

COVID-19 BRIEFING REPORT

URGENT CONSIDERATIONS TO REDUCE THE RISKS TO HEALTH CARE WORKERS IN PUBLIC AND PRIVATE HEALTH CARE FACILITIES IN SOUTH AFRICA

27 April 2020

A physically and mentally healthy and well-equipped healthcare workforce is vital to a country's capability to manage COVID-19 cases effectively. Apart from the direct infection risks arising from close contact with patients and/or potentially infectious co-workers during the COVID-19 pandemic, healthcare workers are also under increasing stress and mental health risks. We have much to learn.¹

He who knows these things, and in fighting puts his knowledge into practice, will win his battles. He who knows them not, nor practices them, will surely be defeated.²

¹ Sim MR. The COVID-19 pandemic: major risks to healthcare and other workers on the front line. <http://dx.doi.org/10.1136/oemed-2020-106567>

² Sun Tzu – The Art of War

PREFACE

This document has been brought together in the form of a rapid review comprising the following:

1. We reviewed media reports to determine the extent of outbreaks in various settings.
2. We conducted informal interviews with colleagues working in hospitals in hotspot areas where there have been outbreaks to identify potential core issues feeding into outbreak scenarios.
3. We drew on emerging literature and guidelines to inform recommendations made here.

Objectively, we have identified key issues and recommended practices by drawing on relevant literature. Subjectively, we have relied on narratives on common trends and elevated our focus on those that ring true as a product of repeated mention. We have used these insights to shape this document.

Our findings are by no means a refined or exhaustive description of the total picture. Instead, they are offered as pieces of the emerging puzzle that can be applied at the early stage of the COVID-19 epidemic to inform and refine the response in South Africa.

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A RAPIDLY UNFOLDING CRISIS

In the few weeks preceding this Briefing Report, there have been at least seven COVID-19 outbreaks in public and private hospitals in KwaZulu-Natal and in Gauteng. Total persons testing COVID-19 positive exceed 200, the majority of whom are health care workers (HCW) or other staff.

This document focuses on analysis of the factors that potentially underlie these outbreaks as well as outlining potential solutions with reference to various literature.

In some settings: a malaise of uncertainty, fear and unfocused indifference

COVID-19 is both tangible and intangible. It seems to be coming yet it does not come. Elsewhere it arrives in full force, displacing and negatively impacting the health of large cadres of health care and allied workers and patients in their care, thus reducing the availability of resources and facilities urgently needed for the COVID-19 response.

Why should this be so? **Our general finding is that wherever there is an absence of a conscious and conscientious focus on small but significant moments of high risk for COVID-19 transmission, there are the seeds for a significant outbreak.**

Such risks take the shape of a lack of attention to detail. For example:

- Having to obtain PPE only on entry to a COVID-19 unit
- Removing PPE from a COVID-19 ward in a non-COVID-19 environment shared by others
- Disposing of PPE and masks into general waste and potential viral dispersal into the surroundings
- Close interaction and socializing between staff without sufficient attention to physical distancing, face mask use and other preventive measures
- Uncontrolled movement of people between COVID-19 wards and other areas in the facility
- Transfer of patients between facilities
- Clinical and non-clinical staff migration and functioning in various wards within a facility as well as functioning across various facilities.

Rotation of staff between hospitals creating the opportunity for cross infection. While these factors are not necessarily universal, where they exist, they pose a significant risk for transmission, for as we know, COVID-19 is unforgiving. It is thus imperative that all HCW, allied staff, patients and visitors have a heightened awareness that a lack of attention to detail can lead to an outbreak that poses risks to many and that unnecessarily diverts resources.

Where these risks exist, **there is a need to refocus by emphasizing the need for accountability within the facility and the health system, responsibility to colleagues and patients, responsibility to the surrounding community and the responsibility to uphold the duty to the nation at a time of critical need.**

Effectively communicated, such sentiments can be translated into motivational value statements that can support the mobilisation of HCW, allied staff and patients with any health care facility.

In situations where HCW are moving into high-risk environments, it is necessary to be vigilant beyond what might have been previously established norms and attention to detail. For example: ‘

- High risk teams should be supervised by a “spotter” who ensures military-level compliance to the use of PPE and other care techniques and practices.
- The quiet period before the proverbial storm should be utilized for spatial organization to reduce risk, for training and for education of staff, and for clarifying key communication to patients and visitors.
- All staff should be comfortable with donning and doffing procedures and all staff need to be observing and correcting each other at every point.
- No person should drop their guard when it applies to their own practices, and no person should be afraid to speak out to help others or raise an alarm. Obsessiveness, focus and attention to detail may very well be the difference between becoming infected with COVID-19 or not.

LESSONS LEARNED IN GLOBAL NORTH

By 20 February 2020 in China, over 2,000 cases of COVID-19 were confirmed among HCW. Observations include that many did not have knowledge or preparedness with dealing with infectious diseases and that most had minimal experience of sequence of PPE use, replacement and disposal. Excess hours and high patient volumes added to fatigue. *“The grim shortage of protective equipment greatly increased the risk of HC facility infections at the onset of the outbreak, exacerbating the spread of diseases among visitors, staff, and patients.”* Immediate administrative actions that can be taken to mitigate these concerns include:

- 1) Commitment to protecting HCW
- 2) Improved guidance on proper use of PPE;
- 3) Strengthened logistics and medical supplies;
- 4) Enhanced disinfection at hotels where HCW were staying;
- 5) Instituting an enhanced monitoring system to detect infections among HCW;
- 6) Establishing an expert group to treat staff;
- 7) Introduction of a special insurance fund for HCW.

