
Commentary

Twitter Analytics to Inform Provisional Guidance for COVID-19 Challenges in the Meatpacking Industry

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Abstract

The COVID-19 pandemic raised considerable challenges to obtain reliable guidance to help occupational health practitioners, workers, and stakeholders building up efficient prevention strategies at the workplace, between the constant increase of publications in the domain, the time required to run high-quality research and systematic reviews, and the urgent need to identify areas for prevention at the workplace. Social Media and Twitter, in particular, have already been used in research and constitute a useful source of information to identify community needs and topics of interest for prevention in the meatpacking industry. In this commentary, we introduce the methods and tools we used to screen relevant posts on Twitter. Twitter analytics is a way to capture real-time concerns of the community and help ensure compliance with the notion of social accountability. As such research has limitations in terms of exhaustiveness and level of evidence, it should be considered as provisional guidance to direct both actions at the workplace and further conventional research projects.

Keywords: COVID-19; meatpacking industry; occupational exposure; Social Media; workplace

The dramatic development of the COVID-19 pandemic (Huang *et al.*, 2020; WHO, 2020) requires the scientific community to be extremely responsive and

to use innovative ways to produce timely evidence. The framework of the peer-reviewed article typically involves a time-consuming process. Alternative ways

to get intermediate evidence include internet platforms such as the Johns Hopkins Coronavirus Resource Center for real-time worldwide data on COVID-19 cases and fatalities (Johns Hopkins University, 2020), online real-time systematic reviews on therapeutic options, such as MetaEvidence (2020), or technical reports on the online COVID-19 Evidence Service of the Center for Evidence-Based Medicine from the University of Oxford (CEBM, 2020). Rapid reviews on several Occupational Health topics have been published, such as the use of Personal Protective Equipment in community healthcare practice settings (Khunti *et al.*, 2020) or on the classification of aerosol-generating procedures (Jackson *et al.*, 2020).

Numerous COVID-19 outbreaks have been reported with meat and poultry processing facilities in different countries. In Alberta (Canada), by 10 May 2020 one in four of all cases of COVID-19 had been linked to meat and poultry facilities. In the USA, in April 2020, 4913 cases with 20 deaths in approximately 130 000 workers of 115 meat and poultry processing facilities were reported (Dyal *et al.*, 2020). Evidence on this topic was required to help stakeholders, occupational health and safety professionals, and workers, to identify the risk factors and build up efficient prevention strategies.

Social Media, such as Twitter, is now used in academic research (Durand-Moreau, 2020). Studies have been published using Social Media Mining methods in various areas such as monitoring prescription abuse (Sarker *et al.*, 2016) or identifying birth defects (Klein *et al.*, 2018). In addition to conducting a rapid literature review, we applied similar methods to the topic of COVID-19 risk in the meat and poultry industry. The full review has been released on the CEBM website (Durand-Moreau *et al.*, 2020). The purpose of this commentary is to share the methods used to run a Social Media analysis for a topic of interest to occupational health practitioners.

We analyzed lay media press articles and posts on Twitter to collect information about meat and poultry facilities in which COVID-19 outbreaks have been reported. Twitter is a large open platform, used by media outlets and journalists to promote their content. Preliminary research can be run on rapid web-based tools, such as *twitonomy.com* and subsequently refined. Raw data can be accessed directly through the Twitter Application Programming Interface (API) which is a way to collect data on tweets, users, media, or places. Data can also be analyzed using third-party social network analysis tools such as NodeXL which we used. However, this may raise technical challenges as the research requires a lot of computer resources

and can take hours to be completed. NodeXL looks at the connections between tweeters and can map different communities based on tweet content, interactions between users (individuals or institutions having a Twitter account) and displays information about top content (up to 10 URL) for up to 10 most influential clusters. Extensive details on this search as well as an interactive figure are available online (<http://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=226737>). We used such figures to identify the topics of interest. As the software is limited to 18 000 posts per extract and period (up to 10 days into the past), we ran a series of searches to capture a comprehensive record for the period from 6 May to 14 May 2020, inclusive.

Twitter search terms need to be specific as it does not use approximate string matching (aka 'fuzzy search'); e.g. a search run on Twitter with the word 'slaughter' will not identify posts with the word 'slaughterhouse'. The cluster of tweets was secondarily classified by two researchers of our team in addition to a media search conducted using 'Google News'. The themes were woven into a narrative summary using a constant comparative method which consists of adding each new source to an emerging picture of the whole until saturation was reached.

