COVID-19 pandemic: workplace readiness to control and contain the spread of coronavirus

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ABSTRACT

The coronavirus outbreak has been declared a pandemic by the World Health Organization. It is a huge concern to both public and occupational health and is the biggest current threat to the global economy and financial markets. The aim of this paper is to highlight the key occupational health challenges based on available literature and to provide some guidance on preventive measures. A literature search was conducted on PubMed and Google for studies published from January to March 2020. Google translate was used for articles in foreign languages. The literature showed that healthcare workers are a high-risk group, although any worker is at potential risk. The key challenges identified relate to labour rights and sick leave, compensation, impact of quarantine on business continuity, and whether transmission is purely through droplets or if airborne transmission plays a role. The evidence, although limited, provides guidance for slowing down and reducing the risk of spread of the virus.

INTRODUCTION

The new coronavirus disease (COVID-19) outbreak that has spread across several countries[1] and continents has been declared a pandemic by the World Health Organization (WHO). The outbreak has become a global public and occupational health threat, raising several challenges for managing exposure and work-related disease.[2,3] The President of South Africa, the Honourable Cyril Ramaphosa, declared COVID-19 a national disaster and announced strict measures to deal with it, including a 21-day lockdown[4] which was extended by a further two weeks.[5]

The purpose of this paper is to raise awareness of COVID-19 readiness in the workplace and to highlight minimum preventive measures to control and contain the spread of the virus. Gilbert and colleagues determined the capacity of countries to detect and respond to cases and showed that South Africa, while having a high importation risk, also had a moderate-to-high capacity to respond to outbreaks.[6] Given the risk, capacity-building training efforts of occupational health professionals must be implemented and cascaded through the labour and health systems for readiness at a national level.[7] Also needed are strong partnerships across the following six streams: 1) surveillance; 2) laboratory diagnosis; 3) quarantine, infection prevention and control; 4) contact tracing and clinical case management; 5) risk assessment and communication; and 6) supply chain management and stockpiles.[6] This literature review was informed by scientific articles published from January to March 2020, and publicly available information as of 24 April 2020. Due to the fact that the outbreak is still evolving, there is limited literature available in the scientific domain.

SOURCES AND ROUTE OF TRANSMISSION

Coronaviruses belong to a family of enveloped ribonucleic acid (RNA) viruses. The species responsible for COVID-19 is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is thought that the transmission chain started from bats to humans. Although it has been suggested that the intermediate host is the pangolin, this remains to be determined.[2,7-9] The main route of transmission is person-to-person through respiratory droplets (coughing, sneezing, talking) and close contact (proximity of ≤ 1 metre) to an infected person.[2,3,10-13] The expelled infectious droplets may land on objects in the workplace, such as tables, desks or equipment. Workers might touch these contaminated surfaces and then touch their eyes, noses or mouths, which are entry points for the virus.[7] The reproductive number for the coronavirus is 2.5 indicating that, on average, an infected individual infects at least two to three additional people. The risk of transmission from asymptomatic individuals, although low, has also been reported.[13-15]

SYMPTOMS ASSOCIATED WITH EXPOSURE TO SARS-CoV-2

The average incubation period is 5.2 days, ranging from two to 14 days from exposure to onset of symptoms.[9] The early clinical manifestation of COVID-19 is mild flu-like symptoms which can be followed by severe respiratory distress and pneumonia.[12,16] The typical symptoms include fever (> 38 °C), headache, dry cough, shortness of breath, malaise and sore throat.[8,12,16] Approximately 80% of persons present with mild to moderate disease (similar to the common flu or cold) and recover. Fifteen per cent of cases require hospital admission, and 5% of cases may become critically ill and require intensive care unit (ICU) admission; 3% might succumb to the infection.[17]