Recommendations include improved training in all aspects of managing infectious diseases and ensuring that mental health services are available to HCW on an ongoing basis.³

- A study in China noted the following factors contributed to HCW risk for COVID-19:
 - 1) Inadequate PPE;
 - 2) Inadequate knowledge;
 - 3) Long periods of exposure to infected patients;
 - 4) Pressure and intensity of work;
 - 4) Inadequate training in PPE use;
 - 5) Lack of professional supervision and guidance.⁴
- A study in China contrasted stigmatisation of HCW – for example being seen as an infection risk when using public transportation – as well as diverse public support and voluntarism including providing transport and sharing public health messages. The study

³ Zhang, Z., Liu, S., Xiang, M. *et al.* Protecting healthcare personnel from 2019-nCoV infection risks: lessons and suggestions. *Front. Med.* (2020). <https://doi.org/10.1007/s11684-020-0765-x>

⁴ Exploring the reasons for healthcare workers infected with novel coronavirus disease 2019 (COVID-19) in China

highlighted the importance of social support and providing access to mental health services.⁵

- A study in China identified several transmissions from HCW to family members, especially during the asymptomatic phase. The authors emphasise preventing HCW infections in the first instance and addressing family safety. Infection control measures at home included separation of living spaces and bathrooms where possible, removing shoes, washing clothing and immediate showering were considerations when returning home, and changing out of hospital clothing at the hospital should also be considered. Self-care measures for HCW should also be emphasised. Facilities should give attention to rest breaks, decompression time, feedback sessions and clear concise communication ‘to help teams stay focused on care and secure in their roles’.⁶
- A study of deficiencies in the United States response to COVID-19, highlighted the need to urgently address supply shortages through mobilising manufacturers to repurpose for PPE production and communities to contribute where they can. Surges do not occur in all locations and the supply chain can be bolstered by channelling PPE and equipment stocks to areas most in need. Co-ordination is vital and compromising the safety of HCW endangers the functioning of the entire health care system.⁷
- A brief review of subclinical COVID-19 infection noted: *“Not only can subclinical patients transmit the virus effectively, but patients can also shed high amounts of the virus and infect others even after recovery from the acute illness. These findings warrant aggressive measures (such as N95 masks, goggles, and protective gowns) to ensure the safety of HCW, especially in the initial stages of the epidemic where limited information about the transmission and infective potency of the virus is available”*.⁸
- An assessment in Italy identified the following multi-pronged aspects: Extensive testing of symptomatic and asymptomatic cases early on; Proactive tracing of potential positives

⁵ Koh D. Occupational risks for COVID-19 infection. Occupational Medicine (Oxford, England). 2020 Mar;70(1):3.

⁶ Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. Jama. 2020 Mar 12.

⁷ Ranney ML, Griffeth V, Jha AK. Critical supply shortages—the need for ventilators and personal protective equipment during the COVID-19 pandemic. New England Journal of Medicine. 2020 Mar 25.

⁸ Chang D, Xu H, Rebaza A, Sharma L, Cruz CS. Protecting health-care workers from subclinical coronavirus infection. The Lancet Respiratory Medicine. 2020 Mar 1;8(3):e13.

including testing at home and neighbours; Self-quarantine if tests not available; A strong emphasis on home diagnosis and care.⁹

- Also, in Italy, a retrospective analysis indicated sub-optimal availability of intensive care unit beds. Self-employed medical practitioners were drawn into service in the public health system. Deficiencies in PPE supplies were a major concern. The Lombardy Doctors Association raised key concerns with ‘errors’ in handling the crisis by authorities including: Lack of testing for HCW; Lack of PPE; Lack of data; Need for inclusion of support to allied health workers and essential workers.
- A presentation on the American College of Occupational and Environmental Medicine (ACOEM) zoom session by Hebert de Jaeger on antibody testing for COVID-19 covered data for the Emilia-Romagna region and Metropolitan area of Bologna in the Netherlands. There are 15,400 HCW employed by the National health services. They tested 7,000 HCW and found 7% positive for COVID-19. They also tested 13,000 HCW using serology and had a yield of 4%. They found more HCW to HCW transmission than patient to HCW transmission – especially initially. This was attributed mainly to lack of social distancing. Correct and appropriate PPE plus social distancing is what they believe was important to reduce risk to HCW. A call-centre was also setup to guide and support HCW.
- Public Health Ontario put out an evidence brief dated 29 March 2020 entitled “Infection prevention and control for First responders providing direct care for suspected or confirmed COVID 19 Patients”. They had reports of infections amongst first responders in North America. They were unable to confirm if these individuals contracted the virus from the community or from Patients. They recommended the First responder use the appropriate PPE depending on the activity performed. All activities necessitated the use of goggles, gowns, gloves and surgical masks. If they performed intubation or high flow oxygen, then a fit tested and seal checked N95 mask was recommended.¹⁰

⁹ Pisano, Sadun & Zanini, Lessons from Italy’s Response to Coronavirus, 27 March 2020, Harvard Business Review. <https://hbr.org/2020/03/lessons-from-italys-response-to-coronavirus>

¹⁰ Public Health, Ontario: Infection Prevention and Control for First Responders Providing Direct Care for Suspected or Confirmed COVID-19 Patients. <https://www.publichealthontario.ca/-/media/documents/ncov/evidence-brief/eb-COVID-19-first-responders.pdf?la=en>

A TEN KEY FOCAL POINTS FOR RISK REDUCTION

1. LEADERSHIP, COORDINATION AND COMMUNICATION

The response to COVID-19 requires concerned and committed leadership with a capacity for coordination that is supported by rapid learning and responsiveness.

