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A media surveillance analysis of COVID-19 workplace outbreaks in Canada and the United States

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Abstract

A media surveillance analysis was conducted to identify COVID-19 workplace outbreaks and associated transmission risk for new and emerging occupations. We identified 1,111 unique COVID-19 workplace outbreaks using the Factiva database. Occupations identified in the media articles were coded to the 2016 National Occupational Classification (V1.3) and were compared and contrasted with the same occupation in the Vancouver School of Economics (VSE) COVID Risk/Reward Assessment Tool by risk rating. After nurse aides, orderlies, and patient service associates ($n = 109$, very high risk), industrial butchers and meat cutters, and poultry preparers and related workers had the most workplace outbreaks reported in the media ($n = 79$) but were rated as medium risk for COVID-19 transmission in the VSE COVID Risk Tool. Outbreaks were also reported among material handlers ($n = 61$) and general farm workers ($n = 28$), but these occupations were rated medium–low risk and low risk, respectively. Food and beverage services ($n = 72$) and cashiers ($n = 60$) were identified as high-risk occupations in the VSE COVID Risk Tool. Differences between the media results and the risk tool point to key determinants of health that compound the risk of COVID-19 exposure in the workplace for some occupations and highlight the importance of collecting occupation data during a pandemic.

Key words: SARS-CoV-2, COVID-19, occupational health, workplace transmission, exposure, risk

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Introduction

On 11 March 2020, the World Health Organization (WHO) declared the SARS-CoV-2 virus (and the COVID-19 disease) a global pandemic (World Health Organization 2020). Many countries declared states of emergency and stay-at-home orders were implemented for all but essential workers, such as retail, sales and services, manufacturing and transportation, and frontline healthcare workers (Ramos et al. 2020). Several groups published risk assessments to identify workers with an increased risk of exposure to the SARS-CoV-2 virus ("COVID-19 exposure") on-the-job in response to the increased spread of COVID-19 among essential workers (Gamio 2020; Vancouver School of Economics 2020; Zhang 2021).

Many of the worker-focused COVID-19 risk assessment tools incorporated data from the Occupational Information Network (O*NET), a primary source of occupational information in the United States (US) (Gamio 2020; Vancouver School of Economics 2020; US Department of Labor 2021; Zhang 2021). The two main O*NET variables used to determine workers' risk of COVID-19 exposure on the job were the potential for exposure to infectious agents and physical proximity to others (industry sector or job title specific) (Gamio 2020; Vancouver School of Economics 2020; US Department of Labor 2021; Zhang 2021). Early risk models focused on variables that describe a recognized pathway of exposure and reflect the known increased risks associated with working in the healthcare sector during a respiratory virus outbreak (e.g., severe acute respiratory syndrome (SARS)) (World Health Organization 2015; Xiao et al. 2020). However, early in the COVID-19 pandemic, it became apparent that non-healthcare workers were also at high risk of COVID-19 exposure on-the-job. Early headlines detailed outbreaks involving grocery stores, meatpacking plants, and workers in public transit, and these non-healthcare workplaces continued to be impacted by subsequent waves of the pandemic.