EPIDEMIOLOGY

From the onset of the outbreak in December 2019, until 24 April 2020, there have been 2 833 047 confirmed positive cases and 197 353 deaths across 210 countries around the world and two international conveyances (the *Diamond Princess* and MS *Zaandam* cruise ships). The infection is increasing daily due to the rapid spread of the virus and strained health systems, including lack of diagnostic capacity in many countries. Whilst the United States of America (USA) has the highest number of reported cases currently, Spain has been most affected by the outbreak. Spain

has more cases and deaths per one million population, exceeding that of China, the epicentre of the disease outbreak.[18] In the first two weeks of March 2020, the number of cases outside China increased 13-fold, causing concern about the spread.[7] However, the situation in China improved significantly and the lockdown in Wuhan was lifted in April. The latter is indicative of the reversal of the exponential increase in the number of cases through lockdown measures. In South Africa, the infection rate of 49% dropped to 4% by the 4th week of the lockdown.[5] Table 1 shows the number of confirmed cases and deaths by country or conveyance, as of 24 April 2020.

A notable number of cases reported in China and Singapore have been due to occupational exposure.[2,11] At the time of writing this paper, there were 4 220 cases and 79 deaths of COVID-19 reported in South Africa across all provinces, with Gauteng having the highest number. The initial cases were imported; however, community transmission is more widespread now. Locally, a number of workers have been infected. An occupational link has been confirmed in three of 25 cases submitted to the Compensation Commissioner to date.These include healthcare workers, South African Police Service workers, correctional service officials, South African National Defence Force workers, and mining and energy sector workers. As defined in the Compensation for Occupational Injuries and Diseases (COID) Act (Act No. 130 of 1993), an occupationally acquired COVID-10 case has disease arising out of or contracted in the course of work by an employee. The lack of a robust occupational health surveillance system impacts on access to accurate data on risk sectors to enable the implementation of adequate preventive strategies.

OCCUPATIONAL RISK GROUPS

Although every person is potentially at risk of exposure to COVID-19, the risk is higher for workers interacting with persons (within a 1–2 m zone) who are potentially infected due to the operations in which they work. Examples are:

- Healthcare (e.g. paramedics, nurses, doctors, porters, other health professionals)
- Airline operations (e.g. airline cabin crew, aircraft cleaners, mechanics)
- Border control (e.g. security officials, and other border officials)
- Laboratories (e.g. medical technologists, scientists, laboratory assistants and researchers)
- Pathology and funeral services (e.g. mortuary attendants, autopsy technicians and funeral directors)
- Solid waste and wastewater management (e.g. waste pickers, water treatment plant workers)

The first documented occupational risk group was seafood and wet market animal workers at a wholesale market in China.[12] Initially, in an

Table 1. Number of confirmed SARS-CoV-2 cases and deaths by countries with the highest number of cases, conveyances and the SADC countries, as at 24 April 2020[7,18]

Country	Total cases	New cases*	Total deaths	Active cases	Total cases/ 1M pop†	Total deaths/ 1M pop†	Total tests/ 1M pop†
World countries							
USA	925 758	38 958	52 217	763 109	2 797	158	15 219
Spain	219 764	6 740	22 524	104 885	4 700	482	19 896
Italy	192 994	3 021	25 969	106 527	3 192	430	27 164
France	159 828	1 645	22 245	94 090	2 449	341	7 103
Germany	154 999	1 870	5 760	39 439	1 850	69	24 738
UK	143 464	5 386	19 506	123 614	2 113	287	9 016
Turkey	104 912	3 122	2 600	80 575	1 244	31	9 844
Iran	88 194	1 168	5 574	16 021	1 050	66	4 761
China	82 816	126	4 632	838	58	3	-
Russia	68 622	5 849	615	62 439	470	4	17 474
Diamond Princess‡	712	-	13	54	-	-	-
MS *Zaandam*‡	9	-	2	7	-	-	
Southern African Development Community (SADC) countries							
South Africa	4 220	267	79	2 668	71	1	2 569
Angola	25	-	2	17	0.8	0.06	-
Botswana	22	-	1	21	9	0.4	2 136
DRC§	394	17	25	321	4	0.3	-
eSwatini	36	5	1	25	31	0.9	615
Lesotho	-	-	-	-	-	-	-
Madagascar	122	1	-	61	4	-	85
Malawi	33	-	3	26	2	0.2	30
Mauritius	331	-	9	37	260	7	10 516
Mozambique	65	19	-	53	2	-	46
Namibia	16	-	-	9	6	-	232
Seychelles	11	-	-	5	112	-	-
Tanzania	299	15	10	241	5	0.2	-
Zambia	84	8	3	44	5	0.2	141
Zimbabwe	29	1	4	23	2	0.3	367