A physically and mentally healthy and well-equipped healthcare workforce is vital to a country's capability to manage COVID-19 cases effectively.

To address the COVID-19 crisis, leadership in health care facilities must develop and work from a co-ordinated plan that outlines key leadership roles and clarifies delegation of responsibilities within the leadership structure.

External support to this leadership, must emphasise and elevate concern about safe working conditions and a commitment to the health of all who enter the facility as staff, patients or members of the public.

Emphasis must be placed on providing the safest possible workspaces by delivering the key learning necessary for all to respond safely and effectively. The resources and curricula necessary to achieve this already exist in various guidelines. *These guidelines must be placed on a central portal and be readily accessible via smart phone apps. The guidelines should be standardized across the country, and across the public and state sector.* Existing guidelines on Infection Prevention and Control (IPC) complement the addenda necessary for COVID-19 IPC.¹¹

What then follows is the need to simply and urgently translate this into habituated and consistent practice.

In order to remain fully effective, functional and committed, personnel need reassurance that their health and wellbeing is a priority, and this principle applies to all others who enter the facility.

Clear and decisive communication is vital and should focus on:

- Concerns about personnel safety and wellbeing and teambuilding;

¹¹ Department of Health. Draft Practical Manual for Implementation of the National Infection Prevention and Control Strategic Framework. 2020. Pretoria, DOH.

- IPC measures implemented in conjunction with responsibility and accountability of all staff. IPC must be led by a dedicated team who review and implement measures on an ongoing basis.
- The importance of collegial support and a spirit of commitment to a common purpose to beat COVID-19.

Vigilance is needed beyond the health care facility

Outbreaks in hospitals have potential to directly impact communities. Attention is needed to identify and adopt preventive measures beyond the facility – for example, when staff return home to families and the practices they adopt in their home settings. Families of these personnel also need education and guidance supported by sound communication. There appear to be gaps along this continuum. (Measures to address these concerns are described further below).

2. UNIVERSAL MANDATORY MASKING, PHYSICAL DISTANCING AND HAND HYGIENE

There are potentially 3 types of patients in a hospital:

- those positive for SARS-CoV-2
- those negative for SARS-CoV-2
- Patients Under Investigation (PUI)

Those who are PUI should ideally be separated from the other two categories until the result is confirmed, this could take 24-48 hours. Each category of patient carries a different risk to HCWs caring for them.

Universal mandatory masking

The risks of respiratory transmission must be prioritized through ***universal and consistent masking; physical distancing; and hand hygiene.***

Due to pre-symptomatic/asymptomatic characteristics of COVID-19, every person within the health care environment must be considered a potential carrier of SARS-CoV-2 – the virus that leads to COVID-19 – or at risk of SARS-CoV-2 infection. Every person who enters the facility poses a risk for SARS-CoV-2 transmission irrespective of any apparent symptoms.

Every person in a health care environment MUST wear a face mask. Masks used will range from cloth face masks to surgical face masks to N95 respirators and higher depending on potential exposure and other specific guidelines.

All potential patients and visitors to the hospital must be made aware that no person can enter the facility without a face mask.

The South African National Fabric Face Mask Guidelines were issued on 10 April in a context where there was already a rapid growth in the production of homemade face masks. This response continues. There is also a rapidly growing trend of factory repurposing to produce cloth face masks. Along with *growing public conscientisation*, this process supports the increasing availability and use of cloth face masks for all South Africans.

Mask making groups are already considering the needs of health care facilities and are making themselves available as partners in support of safe health care provision.

Formalising these partnerships will assist in the provision of cloth face masks to any Health Care personnel NOT involved in patient care, patients (where applicable) and visitors.

Surgical face masks, respirators and PPE must remain a dedicated resource for frontline health care workers, including ensuring general protection from SARS-CoV-2 transmission in any part of the facility as well as providing PPE to a level that is appropriate when exposed to COVID-19 patients. It may also be relevant to supply health care workers with reusable cloth masks for use when they are outside the health care facility and for their families. It must be noted that facemasks must not be used for toddlers and infants as they pose a risk to adequate airflow.

A study of COVID-19 cases in the United States over an eight-week period found 1.7% of infections were among children <18 years. It was noted that children might not have fever or cough symptoms to the same extent as adults. While most cases were not severe, hospitalization was most common for paediatric patients <1 and children with underlying conditions.¹² Children are largely asymptomatic but may spread SARS-CoV-2. Provision of health care to children has different dimensions relating to proximity when feeding and

¹² CDC. COVID-19 in children, United States, February 12-April 2. MMWR. April 10, 2020 / 69(14);422–426. <https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm>

bathing, administration of medication, inadvertent and missed aerosol generation when doing routine procedures, and the inability of children to implement hygiene measures or practice physical distancing.