One of the risk assessment tools was developed by a team at the Vancouver School of Economics (VSE), the VSE COVID Risk/Reward Assessment Tool (VSE COVID Risk Tool) (Vancouver School of Economics 2020) for COVID-19. In addition to the O*NET data described above, the VSE COVID Risk Tool also incorporated socio-economic factors into their risk assessment model, such as living in a crowded dwelling or commuting to work via public transit. While this tool was primarily designed to assess the risks (viral transmission risk) and benefits of re-opening industries in British Columbia, Canada, post-"lockdown", the inclusion of socio-economic factors helped highlight the various groups of workers at risk of COVID-19 exposure on-the-job that were not traditionally associated with exposure to disease and infection via direct contact with patients (Vancouver School of Economics 2020). Using the information provided by the VSE COVID Risk Tool, our research team aimed to compare and contrast the groups of workers at risk of COVID-19 exposure on-the-job with workplace-related infections and spread. This task quickly proved difficult due to the lack of accessible real-time data for workers in Canada and the US. To the best of our knowledge, only a few public health agencies in Canada (e.g., Quebec and Peel Region and Ottawa in Ontario) (Ottawa Public Health 2020; Region of Peel 2020; Institut national de sante publique 2021; Government of Ontario 2022) and the US (e.g., Washington State and Colorado) (Washington State Department of Health and Washington State Department of Labor and Industries 2020; Colorado Department of Public Health & Environment 2021) have publicly reported detailed occupation information for non-healthcare worker COVID-19 cases, beyond workers' compensation claims and general outbreak data that includes community cases (Luckhaupt et al. 2020). The Public Health Agency of Canada's (PHAC) national surveillance program collects occupation information for COVID-19 cases but does not report on workplace outbreaks. Reporting to PHAC is also voluntary for the provinces and territories, and the publically available occupation data is poorly classified (e.g., contains long-term care residents) (Government of Canada 2022).

The objective of this preliminary study was to assess if media surveillance analysis (a case-based surveillance method) (Brownstein, Freifeld and Madoff 2009; Velasco et al. 2014; Fung et al. 2015; Hartley 2015) can be used to identify COVID-19 workplace outbreaks and transmission risk for new and emerging occupations and to compare these findings with job-specific risk ratings for COVID-19 transmission at work identified by the VSE COVID Risk Tool (Vancouver School of Economics 2020), an independent risk assessment tool.

Methods

Factiva is a subscription-based research tool and news database produced by Dow Jones, which contains a comprehensive collection of over 200 global newspapers in 28 languages, including licensed

and free sources (Dow Jones 2021). Using the Factiva database, published media articles were searched to identify workers and workplaces with COVID-19 outbreaks in Canada and the US (Dow Jones 2021). Media articles were searched with the following terms in the headline or lead paragraph: [workers or workplace or occupation*] AND [outbreak] AND [COVID or coronavirus]. Our search included articles published between1 February 2020 and 22 December 2020.

Media articles were excluded if they did not specify COVID-19 infected workers or if they described workplace outbreaks outside of Canada and the US. Because of the nature of republishing in news media, articles were carefully reviewed and duplicates excluded. Media that only included a photo and caption were also excluded. All media articles identified by our search strategy were published in English.

Search results were downloaded and the following variables from the media articles were extracted into a Microsoft Excel spreadsheet: job title(s), industry, geographic location, number of workers infected (and (or) deaths), mentions of immigrant or temporary foreign worker status, and sex or gender. Team members SF, EQ, EH, and ER extracted the information from the media articles, with EQ and EH supporting SF with the first half of the media articles and ER supporting on the remainder. One team member (SF) was responsible for reviewing the extracted variables for completeness and consistency. Job titles were coded to the National Occupational Classification (NOC, 4-digit unit groups, 2016, V1.3) (Statistics Canada 2020) and industries to the North American Industry Classification System (NAICS, 2-digit sectors 2017, V3.0) (Statistics Canada 2021b) by two occupational hygienists with experience in job and industry coding (SF, ER). Once complete, SF was responsible for reviewing the coding for completeness and consistency, and senior occupational hygienist (CEP) was consulted for a third opinion in the event of any coding discrepancies.

Occupations with COVID-19 outbreaks identified in media articles were descriptively compared and contrasted with the risk ratings for the same occupations in the VSE COVID Risk Tool (Vancouver School of Economics 2020). In brief, the VSE Risk Index predicts the COVID-19 transmission risk (seven categories between very high to very low) for NOC unit groups (4-digit). Each category represents a range of risk index scores (e.g., very high = 75–100) but only the word-form risk index was used in this study for comparison purposes, The index is calculated using an algorithm that considers various occupational and worker characteristics, including: physical proximity, exposure to disease/infections, contact with others and face-to-face interactions, outdoor work, commuting via public transit, ability to work from home, and living in a crowded dwelling with a health care worker. The VSE COVID-19 Research Program website provides more information on the tool (Vancouver School of Economics 2020).