*no. new cases: 23 April 2020; † total no. cases per 1 million population; ‡ conveyance; § Democratic Republic of Congo

analysis of the first 425 cases in Wuhan, healthcare workers (HCWs) were recognised as the second-highest risk group, after workers at the wet market, after 14 HCWs were infected by a patient in a Wuhan hospital cluster.[2,12] In addition, HCWs (and their families and friends) experience social stigmatisation from a fearful public as they are accused of spreading the virus.[2] Of those infected, 77.5% worked in general wards, 17.5% in the emergency department, and 5% in ICUs.[2] Hospital-related transmission among HCWs could be up to 29%.[19] In Singapore, 68% of probable occupationally-acquired COVID-19 cases included workers in the tourism, retail and hospitality, transport and security, and construction industries (Table 2). Other workers at risk are cruise ship crew, e.g. waiters and cleaners,[16] and workers with co-morbidities (diabetes, renal disease, cardiac disease or chronic lung diseases).[8,20]

RECOMMENDED CONTROL AND CONTAINMENT MEASURES FOR COVID-19 IN WORKPLACES

Since the onset of the COVID-19 outbreak, prevention and control have been major factors in curbing the rapidly-spreading virus. Therefore, current and credible information on the coronavirus and detailed protocols on planning and preparedness in the workplace for early detection, prompt isolation of contacts and suspected cases, and active surveillance, are essential.[2,3,7,11,21] Employers should provide a safe and healthy workplace for employees, contractors and visitors, guided by the company's occupational health and safety policy. The COVID-19 outbreak presents new risks to organisations and, thus, employers need to review their biorisk assessment strategies and compile risk management matrices for both health and safety, and business risks. Information and understanding of the likelihood and consequences of COVID-19 are needed to help refine risk assessments which will inform mitigation strategies within the work environment. This should include business continuity plans to cushion any economic or job losses. The implementation of necessary control measures should be tailor-made for various sectors, and risks should be communicated to all employees.[8] Restrictions on employee travel (e.g. essential or emergency work) and monitoring thereof should be part of the mitigation plan. Occupational settings should consider having dedicated response teams that should remain in consultation with public health authorities for the early recognition and reporting of suspected COVID-19 cases.

All employees should be educated and alerted about the risk of COVID-19. Workers can be protected by good hand and respiratory hygiene practices[2] and practising social distancing, and should not rely only on personal protective equipment (PPE).[11] Employers should therefore make provisions for wash basins, hand sanitisers and PPE (as informed by the risk assessment), all of which should be readily available to all employees, visitors and contractors, as determined by policy. Sick employees presenting with symptoms related to COVID-19 should be encouraged to stay at home. However, should they present at work, they should be separated from healthy workers. Ideally, a dedicated area should be identified by the employer for temporary isolation of suspected cases. If an employee is confirmed to have COVID-19, employers should inform fellow employees of possible workplace exposure, while maintaining confidentiality.[21]

It is recommended that a tiered approach be followed to address primary, secondary and tertiary prevention measures. Naturally, the risks will be similar for some occupations, hence public and private employers and employees, trade unions and government should collaborate on preventive strategies for all concerned. The recommended approach is illustrated in Figure 1.

