Research Article

Infection control practices of medical practitioners at a large urban public hospital in South Africa during the SARS-COV-2 Pandemic

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ABSTRACT

Background: Infection prevention and control (IPC) preparation and how it relates to the use and reuse of personal protective Equipment (PPE), as well as behavioural changes among doctors has been an area of interest for researchers since the Severe Acute Respiratory Syndrome and Middle East Respiratory Syndrome outbreaks. The aim of this study is to describe the role of IPC practices of doctors at a large urban public hospital in South Africa during the SARS-CoV-2 pandemic of 2020.

Methods: A cross-sectional survey was performed on doctors from the general medical and surgical disciplines of the hospital. All levels of staff were interviewed using an anonymous voluntary self-administered questionnaire administered over a 4-week period.

Results: We determined that the majority of the participants (87.5%) were involved in the care of COVID-19 patients. Internal Medicine participants were more likely to work in a respiratory ward compared to their surgical counterparts. Of the surveyed sample, 90.4% indicated that they received formal IPC training during the COVID-19 pandemic. Contrasting this, only half (52.9%) felt prepared to apply these principles when working with COVID-19 patients. Almost all respondents (90.0%) surveyed reported using PPE. Of the respondents using PPE, 94.4% were reusing their PPE. From the total sample population, 95.2% reported implementing behavioural changes.

Conclusion: Although the majority of doctors surveyed were involved in the care of COVID-19 patients, almost half did not feel prepared to deal with COVID-19 patients despite training being made available. The study also showed a disparity in behavioural changes by health professionals in the medical and surgical departments. The study highlights the importance of targeted ongoing IPC training across departments.

Key words: COVID-19, Infection prevention control, Personal protective equipment

INTRODUCTION

In December 2019, an outbreak of COVID-19, caused by the virus later identified as SARS-CoV 2, was described by the World Health Organisation (WHO). Latest guidelines describe three main transmission routes for COVID-19: droplet transmission, contact transmission, and aerosol transmission.(1)

To minimise the risk of nosocomial healthcare worker infection, Personal Protective Equipment (PPE) is advocated. The level of PPE worn by doctors depends on the relative risk of transmission of SARS-CoV 2, as determined by the nature of their work, as well as the duration and type of contact with patients. Guidance from the WHO states that the people most at risk of infection are those who are in close contact with a COVID-19 patient or those who care for COVID-19 patients.(2)

World Health Organisation preventative precautions for doctors managing patients with COVID-19 include using PPE appropriately, with training on donning, doffing and appropriate disposal of PPE. Appropriate PPE for doctors working directly with COVID-19 patients include gowns, gloves, medical masks, and eye protection (goggles or face shield). For aerosol-generating procedures (such as endotracheal intubation), the recommendations are respirators, eye protection, gloves, gowns and aprons if gowns are not fluid resistant.(3)
The overall effectiveness of protective measures recommended under “droplet precautions” during the Severe Acute Respiratory Syndrome (SARS) epidemic was investigated in a retrospective study of 241 non-infected and 13 infected hospital staff members who had documented exposure to SARS patients. The investigators found that 100% of staff fully practicing full protective measures did not acquire the infection, while all infected staff had omitted at least one of the prescribed measures.(4) A survey assessing the behaviour of health care workers in the Kingdom of Saudi Arabia during the Middle East Respiratory Syndrome outbreak suggested that self-reported infection control practices were not up to standard.(5)

Due to the constrained supply of PPE during the COVID-19 pandemic, methods of limited reuse needed to be implemented. The recommended guidelines based on current evidence include the reuse of the respirator mask rotationally through 72-hour cycles.(6)

The aim of this study was to describe current infection prevention and control (IPC) practices of medical professionals during the SARS-CoV-2 pandemic of 2020.

METHODS

A cross-sectional survey was performed on doctors from the general medical and surgical disciplines at Chris Hani Baragwanath Hospital (CHBAH) (a tertiary level hospital in Soweto, Johannesburg, South Africa). All levels of staff were interviewed using an anonymous voluntary self-administered questionnaire administered over a 4-week period (27 July 2020–23rd August 2020). Seniority of doctors was defined as follows: interns were doctors completing their 2 year internship program, medical officers were those doctors not in registrar training posts or recognised as consultants by the hospital, registrars were those doctors in formal training posts specialising within a department in the hospital, fellows were defined as training in a subspecialty having completed a general specialty and consultants were recognised as those specialists not currently in a further training post, operating at the most senior level in their department.

Parameters assessed in the study included: training in IPC practices, perceptions of preparedness and practices of doctors with regards to IPC, adherence to IPC practices and comparing IPC practices between medical practitioners working in the Internal Medicine versus the General Surgery departments. From this data, an association between IPC practices and level of seniority of medical practitioners was determined. Data obtained also aided in assessing gaps in knowledge and implementation of IPC principles.

After the questionnaire was completed, responses were entered onto an Excel spreadsheet which was converted to a database. Structured query language (SQL) was then used to interpret the data. Queries were then run to create tables that were represented graphically. Ethics clearance for the study was obtained from the University of the Witwatersrand Health Research Ethics Committee.

RESULTS

Demographics

The total number of eligible doctors at CHBAH within the Department of Internal Medicine was 152 and in the Department of General Surgery was 100. In total, data from 104 (41.3%) respondents were collected of which 45 (43.3%) were from the Department of Internal Medicine and 59 (56.7%) were from the Department of General Surgery. All participants answered all questions. The breakdown of seniority levels of doctors is represented below. (Table 1).