Results

A total of 2,153 media articles were identified using our search strategy, of which 846 reported COVID-19 outbreaks among workers. The 846 media articles included information on 1,111 unique workplace outbreaks (i.e., belonging to a specific group of workers or workplace linked by a common exposure and (or) transmission event).

Most workplace COVID-19 outbreaks occurred in the US (884 of 1,111; 80%). At the province, territory, or state level, workplace outbreaks were most frequently reported in the Canadian provinces of Ontario ($n = 94$) and Alberta ($n = 46$), and in the US State of Utah ($n = 558$).

The manufacturing industry (NAICS 31–33) accounted for the greatest number of unique reports of COVID-19 outbreaks at 254 (23% of 1,111). Within manufacturing, food manufacturing contributed half (50%) of the outbreaks (127 of 254; NAICS 311). Following manufacturing, health care and social

assistance (NAICS 62; $n = 188$), and accommodation and food services (NAICS 72; $n = 114$), were the industries with the most COVID-19 outbreaks reported in the media in Canada and the US. Nearly all the outbreaks in the food manufacturing (108 of 127) and accommodation and food services industries occurred in the US (113 of 114). A similar number of outbreaks were captured in the health care and social assistance industry (Canada = 91 and US = 97). Approximately 20% (161 of 846) of the media articles that reported COVID-19 outbreaks among workers mentioned immigrant or temporary foreign worker status, and the majority worked in the agriculture, forestry, fishing and hunting (NAICS 11; $n = 117$) or manufacturing industries (NAICS 31–33; $n = 38$). Less than 10% of articles (54 of 846) that reported COVID-19 outbreaks included information on the workers sex and (or) gender.

Occupations with COVID-19 outbreaks

The 1,111 unique workplace COVID-19 outbreaks among workers occurred across 145 of the 500 4-digit NOC unit groups. There were 40 occupations with 5 or more unique COVID-19 outbreaks (**Table 1**). Occupations with less than 5 unique COVID-19 outbreaks are provided in **Supplementary Table S1**.

Nurse aides, orderlies, and patient services associates accounted for the greatest number of unique outbreaks reported ($n = 109$). Outbreaks were also frequently reported among industrial butchers and meat cutters, poultry preparers, and related workers ($n = 79$); food and beverage servers ($n = 72$); material handlers ($n = 61$); and cashiers ($n = 60$). Most outbreaks involving food and beverage servers (71 of 72) and material handlers (58 of 61) occurred in the US.

Overall, there was alignment between occupations identified as high risk of COVID-19 in the VSE COVID Risk Tool (Vancouver School of Economics 2020) and occupations identified as at risk of COVID-19 transmission in the media articles (**Table 1**). As VSE risk index increases, the media reported a larger number of these occupations. For example, the VSE risk assessment ranked nurse aides, orderlies, and patient service associates as very high risk and the media articles included the most reports of outbreaks in these workers.

However, several other occupations identified as at risk for COVID-19 transmission in the workplace via media surveillance were not identified as high risk in the VSE COVID Risk Tool (Vancouver School of Economics 2020). For example, industrial butchers and meat cutters, poultry preparers and related workers, material handlers, construction trades helpers and labourers, and retail salespersons were consistently and frequently reported in the media for workplace transmission but were assessed as medium risk (i.e., medium–high to medium–low) for transmission in the VSE COVID Risk Tool. Further, the media surveillance analysis identified 28 unique COVID-19 outbreaks involving general farm workers, but the VSE COVID Risk Tool classified the risk among this occupation as very low. Other occupations, such as labourers in mineral and metal processing, labourers in chemical products processing and utilities, nursery and greenhouse workers, program officers unique to government, and fish and seafood plant workers were also identified as low risk in the VSE COVID Risk Tool, but they were identified with transmission in the media articles ($n = 7$–14 outbreaks by occupation).