Table 2. Job types of 17 of the 25 probable occupationally-related COVID-19 cases in Singapore (4–11 February 2020)[2]

Job type	No. cases
Retail staff selling complimentary health products	4
Domestic worker of one of the retail staff cases above	1
Tour guide who led tour group	1
Jewellery store worker	1
Multinational company staff attending international business meeting	3
Taxi driver	1
Private hire car driver	1
Sentosa Resort employee	1
Security officer who served quarantine order to two persons	1
Casino worker	1
Workers at construction site	2

CHALLENGES

There are a number of challenges that hamper the containment and control of the COVID-19. Some of these are listed below:

- There is a delay between disease development and progression, diagnosis and quarantine.[12]
- Healthcare systems are strained, surveillance is inadequate, laboratory capacity is limited, public health human resources are scarce, and there are limited financial means to address these factors.
- Multiple health challenges face the African continent, such as rapid population growth, increased movement of people, existing endemic diseases (eg. human immunodeficiency virus (HIV), tuberculosis, malaria), emerging and re-emerging diseases, and increasing incidence of non-communicable diseases.[6]
- The main symptoms (fever, cough and shortness at breath) may not all be discernible at early stages of the disease, therefore a high level of clinical suspicion should be maintained to prevent disease transmission.[16]
- There is no treatment, vaccine or pre-existing immunity to the virus.
- Screening efforts may miss asymptomatic individuals who could transmit the virus.
- A possible airborne mode of transmission is likely; however, insufficient scientific evidence is available.
- Shortages of outbreak-related resources (e.g. PPE supply and/or universal masking) pose a challenge to workplaces globally, particularly in healthcare. Thus, interim measures for protecting workers must be put in place based on priority, i.e. imminent risk in the workplace, and available financial resources.
- Lack of awareness leads to individuals presenting to ear, nose and throat (ENT) departments, thus overloading and increasing risk exposure to HCWs.
- Contact tracing may miss certain individuals as the person under investigation (PUI) may not recall all contacts, or fear reporting them.
- The biological agent classification for SARS-CoV-2 definition in the current regulation does not match the actual disease presentation.
- Immune susceptibility varies among workers and, therefore, the risk profiles are different. In addition, workers do not disclose their underlying conditions, thus making it difficult to prioritise them.
- Compliance to lockdown measures is problematic in some areas and occupational sectors (e.g. public transport and informal trade).

Figure 1. Recommended business approach to workplace readiness for COVID-19

CONCLUSION

COVID-19 is now considered a global pandemic and the virus is spreading at an unprecedented rate. Given the challenges highlighted in this paper, it is crucial that scarce resources be appropriately allocated to prepare and respond effectively in a unified and co-ordinated manner across workplaces, countries and continents. Technical operations and testing must be impeccable and quality-assured, and collaboration and communication needs to be strengthened. The actions needed in the occupational health arena are fundamental and will contribute to the prevention of a social, health and economic tragedy. It is the responsibility of the employer to implement a preparedness plan for containing and controlling potential exposures, as well as to review its business continuity plans, in order to maintain a healthy, safe and sustainable workplace.

DECLARATION

The authors declare that this is their own work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design of the paper: TSS, DOM
Drafting of the paper: all authors
Critical revision of the paper: TSS