Physical distancing

Physical distancing – which is a subset of broader social distancing measures – requires adherence to a recommended spacing of at least 1.5-2m between individuals. The concept aims to reduce immediate contact exposure and works well in open air spaces. In enclosed spaces where space is a premium, or when work in close proximity is largely unavoidable as is required when delivering health care, physical distancing becomes less possible.

In confined spaces the circulated air and duration of exposure contributes to transmission risk and this requires heightened consideration. Crowding risk in offices, at workstations, in meeting rooms, out-patient's clinics, wards, dining areas, and changing rooms may increase the risk of transmission even where physical distancing is employed. This environment results in a decreased awareness of risks, and the inattention creates an environment within which infection can spread. HCWs should be discouraged from undertaking unnecessary social engagements.

- In as much as we speak on physical distancing for the general public, in healthcare facilities we should consider the effect of crowding risk, shared airspace, circulation and purification of air spaces and surface contamination and spread.
- HCW should be provided access to cubicles for washing and dressing, separate lockers for clean and contaminated clothing and sterilisation of any shared space before and after use.

Simply adopting physical distancing without the consideration of the above places the HCW at risk

As an aside the points above can be applied in any crowded areas including mines; prisons; factories and retailers which are all at increased risk. On 25 April, the Department of Correctional Services reported 118 confirmed cases of COVID-19 amongst offenders and

officials¹³. There have been several reports of confirmed cases amongst food manufacturing and retail employees. The Western Cape Provincial government has warned of an emergent pattern of local transmission amongst supermarket workers.¹⁴

Hand hygiene

From European Union guidelines:

- Prioritise rigorous hand-washing practices using water and soap; ensure access to hand-washing facilities.
- If alcohol-based hand rub is not available in sufficient quantities, the highest priority is at the point-of-care, with priority given to areas with confirmed cases.
- Individuals should each be assigned a supply of alcohol-based hand sanitiser to be kept on person, as it remains challenging to maintain a general ward / clinic supply.
- If sufficient stocks are available, (automatic) hand sanitiser dispensers should be placed in common areas with high footfall outside of designated COVID-19 areas.

3. AGGRESSIVE AEROLISED VIRAL PARTICLE LOAD REDUCTION WITHIN FACILITIES

Respiratory transmission is the primary mode of transmission of SARS-CoV-2. Apart from the early phase of infection, viral shedding occurs along the continuum of disease which includes pre-symptomatic, asymptomatic, symptomatic and post-symptomatic phases.

Respiratory droplets and aerosolized viral particles are expelled through respiratory mechanisms during breathing, talking, shouting, singing, coughing and sneezing. The combination of the duration of any of these activities, and their relative force of expiration determines the extent to which droplets and aerosols are released. While heavier respiratory droplets may fall on surrounding surfaces, aerosolized particles may float in the air for varying periods of time, depending on environmental conditions. Studies demonstrate that distances travelled by droplets and particles through mechanisms such as

¹³ <https://www.news24.com/SouthAfrica/News/awaiting-trial-prisoner-tests-positive-for-COVID-19-at-tshwane-prison-20200425>

¹⁴ <https://www.news24.com/SouthAfrica/News/COVID-19-outbreaks-at-supermarkets-a-concern-for-western-cape-government-20200416>

talking, coughing and sneezing exceed the typical physical distancing guidance of >1.5m including well over 2m.^{15 16}

Indoor environments pose higher levels of risk than outdoor areas where ventilation is free flowing. **Improving facility-level ventilation is a key preventive measure.**

There needs to be a high level of awareness of the concept of ‘viral dose’ and viral shedding among staff throughout the health care facility.¹⁷ The higher the initial dose of viral particles, the higher the likelihood is of a more severe course of infection.

Face masks as source control measures, mitigate this risk, as do other PPE for prevention of exposure. **But this only works if people are consistent and use PPE correctly.** The requirement that needs to be ingrained is: Masks on, by everyone, always. And in COVID-19 wards, where exposure exists through multiple routes, levels of vigilance, quality of PPE, hand hygiene and all other in-ward practices, as well as physical movement out of exposed areas, needs to meet the highest standards.

The following observations by virology specialists are worth noting:

- *An infection can start with just a small number of Particles (the ‘dose’). The actual minimum number varies between different viruses and we don’t yet know what that ‘minimum infectious dose’ is for COVID-19, but we might presume it’s around a hundred virus particles.... We must be more concerned about situations where somebody receives a massive dose of the virus – particularly through inhalation. Under such circumstances the virus receives a massive jump start, leading to a massive innate immune response, which will struggle to control the virus to allow time for acquired immunity to kick-in while at the same time leading to considerable inflammation and a cytokine storm. In the COVID-19 clinic, the purpose of PPE is to prevent such large exposures leading to high dose infection. Situations we should be concerned about are potential high dose exposure of clinical staff conducting procedures on patients who are not known to be infected. Dr Michael Skinner, Reader in Virology, Imperial College London.*

¹⁵ Bahl P, Doolan C, de Silva C, Chughtai AA, Bourouiba L, MacIntyre CR. Airborne or droplet precautions for health workers treating COVID-19?. The Journal of Infectious Diseases. 2020 Apr 16.