Conversely, the VSE COVID Risk Tool (Vancouver School of Economics 2020) identified the following occupations as being high risk for COVID-19 transmission, but the media surveillance analysis captured fewer reports of outbreaks ($n = 5$–6): hairstylists and barbers, social and community service workers, and firefighters. Additional occupations that were identified as high risk by the VSE COVID Risk Tool but with less than 5 associated outbreaks reported in the media are included in **Supplementary Table S1**.

Table 1. Media reports of occupations with 5 or more unique COVID-19 outbreaks in Canada and the United States (1 February–22 December 2020) compared to the Vancouver School of Economics COVID Risk/Reward Assessment Tool Risk Index (Vancouver School of Economics 2020).

NOC Unit Group (NOC Code)	No. of COVID-19 outbreaks reported in the media
VSE Risk Index: Very low	
General farm workers (8431)	28
VSE Risk Index: Low	
Nursery and greenhouse workers (8432)	8
Program officers unique to government (4168)	8
Fish and seafood plant workers (9463)	7
Labourers in chemical products processing and utilities (9613)	12
Labourers in mineral and metal processing (9611)	14
VSE Risk Index: Medium low	
Transport truck driver (7511)	11
Landscaping and grounds maintenance labourers (8612)	8
Process control and machine operators, food and beverage processing (9461)	13
Motor vehicle assemblers, inspectors, and testers (9522)	18
Labourers in rubber and plastic products manufacturing (9615)	19
Other products assemblers, finishers, and inspectors (9537)	7
Electronics assemblers, fabricators, inspectors, and testers (9523)	9
Securities agents, investment dealers and brokers (1113)	8
Material handlers (7452)	61
Automotive service technicians, truck and bus mechanics and mechanical repairers (7321)	7
Plateless printing equipment operators (9471)	10
Labourers in food and beverage processing (9617)	27
Other labourers in processing, manufacturing and utilities (9619)	6
VSE Risk Index: Medium	
Construction trades helpers and labourers (7611)	59
Power engineers and power systems operators (9241)	5
Residential and commercial installers and servicers (7441)	5
Cooks (6322)	5
General office support workers (1411)	7
Central control and process operators, petroleum, gas and chemical processing (9232)	19
Mine labourers (8614)	7
Industrial butchers and meat cutters, poultry preparers and related workers (9462)	79
Heating, refrigeration and air conditioning mechanics (7313)	5

(*continued*)

Table 1. (*concluded*)

NOC Unit Group (NOC Code)	No. of COVID-19 outbreaks reported in the media
VSE Risk Index: Medium high	
Electricians (except industrial and power system) (7241)	5
Food counter attendants, kitchen helpers and related support occupations (6711)	28
Hotel front desk clerks (6525)	11
Retail salespersons (6421)	45
Bus drivers, subway operators and other transit operators (7512)	6
VSE Risk Index: High	
Social and community service workers (4212)	6
Food and beverage servers (6513)	72
Firefighters (4312)	5
Correctional service officers (4422)	35
Cashiers (6611)	60
Hairstylists and barbers (6341)	6
VSE Risk Index: Very high	
Nurse aides, orderlies and patient service associates (3413)	109
Registered nurses and registered psychiatric nurses (3012)	56

Note: NOC Code, 4-digit unit groups, 2016, V1.3 (Statistics Canada 2020). Data sorted by VSE Risk Index (based on the factor model numeric value) (Vancouver School of Economics 2020) followed by the number of unique COVID-19 outbreaks.

