incidents at Sea—How Can It Inform Prevention and Response?

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Introduction. Medical emergencies at sea occur remote from shore-based medical facilities. Seafarers' risk of adverse health consequences is increased if their medical needs exceed the ship's limited capacity to provide care, necessitating shore-side reviews, ship diversions, & medical disembarkations to access shore-side medical care. This has operational and commercial impacts.

International and national maritime standards on medical fitness, hazard control, and medical care aim to mitigate the risk of adverse health consequences. But there are no maritime standards for monitoring the effectiveness and prioritising continuous improvement for medical emergencies at sea.

Methods. Medical cases in a marine transport fleet over 7 years were analysed for incidence rates, trends, case severity, impact, and diagnosis. Risk matrix evaluation identified intervention priorities. A root cause model was applied to identify potential mitigations for representative high-impact diagnoses, taking into account typical risk and progression factors of illness. Environmental & operational information, and seafarer survey data were used to contextualise the findings.

Results. Person-year case incidence rates were: 28% exceeding first-aid, 9.0% shoreside review, 2.8% repatriation, 0.3% ship diversion.

Longitudinal analysis showed a temporary reduction of shore-side reviews for all diagnoses during the COVID pandemic. Contemporary seafarer survey data indicate coinciding changes in health behaviours.

A high-frequency low-severity high-impact category was the dental diagnostic group. Low-frequency high-severity high-impact categories were urological, accidents, & CVS diagnostic groups. Mapping of mitigations demonstrated diagnosis-specific opportunities for multi-level preventative and reactive measures.

Discussion. Systematic data analysis from medical incidents at sea is essential to identify patterns and trends, monitor the effectiveness of the medical emergency management programme in a remote workplace setting, and prioritise actions. Recording and learning from medical incidents at sea should mirror already established provisions for recording and learning from safety incidents—to drive meaningful improvement for the management of medical incidents at sea.

4.23. Uncharted Territory: Hearing Conservation And Audiometric Surveillance In International Maritime Transport

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Introduction. Noise-induced hearing loss (NIHL) is a known occupational risk, including for seafarers. Internationally, good NIHL risk management practice consists of noise monitoring, a hierarchy of controls including personal hearing protection (PPE), and audiometric surveillance for exposed workers. The 2012 International Maritime Organisation Code on Noise Levels in board ship sets standards for protection against noise for seafarers. Under the Code, audiometric surveillance is only optional. Many flag state adoptions of the Code don't include mandatory audiometric surveillance, and consequently, audiometric surveillance is rarely available to seafarers.

Methods. A narrative approach was used to describe the implementation of a hearing conservation programme, including audiometric surveillance in a maritime transport fleet spanning across different flag states and different seafarer nationalities, involving a range of employment and contractual terms. It covers the risk assessment process, the modelling of exposures, effects & detection errors, and the practical implementation of the hierarchy of controls principle. It addresses the obstacles and limitations of an audiometric surveillance programme in a diverse and globally dispersed international seafarer population.

Results. The results of the audiometric surveillance programme for 745 seafarers for the first year are presented. In 8 cases, a threshold shift has been noted, requiring confirmation testing.

Discussion. A hearing conservation programme including audiometric surveillance in international maritime transport is feasible and can confirm whether seafarers' risk of NIHL is effectively controlled. A close integration of the surveillance programme into existing processes for risk management on the ship and into processes for the periodic seafarer medical examination on shore is necessary.

4.24. Unique Occupational Cardiovascular Risk Factors in Female Healthcare Workers: A Literature Review

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Introduction. Cardiovascular disease (CVD) is the leading cause of mortality in women worldwide. Female healthcare workers (HCWs) experience a dual burden of traditional CVD risk factors and occupational stressors—such as prolonged shift work, long working hours and disrupted work–life balance. These exposures intersect with reproductive health, contributing to adverse outcomes including miscarriage, infertility, and postpartum cardiomyopathy, thereby compounding cardiovascular vulnerability.

Objective. To synthesize existing literature on the occupational cardiovascular and reproductive health risks specific to female HCWs, with a focus on how these risks contribute to adverse pregnancy outcomes and long-term cardiovascular morbidity.

Methods. We conducted a systematic literature review across PubMed, Embase, and Google Scholar (2000–2025), including observational, cohort, and cross-sectional studies evaluating cardiovascular and reproductive outcomes among female HCWs. Inclusion criteria were female participants working in healthcare, documented occupational exposures, and measured cardiovascular or reproductive outcomes.

Results. Thirty-five studies involving over 200,000 female HCWs were included. Prolonged working hours (>55 h per week) were associated with a 25% higher risk of hypertension as well as increased infertility rates. Night shift exposure among nurses and midwives was linked to menstrual irregularities, spontaneous abortion, and infertility, with the greatest impact observed during the first trimester. In addition, physicians and nurses working under conditions of heavy workload, prolonged standing, and recurrent night shifts exhibited higher rates of pregnancy complications, including preterm birth, postpartum hemorrhage, and postpartum cardiomyopathy.

Conclusion. Female HCWs face a unique, dual burden of occupational and reproductive health risks that heighten their lifetime CVD risk. This includes not only traditional occupational hazards but also a pronounced association with adverse reproductive outcomes—miscarriage, infertility, and postpartum cardiomyopathy—that further compound cardiovascular vulnerability. Workplace interventions should prioritize optimized shift scheduling, reproductive health support, and targeted CVD prevention programs for this high-risk group.

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Conflicts of Interest

The authors declare no conflict of interest. Given the role as an Editorial Board Member, Norvil Antonio Mera Chu had no involvement in the peer review of this paper and had no access to information regarding its peer-review process. Full responsibility for the editorial process of this paper was delegated to another editor of the journal.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.