A research program to provide a comparative contextualized analysis of occupational COVID-19 among health workers: Preliminary insights from a South African-Canadian collaboration

Objective The COVID-19 pandemic has demonstrated that healthcare workers (HCWs) in many settings are at high risk of occupational exposure to infectious diseases, especially where attention to occupational protection was lacking. In July 2020 our World Health Organization (WHO) collaborating centres in Canada and South Africa launched a joint Rapid Response Research program in partnership with local government health service delivery agencies in both countries to better understand how local contexts affect policies and practice; scrutinize their respective scientific and contextual rationales as well as outcomes; grasp how and how these change over time; and understand organizational factors that enhance implementing resilient policies.

Methods The collaboration includes cohort studies, in the Vancouver Coastal Health (VCH) region in Canada, and Gauteng province in South Africa respectively, to assess risk factors for SARS-CoV-2 infection among HCWs as well as evaluate the effectiveness of SARS-CoV-2 infection prevention and control measures. It also includes a cross-sectional study in Gauteng to explore mental health of HCWs during the pandemic and identify areas for intervention; a quasi-experimental study of the role of information systems in strengthening occupational health services for healthcare workers; and global policy analyses including an analysis of a global survey of HCWs from 161 countries.

Results The global survey revealed considerable variations in the degree to which prevention and control measures were deemed adequate; the South African baseline audit of 42 hospitals also revealed considerable variations in implementing occupational health protection. We demonstrated the utility of information systems to assess risk by occupation and setting in VCH; preliminary results of the VCH case-control study demonstrated the feasibility of this design; and, importantly, we identified challenges in leveraging operational research to inform policy, practice and world-knowledge in both VCH and South Africa.

Conclusion Our research activities showed the impact of vaccine roll-out and new variants on rates of COVID-19 among HCWs within different healthcare settings and occupational groups and how policies to protect HCWs have evolved (e.g., masking policies and vaccine protocols for HCWs). We conclude that lessons regarding procedural barriers to data acquisition and sharing must be addressed with an ethical framework in mind.
strong evidence that mild steel welding fumes, in addition to stainless steel, induce chronic inflammation and are immunosuppressive, and this was confirmed in molecular epidemiology studies of workers. We continued studies using metabolomic approaches in a repeated measures design and found welding fume exposure-related changes in blood in pathways related to disturbances in unsaturated fat metabolism, as in the signaling lipids Sphingosine 1-phosphate (S1P) and sphingosine 1-phosphate (SAIP). Global metabolomic profiling also revealed several metabolic changes after welding fume exposure, mainly involved in the lipid pathway (glucocorticoid class (cortisol, corticosterone, and cortisone), acylcarnitine class, and DiHOME species (9,10-DiHOME and 12,13-DiHOME)), amino acid utilization (isoleucine, proline and phenylalanine), and S-(3-hydroxypropyl) mercapturic acid (3-HPMA): compounds are all associated with inflammation.

**Conclusion** There is strong mechanistic evidence in humans for inflammatory and metabolic changes that promote carcinogenicity of welding fumes in humans.

**S-497** COMPARISON OF REPORTED RELATIVE RISKS FOR HEALTH CARE, TRANSPORT, AND FOOD PROCESSING WORKERS

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10.1136/OEM-2021-EPI.451

**Background** Risk of SARS-CV-2 infection has been strongly linked to occupation, with specific occupational sectors such as health care, food production, and transport, particularly affected. To better understand the potential risks by occupational sector we investigated the reported risks of COVID-19 infection and mortality for employees in the three sectors.

**Methods** We performed a rapid review of observational studies reporting COVID-19 risk for employees in health care, food manufacturing, and transport sectors. All studies published in the peer-review and pre-print literature between March 2020 and June 2021 were considered. The primary outcome measure was COVID-19 infection, with COVID-19 related mortality and hospitalisation considered as secondary measures. We