Discussion

This media surveillance analysis adds to the growing body of knowledge regarding workers' risk of COVID-19 exposure and transmission while working during the pandemic (Baker 2020; Baker et al. 2020; Gamio 2020; Koh 2020; Lan et al. 2020; Mutambudzi et al. 2020; Sears et al. 2020; Vancouver School of Economics 2020). Nearly 25% (254 of 1,111) of all COVID-19 outbreaks reported by the news media occurred in the manufacturing sector, specifically food manufacturing, and involving industrial butchers and meat cutters, poultry preparers and related workers, and other labourers. These findings reflect the large number of COVID-19 outbreaks that occurred in meatpacking plants and other food manufacturing settings across Canada and the US. To date, one of Canada's largest COVID-19 outbreaks occurred at a meatpacking facility in Alberta, which infected almost half of the 2,000 workers and resulted in 3 deaths (Postmedia Breaking News 2020; Herring 2020). In the US, at least 42,000 meatpacking workers tested positive for COVID-19 and more than 200 workers died from COVID-19 through September 2020 (Kindy 2020).

COVID-19 outbreaks in meatpacking plants were some of the first large workplace outbreaks of the pandemic in Canada and the US. Meat processing is the largest employer within the food manufacturing sector in both countries, employing approximately 63,000 Canadians and 460,000 Americans (Statistics Canada 2021a; US Bureau of Labor Statistics 2021). These outbreaks demonstrated rapid transmission via a community–workplace exposure pathway, where workers are in close proximity

to their co-workers for extended periods of time but are not in contact with COVID-19 patients or the public (Partnership for Work Health and Safety 2020). The VSE COVID Risk Tool (Vancouver School of Economics 2020) described the risk of COVID-19 transmission as medium for industrial butchers and meat cutters, poultry preparers, and related workers. This assessment incorporated occupational risk factors (e.g., physical proximity, exposure to disease/infections) and other factors related to the worker (e.g., commuting via public transit, working from home) (Vancouver School of Economics 2020). However, our findings suggest meatpacking plant workers are high or very high risk for COVID-19 exposure and transmission, and that additional factors contribute to their increased risk as workers.

In addition to the variables included in the VSE COVID Risk Tool (Vancouver School of Economics 2020), the current literature describes other occupational factors and social determinants of health that may compound the risk of COVID-19 exposure and workplace transmission (Middleton, Reintjes and Lopes 2020; Waltenburg et al. 2020; Burdorf, Porru and Rugulies 2021; Durand-Moreau et al. 2021; Saitone 2021) and could also help explain the misalignments with the VSE COVID Risk Tool. For example, in addition to physical proximity and working with others, the number of employees working per shift, tasks, and associated physical activity are important considerations. Aspects of the indoor work environment, such as ventilation and hygiene measures, should also be considered. If the employee commutes via shared employer-provided transportation, transmission risk may be exacerbated. Likewise, living in a work camp or with co-workers offsite may increase the risk of COVID-19 community–workplace transmission. Many occupations with COVID-19 cases identified in media articles are also typically associated with job strain (i.e., high demands and low control) that may influence decision-making to attend work when experiencing COVID-19 symptoms. Further, precariously employed worker populations are less likely to have employer-paid benefits, including sick leave benefits that contributes to pressure to report to work for economic reasons versus taking unpaid time off when experiencing symptoms.

These additional determinants can also explain the range of occupations with COVID-19 outbreaks reported in the media, beyond those captured by other risk assessment indicators, including: material handlers, construction trades helpers and labourers, retail salespersons, and general farm workers (Partnership for Work Health and Safety 2020). They reflect the worker demographics that perform a disproportionate burden of precarious, "essential" work, including among women, migrant workers, and workers from racialized groups (Ramos et al. 2020). A notable portion (20%) of the media articles that reported COVID-19 workplace outbreaks occurred among immigrant or temporary foreign status workers, and the majority of these worked as general farm workers (or nursery and greenhouse workers) or in meatpacking plants. In sum, many of the precarious employed "essential" workers, captured by media surveillance, experience several occupational and social determinants of health with associated negative impacts related to transmission during an infectious disease pandemic.