¹⁶ Bourouiba L. Turbulent gas clouds and respiratory pathogen emissions: potential implications for reducing transmission of COVID-19. Jama. 2020 Mar 26

¹⁷ <https://www.sciencemediacentre.org/expert-reaction-to-questions-about-COVID-19-and-viral-load/>

- *We know that the likelihood of virus transmission increases with duration and frequency of exposure of an uninfected individual with someone infected with the virus.* Prof Jonathan Ball, Professor of Molecular Virology, University of Nottingham:
- *On the basis of previous work on SARS and MERS coronaviruses, we know that exposure to higher doses are associated with a worse outcome and this may be likely in the case of COVID-19 as well. This means that health care workers that care for COVID-19 patients are at a particularly high risk as they are more likely to be exposed to a higher number of viral particles, particularly when there is a lack of personal protective equipment (PPE) as is reported.* Professor Willem van Schaik, Professor in Microbiology and Infection at the University of Birmingham.
- *All in all, it is crucial for to limit all possible exposures to COVID-19, whether these are from highly symptomatic individuals coughing up large quantities of virus or to asymptomatic individuals shedding small quantities. And if we are feeling unwell, we need to observe strict self-isolation measures to limit our chance of infecting others.* Dr Edward Parker, Research Fellow in Systems Biology at the London School of Hygiene and Tropical Medicine

Considering the above key points aerolised viral load and surface viral load may potentially trigger reinfection and or a more serious infection. The following should be considered with urgency:

- Patients to be managed in isolation or in pods and not clustered together with open transmission
- Ventilation system adequacy at all facilities should be reviewed including service records and replacement of filters
- All COVID-19 ward patients should be housed in areas where extraction ventilation systems are effective
- Facilities need to review their air-conditioning systems, especially in multi-block facilities, and assess whether there is cross-over of circulation from COVID-19 wards to other areas.

- Sampling and screening of all wards should be conducted routinely to ensure that the ventilation systems are adequate
- In each environment, there is a hierarchy of controls according to health and safety regulations. Particular attention needs to be focused on this.
- The first control is elimination, which is not possible in COVID-19.
- The second control is engineering controls, i.e. air filters, negative pressure ventilation, and physical barriers including masks, plastic visors, etc.
- The third level is administrative controls including minimising exposure of entire teams, rotation of HCW on duty where possible, sick stay home, shift work changes, training on infection control practices, safe work practices, and lastly PPE

See Appendix 1 for considerations regarding facility buildings.

4. SCREENING AND TESTING

Screening and testing should be part of a comprehensive medical surveillance programme overseen by an occupational medical practitioner. The aim of the programme is to detect early signs of work-related illness, in this case COVID-19.

Although this is usually a secondary prevention strategy, the nature of COVID-19 and its risk to HCW, demands that a medical surveillance programme be prioritised at the same level as the hierarchy of controls as listed in the Hazardous Biological Agents Regulations.

What is the value of screening hospital staff?

Is there a benefit for screening all hospital staff? What should be considered? Could we use a risk-based screening or sampling methodology?

The following screening should be considered in all environments:

- **Level 1-** Self-screening- personally evaluate one's own health status.
 - > The responsibility here lies with the individual and this is possibly not ideal. It requires individual responsibility, consistency, and should be part of duty of care to oneself and to others.
 - > It may take the form of self-monitoring or self-monitoring with delegated supervision:

a) Am I feeling well, or do I have any flu like symptoms? b) Do I have a fever? (Should I be testing myself and my family daily?)

- **Level 2-** General screening at place of work. a. Daily symptom checks (utilize screening record sheets) and twice daily temperature
- **Level 3** - PCR screening. Currently there are no rapid tests for early diagnosis. It is our belief that one should have a baseline screening of ALL staff at one time. Thereafter testing can be risk based.
 - > *General staff:* There is no indication for random screening of all persons without justification.
 - > *Targeted screening:* i. High risk HCW e.g. ICU, COVID-19 wards could be tested every 7 days; ii. Medium risk e.g. non-COVID-19 wards could be tested every 2 weeks; iii. Low risk e.g. administrative personnel tested if develop symptoms. iv. Given the severe shortage of HCW in South Africa, and the access to gene-expert testing, the costs of more frequent testing in the short-term, needs to be considered against the long-term costs of disability or mortality of HCW due to COVID -19. Where PCR costs or reagent availability are limiting, we may consider a sampling methodology to be employed with more frequent testing in high risk units and less frequent in lower risk wards.
 - > Rotational screening in non-COVID-19 wards and amongst non-COVID-19 staff. This would aim to ascertain degree of exposure outside of the high risk and medium risk areas. Similar to community testing, it would inform the discussion regarding higher rates of exposure within healthcare environments. It would also serve to provide a secondary measure of whether the controls in the hierarchy of standards are succeeding.
- **Level 4-** The necessity for Hygiene surveys (air sampling) by an Approved Inspection Authority (AIA): Touch points in high risk areas and additional points in lower risk non Covid-19 wards should be swabbed and tested. This is considered a critical measure to evaluate routes of viral particle migration and may be indicative of the adequacy of sterilisation; purification; and people or surface spread.
- The exact areas to be tested will be determined by the Approved Inspection Authority (AIA), health and safety team and Occupational Health Practitioner. The results will

identify the extent of contamination and will guide you on type and frequency of decontamination.