REFERENCES

1. Joob B, Wiwanitkit V. COVID-19 in medical personnel: observation from Thailand. J Hosp Infect. 2020; 27 Feb. doi: 10.1016/j.jhin.2020.02.016.
2. Koh D. Occupational risks for COVID-19. Occup Med (Lond). 2020; 70(1):3-5.
3. Spina S, Marrazzo F, Migliari M, Stucchi R, Sforza A, Fumagalli R. The response of Milan's Emergency Medical System to the COVID-19 outbreak in Italy. Lancet. 2020; 395(10227):E49-E50.
4. News24. Ramaphosa declares national disaster, announces strict measures to deal with Covid-19 crisis. https://www.news24.com/SouthAfrica/News/state-of-war-ramaphosa-takes-command-of-covid-19-response-as-national-disaster-is-declared-20200316 (accessed 12 Apr 2020).
5. Republic of South Africa. Department of Health. Message by President Cyril Ramaphosa on COVID-19 pandemic Thursday, 9 April 2020. Issued by the Presidency of the Republic of South Africa. Available from: https://sacoronavirus.co.za/2020/04/09/message-by-president-cyril-ramaphosa-on-covid-19-pandemic-thursday-9-april-2020/ (accessed 10 Apr 2020).
6. Nkengasong JN, Mankoula W. Looming threat of COVID-19 infection in Africa: act collectively, and fast. Lancet. 2020; 395(10227):841-842.
7. World Health Organization. Coronavirus situation reports; 2020. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/ (accessed 12 Apr 2020).
8. O'Keefe LC. Middle East Respiratory Syndrome coronavirus. Workplace Health Saf. 2016; 64(5):184-186.
9. Sun P, Lu X, Xu C, Sun W, Pan B. Understanding of COVID-19 based on current evidence. J Med Virol. 2020; 1-4. doi: 10.1002/jmv.25722.
10. Kapata N, Ihekweazu C, Ntoumi F, Raji T, Chanda-Kapata P, Mukonka V, et al. Is Africa prepared for tackling the COVID-19 (SARS-CoV-2) epidemic? Lessons from past outbreaks, ongoing pan-African public health efforts, and implications for the future. Int J Infect Dis. 2020; 93:233-236.
11. Peng PW, Ho PL, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. Br J Anaesth. 2020; doi: 10.1016/j.bja.2020.02.008.
12. Ralph R, Lew J, Zeng T, Francis M, Xue B, Roux M, et al. 2019-nCoV (Wuhan virus), a novel Coronavirus: human-to-human transmission, travel-related cases, and vaccine readiness. J Infect Dev Ctries. 2020; 14(1):3-17.
13. Rocklöv J, Sjödin H, Wilder-Smith A. COVID-19 outbreak on the Diamond Princess cruise ship: estimating the epidemic potential and effectiveness of public health counter measures J Travel Med; 28 Feb 2020. Available from: https://doi.org/10.1093/jtm/taaa030 (accessed 12 Apr 2020).
14. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. N Engl J Med. 2020; 382(10):970-971.
15. Zhang S, Diao M, Yu W, Pei L, Lin Z, Chen D. Estimation of the reproductive number of novel coronavirus (COVID-19) and the probable outbreak size on the Diamond Princess cruise ship: a data-driven analysis. Int J Infect Dis. 2020; 93:201-204.
16. Arashiro T, Furukawa K, Nakamura A. COVID-19 in 2 persons with mild upper respiratory symptoms on a cruise ship, Japan. Emerg Infect Dis. 2020; 26(6), doi: 10.3201/eid2606.200452.
17. National Institute for Comminicable Diseases. How to manage the threat of COVID in your workplace or institution. National Institute for Communicable Diseases. Johannesburg: NICD; 2020. Available from: https://www.nicd.ac.za/how-to-minimize-risk-of-covid-19-in-the-workplace/ (accessed 12 Apr 2020).
18. Worldometer. Coronoavirus. Available from: https://www.worldometers.info/coronavirus/ (accessed 12 Apr 2020).
19. Chen X, Tian J, Li G, Li G. Initiation of a new infection control system for the COVID-19 outbreak. Lancet Infect Dis. 2020; 20(4):397-398.
20. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares Global Emergency: a review of the 2019 Novel Coronavirus (COVID-19). Int J Surg. 2020; 76:71-76.
21. Cheng VC, Wong SC, To KK, Ho PL, Yuen KY. Preparedness and proactive infection control measures against the emerging Wuhan coronavirus pneumonia in China. J Hosp Infect. 2020; 104(3):245-255.