Stay-at-home orders, working from home, closure of non-essential businesses and schools, border restrictions, physical and social distancing, masking, screening/testing, and financial supports are some of the COVID-19 policies that have been used in both countries, varying by jurisdiction, timing, and intensity (McCoy et al. 2020; Wibbens et al. 2020; Polisena et al. 2021; Unruh et al. 2021). COVID-19 policies may impact transmission risk in the workplace but assessing the effectiveness of these polices depends on having accessible and accurate occupational data for COVID-19 cases and a summary of policy actions by jurisdiction, including timelines. We do not have access to either types of data but generally speaking, Canada's initial COVID-19 policy actions were thought to be quicker and more comprehensive compared to the US (Béland et al. 2021). Indeed, the majority of outbreaks captured by media surveillance occurred in the US and a simple comparison of epidemic curves for the same time period as data collection (February–December, 2020) demonstrates that the US had a

greater number of daily COVID-19 cases per million people for much of that time period (Ritchie et al. nd). A more in-depth investigation into the effectiveness of COVID-19 policies on preventing workplace outbreaks and reducing transmission risk is warranted but beyond the scope of this preliminary study. The media surveillance methodology provided signals of occupations at high risk of COVID-19 workplace transmission. The relationship between workplace transmission risk and a small number of media reports is less clear, but it is probable that any reporting of workplace transmission is a signal that increased risk exists for that occupation. In the absence of accessible real-time data for workers in Canada and the US, media surveillance can help identify occupations that would benefit from public health intervention, particularly new and emerging occupations traditionally categorized as low or medium risk for exposure to, and transmission of, infection and disease. Preventing workplace outbreaks is imperative in slowing the spread of COVID-19. This requires co-operation between occupational health and public health practitioners and regulatory organizations, working together to understand and manage COVID-19 workplace exposure risk as the intersection of the two domains.

While occupational health and public health organizations have collaborated on the public health response in Canada, the jurisdictional and legislative silos of occupational health and public health have challenged the collection of occupation data for COVID-19 surveillance purposes and may contribute to inequities in exposure and transmission in worker populations. More than two years into the global pandemic, Canada and the US still lack effective occupational epidemiological surveillance systems. Effective occupational epidemiological surveillance systems for infectious diseases for all workers have been developed in other jurisdictions, and we can look to several European countries for successful examples (Folkhalsomyndigheten 2020; Kavaliunas et al. 2020; Government of the United Kingdom 2021; Istituto Nazionale Per L'assicurazione Contro Gli Infortuni Sul Lavoro [Covid-19: information products] 2021; Sante Publique France 2021). While the news media has filled a void in identifying high-risk occupations, the media are typically reporting on significant outbreaks affecting numerous workers and the often the broader community. More integrated surveillance systems, as in Europe, offer the potential to identify worker cases early before significant transmission to other workers or the community or to prevent transmission in the first place.

Strengths

The main strength of the media surveillance method is the ability to fill the data void in the absence of accessible real-time data for workers in Canada and the US. This study demonstrates that media surveillance can identify known as well as new and emerging occupations at risk of COVID-19 workplace transmission. As previously mentioned, only a few public health agencies in Canada (Ottawa Public Health 2020; Region of Peel 2020; Institut national de sante publique 2021; Government of Ontario 2022) and the US (Washington State Department of Health and Washington State Department of Labor and Industries 2020; Colorado Department of Public Health & Environment 2021) have publicly reported detailed occupation information for non-healthcare worker COVID-19 cases (Luckhaupt et al. 2020). COVID-19 epidemiological surveillance dashboards generally do not include occupation data for positive cases, and COVID-19 case counts for facility-specific outbreaks combine worker and community cases.

Media surveillance can also supplement risk assessment tools since data on infectious disease outcomes by occupation is rare. Media reports are a unique source in that they provide some quantitative data with a qualitative backstory, providing further insight into a workplace outbreak, such as the immigrant or vulnerable workers identified in the current study. Additionally, media reports are current and ubiquitous. In the event that public health agencies collect more occupational data in the future, media reports would remain a useful resource to compare and contrast data with more formal sources.