- **Level 5.** Registry creation for the collection of information of health care worker exposure, including outcomes, co-morbidities, possible areas of exposure, access to PPE, as well as institutional control.

5. INSTITUTIONAL MANAGEMENT OF HCW

It is imperative that there are daily briefings from management regarding the situation within the health facility as well as at district and provincial level. Absence of such briefings creates uncertainty, distrust, fear and anxiety, and results in disempowered HCW.

There is concern regarding the reports of the ease with which the transmission of COVID-19 seems to occur. This virus exhibits characteristics of TB; influenza; and legionella. There are numerous articles which speak to the release of viable aerolised and surface concentrations of SARS-CoV-2 particles within COVID-19 treatment wards. As noted above – expelled respiratory droplets and particles occur on a continuum. Any expiratory action from as little as talking to as much as sneezing includes the release of respiratory droplets and aerosolized SARS-CoV-2 particles. In studies of health care settings, virus particles are found to exist on every surface including bed rails, door handles, sleeves of healthcare workers, external harder surfaces of PPE, on floors, on the soles of shoes of health care workers, among other surfaces. HCW moving from COVID-19 wards where surface and aerosol exposure are high, risk transferring viral particles to other parts of the facility unless adequate transitioning measures are followed. Safe keeping and disposal of exposed PPE and other items must be addressed.

The following suggestions should be considered for all facilities and may be paramount within the next few weeks as we prepare for the post lock down surge. Apart from universal masking:

4. A risk assessment should be performed to identify the hazards/hazardous activities and gaps that can be filled by mitigating the risk using the hierarchy of controls.

5. Hospitals should have a detailed plan on the location of their COVID-19 ward and the movement of all patients and staff in the facilities should be mapped and restricted. Where possible, patient screening and testing should precede an admission for an elective procedure or during inter-hospital transfers. Where pre-emptive screening is not possible, patients should be screened on site prior to admissions and consideration should be given to a holding area where non-COVID suspected patients wait prior to admission.
6. There should be an itemized process separation between clinical and administrative and any non-essential process should be conducted outside of the COVID-19 ward.
7. All staff should follow a wash-on, wash-off process prior to entering the ward and on leaving the ward, including the provision of two lockers for clean and soiled laundry.
8. Shoe bins, shoe covers, or chemical floor trays should be available to clean shoes when leaving the COVID-19 ward to reduce the risk of viral transmission
9. Ventilation - the presence of aerosolised viral particles is an ongoing concern. In the interim cohorting of COVID-19 patients should be reduced and patients should be separated by Perspex or other boxes with adequate extraction ventilation. Until further evidence is available all patients should be managed independently as the reinfection risk through cohorting cannot be ascertained. If patients cannot not be separated, then the least would be to restrict airspace. The Texan helmet and similar devices have demonstrated benefit, and this may not have been directly from the oxygen concentration but may also have resulted in cleansed viral free air.
10. Attention to regular sanitization – especially of shared spaces and equipment including disinfection of work surfaces, computers, keyboards and computer mice.
11. Adequacy of all hospital ventilation and air-conditioning systems is critical. All hospitals and any workspace environment should consider the adequacy of their ventilation system and air-conditioning systems. All facilities should demonstrate service records and replacement of HEPA or relevant filters meeting the prescribed quality regulator. All facilities should engage in routine bio-surveillance and document the concentrations of the virus in both COVID-19 and non COVID-19 wards. There is a concern that the failure

of controls and potentially the inadequacy of ventilation may have contributed to the increased the exposure risk for HCW and also personnel in other settings such as retail outlets. The further evaluation of the air quality and effectiveness of ventilation system is therefore a recognized priority for all health care facilities including hospitals and clinics.

12. Safety of HCW teams. Management needs to support the restructuring of the way teams function to limit exposures of entire teams within individual disciplines. This must be recognized as a necessary strategy to mitigate fallout of numerous HCW due to unnecessary exposure. Staff over 65-years of age or those with underlying medical conditions should be re-allocated to non-COVID-19 areas or given administrative duties to avoid potentially severe COVID-19.
13. Institutions should facilitate access to video conferencing video platforms to be used even within facilities, thus decreasing the need for close contact during meetings.
14. Psychosocial support is paramount given the fear, uncertainty and immense stress that HCW are under. Regular debriefings need to be planned and facilitated to ensure the mental health of HCW is supported. HCW would no doubt be experiencing moral injury, unable to do what they would usually be able to do, and this results in accelerated burnout.
15. Dedicated transport arrangements for those using public transport. Urgent consideration should be given to arranging dedicated public transport for HCW, which would decrease the potential for cross -transmission. This should be discussed with municipalities. This has been the practice in Wuhan, and in some areas of the United Kingdom National Health System.
16. Provision of appropriate self-isolation facilities for staff who are unable to self-isolate within their homes is the responsibility of the HC institution. These facilities must be appropriate and provide a comforting environment during the stressful period of self-isolation. The HCW should not incur any costs and there should be no stigmatization of HCW in self isolation.