The broad themes are listed in Table 1 and are reported extensively in the full report (Durand-Moreau *et al.*, 2020). In sum, newspaper articles depict an industry dominated by large multinational companies, working to 'just-in-time' supply chain pressures and oriented to maximizing efficiency. The workforce is depicted as vulnerable and the nature of the work as making it difficult or impossible to implement and follow high standards of infection control. Some plants appear to have seen high levels of transmission. Poor-quality and at times overcrowded communal living and traveling conditions are depicted as exacerbating the risks. The tension between regulatory controls (which often require prolonged closures) and lobbying by industry voices (which push for remaining open) plays out differently in different countries.

Our combined methodology of Social Media analysis with a rapid review allowed us to provide contemporaneous insight with regard to the following question: what explains the high rate of SARS-CoV-2 transmission in meat and poultry facilities?

- The working environment in these facilities is favorable to SARS-CoV-2 persistence (metallic surfaces, low temperatures, and relative humidity).

Table 1. Summary of the topics identified in the Social Media analysis about COVID-19 and meat industry.

High-risk industry for COVID-19 spread	Meatpacking plants, abattoirs, and slaughterhouses were depicted as major sources of local outbreaks, and sometimes as a key source of a national upsurge in cases when the disease was otherwise under control.
Business pressures	Small plants were reported to close and be replaced by large plants owned by large companies achieving economies of scale. The industry was described as lacking the resilience to withstand an external shock.
Prioritization of the supply chain	Some articles depicted the meat industry as under pressure to maintain production because its output was a necessary and 'just-in-time' staple.
Vulnerable workforce	Many articles described how meat workers are typically immigrants. Many would have feared losing their jobs, and so may have accepted low pay and poor conditions without protest.
Inadequate health and safety measures	Many articles pointed out an absence of adequate infection control measures on the factory floor and indeed the impossibility of physical distancing in the cramped conditions of some plants.
Overcrowded housing and transport	Several articles described overcrowded living conditions, sometimes with immigrant workers living in 'barrack-style' dormitories and traveling on crowded buses or vans to and from work.
Regulatory oversight	Measures to implement food standards regulations and align these with pandemic response measures such as contact tracing were described in broadly reassuring terms and appeared as a mitigation factor.
Political involvement	Maintenance of the meat supply chain was depicted as a political as well as business priority, and classified as critical infrastructure.

- The working environment may help SARS-CoV-2 transmission (crowded working places, shared transportation, production of aerosols, droplets, and fomites).
- A vulnerable, low-paid workforce may be under pressure to keep working despite having symptoms of COVID-19.

Our method has some limitations. On the one hand, we conducted our research at a time in which the amount of data available was increasing rapidly with data often being of comparatively low quality, with a concomitant popularity of preprints servers sharing non-peer-reviewed papers. This increase in the number of COVID-19 papers ongoing at the time of writing our review meant that we could not be exhaustive. On the other hand, the pandemic has disrupted life to such an extent that information to help address critical aspects of the pandemic was needed urgently. Conducting a full systematic review to the established methodological standards is typically a time-consuming process, but emergent situations may require a more streamlined approach. There was a need to fill the knowledge gap in real time considering the immediate societal need for guidance. Thus, this type of research should be seen as providing provisional milestones, that will help to identify further research topics for later, more extensive,

study. Further systematic reviews will certainly be helpful by addressing different and narrower research questions ([Greenhalgh et al., 2018](#)).

Twitter reflects real-time concerns and is thus a useful tool to capture topics of interest in the community of users. It may also be seen as a way to address social accountability, which was defined by WHO as the *obligation of medical schools to direct their education, research and service activities towards addressing the priority health concerns of the community, region and/or nation they have a mandate to serve* ([Rourke, 2018](#)). Social Media is a way to both identify and address the education needs of communities. Especially in occupational health and at a time of a pandemic, it is of critical importance that research is driven by the workers' needs and is conducted in a timely fashion and translated into policies based on available evidence to improve the occupational health of such essential workers.

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Conflict of interest

The authors declare no conflict of interest relating to the material presented in this article. Its contents, including any opinions and/or conclusions expressed, are solely those of the authors.

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