Limitations

The main limitation of our media surveillance analysis was assigning 4-digit level occupational NOC codes using information provided in media articles. Reporting of specific job titles of workers was variable, and trained occupational hygienists had to interpret the available information to code job titles for analytic purposes. Our methodology was sensitive enough to identify known high-risk occupational groups (e.g., nurses), but was limited to delineate more specific occupational sub-groups (e.g., licensed practical nurses), unless specific job titles were provided.

In addition, approximately half (565 of 1,111; 51%) of the workplace COVID-19 outbreaks included in our media surveillance analysis were referenced in a single article from Utah (Carlisle 2020). This article references more than 500 workplace outbreaks in Salt Lake County, Utah, identified via a public records request. A comparison of the NOC broad occupational categories (1-digit) demonstrates that the groups of workers impacted in Utah were representative of the same groups of workers impacted by outbreaks across Canada and the US (i.e., sales and services (NOC 6), trades, transport and equipment operators and related occupations (NOC 7), and occupations in manufacturing and utilities (NOC 9)).

The findings from this preliminary study suggest media surveillance may be a viable option for identifying COVID-19 workplace outbreaks in the absence of occupational data, but future research could improve upon the current research methods. This may include expanding media surveillance to include other languages, including French and other languages spoken by migrant workers and workers from racialized groups. Media articles from other countries could also be analyzed and country-specific occupational coding systems could also be used to improve upon the current study. The Canadian-based NOC coding system was applied to all COVID-19 outbreaks for simplicity, whereas the Standard Occupational Classification (SOC) system would typically be used for US occupations (U.S. Bureau of Labor Statistics n.d.). This limits our ability to expand beyond a simple descriptive comparison to include considerations such as the number of COVID-19 outbreaks in relation to labour force size. However, the simplicity of this preliminary study was beneficial for illuminating new and emerging occupations at risk for transmission due to a confluence of occupational factors and social determinants of health. The current results were reviewed by the co-authors with advanced training and experience in occupational hygiene, public health, epidemiology, and economics, and we posit that the occupations identified as being at risk for COVID-19 workplace outbreaks or transmission by media surveillance are valid signals of risk, and that the method likely underestimated the true contribution of the workplace as a source of COVID-19 transmission. News media has varied capacity and motivations for capturing and reporting on outbreaks, and the motivations for reporting outbreaks may wane over time. Overall, it is likely that the media surveillance underestimated the risk of COVID-19 workplace transmission, but accurately identified new and emerging occupations at risk for transmission of infection that would benefit from public health measures and interventions.

Concluding remarks

Preventing workplace outbreaks is imperative in slowing the community–workplace spread of COVID-19, but this requires understanding and managing the risk of exposure in the workplace at the intersection of occupational health and public health. In the absence of occupational data, public health interventions should target the occupations identified by media surveillance as being at increased risk of COVID-19 workplace outbreaks and transmission. However, it is important that public health agencies collect and share real-time detailed occupation information for COVID-19 cases. Agencies can mirror effective occupational epidemiological surveillance systems for infectious diseases developed in other countries. A system that collects occupation data for COVID-19 cases

could replace or supplement media surveillance and, importantly, reduce the risk of severe outcomes for workers and their community.

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Author contributions

MWK and CEP conceived and designed the study. SF, EKQ, ER, and EH performed the experiments/collected the data. SF, ER, HWD, RAM, CBM, MWK, and CEP analyzed and interpreted the data. MWK and CEP contributed resources. SF, EKQ, ER, EH, HWD, RAM, CBM, MWK, and CEP drafted or revised the manuscript.

Data availability statement

Data available on request to corresponding author.

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Competing interests

The authors declared no conflicts of interest.

Supplementary material

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Supplementary Material 1

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