The following principles apply to PPE and are adapted from the WHO guidelines.¹⁸

- Administrative controls include ensuring the availability of resources for infection prevention and control measures, such as appropriate infrastructure, the development of clear infection prevention and control policies, facilitated access to laboratory testing, appropriate triage and placement of patients, adequate staff-to-patient ratios and training of staff.
- Environmental and engineering controls aim at reducing the spread of pathogens and reducing the contamination of surfaces and inanimate objects. They include providing adequate space to allow **physical distance of at least 1 m, when universally masked**, to be maintained between patients and between patients and healthcare workers and ensuring the availability of well-ventilated isolation rooms for patients with suspected or confirmed COVID-19.
- Address the supply chain for PPE. Where conventional suppliers are not able to provide sufficient quantities, explore the possibility of factory repurposing or sourcing devices that can be adapted to serve as PPE.

The key takeaway from this document are: 1) Assess current facilities' capabilities for creation of adequate isolation rooms or areas, identifying potential areas that could be converted effectively with minimum modifications; 2) Carry out through a desktop planning exercise using recent hospital plans. Focus on existing wards, theatres or catheterisation labs, including prep and scrub areas; 3) Avoid any through routes for non-COVID-19 traffic; 4) Consider logistical flows of clean and dirty waste; 5) Maintain fire evacuation routes; 6) Special environmental controls, such as negative pressure isolation rooms, are not necessary to prevent the transmission of SARS-CoV-2. However, in the early stages and in high-risk settings, patients with suspected or confirmed COVID-19 or patients under investigation (PUI) may be isolated in negative-pressure rooms.

¹⁸ WHO. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPPE_use-2020.1-eng.pdf

6. INDIVIDUAL-LEVEL MEASURES FOR HCW

Currently, every HCW faces their own individual challenges. Usual support structures are probably unavailable. The sheer scale of what might occur remains clear. At the same time, the normal has been completely disrupted.

A critical question is: Who do I want to be during the COVID-19 pandemic? Do I want to remain in a fear zone? Do I want to be in a learning zone? Can I move into a growth zone? Where is my centre of control?

There are several steps HCW can take to mitigate personal risk including:

- Work safely – ensuring correct and consistent use of PPE. If there is no PPE, do not place yourself at risk
- Educate yourself, and be familiar with safe management of your PPE
- Know and practice the correct methods for donning and doffing PPE
- Be clear what the process is especially when re-using masks
- When dressing for work – use scrubs, no or minimum jewellery, tie your hair back, keep fingernails short and do not use nail varnish
- Keep bags to a minimum, and switch to paper bags for food
- When leaving the hospital change into another set of clothes. Ensure that your scrubs are placed in a plastic bag.
- If you do not change at work, then ensure that you have a routine to prevent contamination at home. This may involve having a designated pathway into your home, removing your clothes in an outer room or before entering your home if possible, having a shower immediately, and washing your scrubs
- Ensure your phone is sanitized using the appropriate care guide. Place your cell phone in a sealed plastic bag as it can carry the virus on its surface.
- Your stethoscope should be sanitized and should remain at work
- Sanitise your ID badge, glasses
- Car keys etc must be disinfected too.

- Have a dedicated pair of work shoes, and change into another pair before entering your home
- Place your clothing / scrubs immediately into the wash when returning home
- Wash your lunch containers / bottles separately – do not leave them with the general washing
- Focus on some self-care activities for at least an hour a day
- Ensure you have adequate restful sleep, meaningful interactions with your loved ones, and focus on good nutrition
- Take additional supplements -including Vit C, Vit D, Vit B and Zinc during this period
- Do not place colleagues and family at risk by working at multiple facilities without adhering to contact exposure and NICD guidelines. In days to come all HCWs will have had a Covid-19 contact, and hence it is imperative that the staff and patients are confined. Each HCW must reflect on their own reasons for working and make sacrifices whether it be financial or risk losing potential clients and contract work through limiting exposure.

7. MANAGEMENT OF PATIENTS

Physical distancing and universal masking

Compassionate medicine is required more than ever before. With the advent of COVID-19 patients and HCW are entering an environment that is potentially dangerous with less control than they would have had previously. It is imperative that communication and compassion remain at the forefront of all interactions.

With the necessary requirement for masks and physical distancing, the practice of medicine becomes more difficult, as these are barriers to effective communication. This needs to be recognized, and requires more emphasis on maintaining on clear, calm and proper communication.

The following would improve patient and HCW interactions within facilities:

- Clear communication with patients detailing what they should expect when entering and being in health care facility.
- All patients should be screened with questionnaires, temperature checks, contact history and if they suspect they have the symptoms, they should call before visiting the doctor. In the public sector this may be difficult. Stringent screening measures should be in place to mitigate these risks
- All patients should be provided with appropriate masks. Facilities should either provide these or liaise with local mask-making groups to assist with the provision of cloth face masks. Surgical masks should be reserved for patients suspected of COVID-19.
- All visitors must wear masks. This visiting policy requirement should be made clear and regulated with compassion. Special provision should be made for visits for critically ill and dying COVID-19 negative patients, as well as for caregivers and parents of paediatric admissions
- Patients should be reminded of the need to follow physical distancing requirements. If community HCW are available, they should be redeployed to clinics to assist with maintaining physical distancing.

