PMC form 2018–2020'), the software will also have the potential to identify new patterns and relationships within the corpus (e.g. 'the most sampled industry/occupation in literature with benzene measurements in PMC from 2018–2020'). The document-level method uses automated keyword searches with optional filters to highlight documents with potential relevant information. Once highlighted by the search algorithm, the documents may be screen manually or with other automatic software to extract relevant information and data. We are currently focusing on exposure to diesel engine exhaust but plan to expand to other substances. The protocol will form part of the EPHOR toolbox being developed as part of the project.

S-492

A RESEARCH PROGRAM TO PROVIDE A COMPARATIVE CONTEXTUALIZED ANALYSIS OF OCCUPATIONAL COVID-19 AMONG HEALTH WORKERS: PRELIMINARY INSIGHTS FROM A SOUTH AFRICAN-CANADIAN COLLABORATION

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10.1136/OEM-2021-EPI.446

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 outcome; grasp why 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.

S-493

ARTIFICIAL INTELLIGENCE AND OCCUPATIONAL HEALTH

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10.1136/OEM-2021-EPI.447

The multitude and complexity of data in health sciences has given rise to the increasing use of artificial intelligence (AI). AI technologies of importance include machine (ML) and deep (DL) learning, natural language processing (NLP) and rule-based expert systems (RBES). These AI technologies have also found their way into occupational health in the analyses of structured and unstructured data varying from application in job-codings (e.g. NLP), exposure assessment (e.g. NLP and RBES), data analyses (e.g. ML, DL and Neural networks), and risk assessment (RBES). Examples of AI technologies in Occupational Health will be presented including efforts on job-codings, job-exposure-matrix construction from the EPHOR project, high-dimensional (ML) data analyses within UK-Biobank and the Synergy project, and the application of RBES in risk assessment of benzene. Ethical issues in the application of AI in occupational health will also be discussed.

S-494

MECHANISTIC EVIDENCE FROM POPULATION STUDIES OF WELDING FUME EXPOSURE AND CANCER RISK

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10.1136/OEM-2021-EPI.448

Objectives to describe evidence from human studies of welding fume associated responses predisposing to cancer.

Methods The process of evaluating potential carcinogenicity of occupational exposures entails comprehensive evaluation of in vitro and in vivo studies of cells, animals and human populations. With advancements in our ability to assess exposure-related health affects in humans, we can use molecular epidemiologic methods to study pre-clinical disruptions in homeostasis that can lead to cancer. Welding fumes were evaluated recently in IARC Monograph #118 (2017).

Results With respect to the key characteristics of human carcinogens, adequate data from in vitro and in vivo studies were available to evaluate if welding fumes: induce chronic inflammation; are immunosuppressive; are genotoxic; induce oxidative stress; alter cell proliferation, cell death, and nutrient supply; and modulate receptor-mediated effects. There is