8. PRECAUTIONS HCW SHOULD TAKE TO PROTECT THEMSELVES AND THEIR FAMILY:

An understandable and justifiable fear among HCW is the exposure of family members to SARS-CoV-2. This is heightened when family includes the elderly persons and those with co-morbidities. To decrease the possibilities of such exposure, the following should be considered:¹⁹

- Always wear a face mask in the health care setting, even when talking to friends. Maintain physical distancing at mealtimes and speak softly to decrease aerosol generation

¹⁹ <https://doi.org/10.1093/cid/ciaa255>; The department of Employment and Labour, Workplace preparedness – COVID 19

- Always maintain fastidious hand hygiene. Ensure that this is done meticulously after each patient and one is thorough.
- Use full PPE as recommended in each ward/setting. If you feel unsafe, then bring this to the attention of your Management. The Occupational Health and Safety Act applies to you as well. Ensure you use PPE correctly, and wash your hands immediately if you touch the outside of the mask.
- Always wear a face mask in any outdoor area and especially on public transport
- Wear a mask at home if you have high exposure to COVID-19 patients or colleagues treating COVID-19 patients
- Disinfect hands before going home, and immediately when you reach home.
- Ensure you follow a strict routine to prevent your family being exposed to your clothing, bags, shoes, or food containers.
- Do not share any personal items like toothbrushes
- Do not share crockery and cutlery
- Preferably stay away from family members who are high risk: Elderly, cancer suffers, diabetics, hypertensives, immunocompromised, renal failure, pregnant etc
- Perform a daily symptom check and temperature check for all in the family

9. ADEQUACY OF CONTROLS AND INFECTION MANAGEMENT PRACTICES:

The current outbreaks in Health Facilities require keen interrogation to identify the fault lines and urgently implement measures to rectify them. This will not be achieved in a hostile and blaming environment. COVID-19 is unforgiving and effective management requires honesty and transparency by all personnel so that the lessons can be learned, and urgent changes can be implemented to the benefit of all. Some of the questions to be asked include:

- Where are the gaps in Infection Prevention control standards and procedures?
- Were IPC audits done regularly and documented?
- Were action plans in place and mitigation methods implemented?

- What were the reports on nosocomial infections and what actions were taken to limit it?

It is also necessary to consider whether the training for all HCW was adequate, implemented with sufficient intensity, re-enforced and adhered to consistently.

10. WILLINGNESS TO ACCEPT AND IMPROVE

In order to maintain a committed and able health care team: institutions and decision makers must demonstrate a keen ability to listen and a willingness to improve. They must accept that they cannot be the locus of control and function in a top-down hierarchy. They must demonstrate that they act in good faith and heed the requests by health care workers which include the following

- **To be heard** – their input and expertise as HCW must be recognised. As it stands, this is an area of great disconnect. This requires forums and feedback channels, to ensure that HCW are part of the decision-making process
- **To be protected** – they need the risk of acquiring the infection to be reduced for both themselves and their families. This requires adequate PPE, facilities for self-isolation, and access to testing as required.
- **To be prepared** – they require adequate training that leaves them empowered to provide quality care to their patients. Many will be working outside their areas of expertise, and this creates the possibilities for even greater risks and stress. There needs to be rapid and ongoing training, standardised across facilities, and accessible via the internet and on smart phone apps on data free platforms. There needs to be immediate access to experts to resolve any uncertainty.
- **To be supported** – they require acknowledgment that there are human limitations in what they are able to provide amidst an extreme environment, filled with uncertainty. Additional support for family needs must be taken into account. There is also support needed to ensure that healthy meals are available, as well as rest areas, and transportation. Psychosocial support is paramount, and should be delivered by webinars, focusing on self-care, anxiety, anger, fear and moral distress.

- **To be cared for** – they need to know that they will be cared for if they especially require quarantine. There needs to be clarity on what their rights are in terms of paid leave during quarantine, and other such occupational health matter

APPENDIX 1

Summary of practical measures for building services operation²⁰

- Secure ventilation of spaces with outdoor air
- Switch ventilation to nominal speed at least 2 hours before the building usage time and switch to lower speed 2 hours after the building usage time
- At nights and weekends, do not switch ventilation off, but keep systems running at lower speed
- Ensure regular airing with windows (even in mechanically ventilated buildings)
- Keep toilet ventilation 24/7 in operation
- Avoid open windows in toilets to assure the right direction of ventilation
- Instruct building occupants to flush toilets with closed lid
- Switch air handling units with recirculation to 100% outdoor air
- Inspect heat recovery equipment to be sure that leakages are under control
- Switch fan coils either off or operate so that fans are continuously on
- Do not change heating, cooling and possible humidification setpoints
- Do not plan duct cleaning for this period
- Replace central outdoor air and extract air filters as usually, according to maintenance schedule
- Regular filter replacement and maintenance works shall be performed with common protective measures including respiratory protection

²⁰ REHVA COVID-19 guidance document, April 3, 2020. How to operate and use building services in order to prevent the spread of the coronavirus disease (COVID-19) virus (SARS-CoV-2) in workplaces.
https://www.rehva.eu/fileadmin/user_upload/REHVA_COVID-19_guidance_document_ver2_20200403_1.pdf