Most of the participants (87.5%) were involved in the care of COVID-19 patients. Participants surveyed from the Department of Internal Medicine were more likely to work in a respiratory ward (a higher risk ward where exposure to COVID-19 patients was more likely) compared to their surgical counterparts: with an odds ratio [(OR)=21; 95% confidence interval (CI) (5.89–74.82)].

Training and Preparation

Of the surveyed sample, 90.4% indicated that they had received in-service training provided by the hospital’s division of infectious diseases regarding IPC during the COVID-19 pandemic. However, only half of respondents (52.9%) felt adequately prepared to apply these principles when working with COVID-19 patients. Self-reported preparedness varied by rank, with 75% of consultants feeling prepared for the COVID-19 pandemic, whereas only 35.6% of interns felt that they were adequately prepared.

The types of IPC practices were determined, and IPC practices between doctors working in different departments at CHBAH were compared:

Screening of Staff (Table 2)

Participants were asked whether they were being screened for COVID-19 symptoms, which included self-monitoring and facility/department-based screening (e.g., temperature monitoring in the wards). Less than half (37.5%) of participants indicated that they were actively screening/
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being screened by the hospital for COVID-19 symptoms as they reported for duty. The respondents were twice as likely to be screened if they worked in the medical compared to the surgical department. [OR=2.08(1.24–6.37)]. The most common method of screening amongst participants was self-screening for symptoms followed by temperature reading upon entering wards. When comparing the different levels of staff, consultants actively screening for COVID-19 was 43.8%, registrars was 48.3%, medical officers was 41.7% and interns only 24.4%.

PPE Use

The majority (90%) of participants reported using PPE. The results were similar among different levels of medical personnel within departments. In the medical department only 72.2% used PPE and were the smallest proportion as a single subgroup.

Classes of PPE used (Fig 1) (listed from most to least frequently used) were: Medical department: eye protection (77.8%), gloves (68.9%), N95 respirators (64.4%), plastic aprons (55.6%), impermeable gowns (44.4%), and surgical masks (31.1%). Surgical department: eye protection (including visor and goggles of any form) and plastic aprons (100% respectively), N95 respirators and gloves (86.4% respectively), impermeable gowns (42.4%) and surgical masks (15.3%). Participants from surgical departments were more likely to use eye protection [OR=1.78 (0.69–4.60)] and more likely to use N-95 respirator masks [OR=2.01 (0.86–4.70)] compared to those in the medical department.

PPE Reuse

Most (94.4%) of the candidates who were using PPE, were reusing their PPE. The participants in the Surgery department were more likely to reuse their PPE than those in the Internal Medicine department [OR=1.97(0.49–7.87)]. The PPE reused by most participants in the surgical and medical departments was an N-95 Respirator mask (39.2% and 46.8% respectively of the total PPE reused). (Fig 2) Medical registrars were more likely to reuse their N-95 respirators than to reuse their eye protection gear, compared to their surgical counterparts [OR=2.72 (0.62–12.04)].

Behavioural Change

When asked whether participants were implementing behavioural changes to prevent infection with SARS-CoV 2, 95.2% reported implementing behavioural changes (95.6% in the Internal Medicine department and 94.9%
and service.(8) Also, more senior participants may have had previous training or exposure to IPC making them more confident in implementing these principles. The consultant group, however, was underrepresented, and thus no definitive conclusions could be drawn. The current study findings, however, suggests a greater need for senior healthcare member responsibility in the education and enforcement of IPC practices amongst junior colleagues.

Most participants indicated that during the study period they were implementing behavioural changes. This result resonates with a similar study which assessed HCW behaviour during the MERS epidemic.(5) It has also been shown that HCWs who have been adequately trained in IPC practices are more likely to practice IPC measures.(8) Our participants had reported good IPC knowledge and the majority were practising behavioural change. Participants in the medical disciplines were more likely to implement behavioural changes than those in the surgical departments. This finding could be attributed to overall stricter IPC practices among the medical departments at the time of the study.

Interestingly, almost two thirds of participants during the study period were not implementing screening/being screened for COVID-19 symptoms. This may have been due to administrative limitations during the early phase of the pandemic, when screening protocols were not yet uniformly implemented in the wards. Participants were twice as likely to be screened for COVID-19 if they worked in the medical department compared to the surgical department. This may have been related to the fact that as the hospital prepared for the COVID-19 pandemic, resources were directed predominantly to the medical wards as they were the primary caregivers for these patients.

Most of our participants reported using PPE during the pandemic and most of them were using the WHO prescribed PPE.(3) Participants from surgical departments were almost twice as likely to use eye protection and N-95 respirator masks compared to those in medicine. This may be due to a propensity among surgery participants for the use of eye protection prior to the onset of the COVID-19 pandemic, as they have higher occupational exposure to blood and body fluids in their daily duties, compared to their medical counterparts. At the time of the pandemic, N-95 respirator masks were only recommended for high-risk aerosolising procedures,(3) and medical masks for medical personnel working with COVID-19 patients.(3) Medical participants may have been following these guidelines more strictly, as a result of greater IPC coverage within the department at the time of the study, explaining the lower prevalence of N-95 respirator mask use among medical participants.

The reuse of PPE was described by the majority of participants regarding N95 masks. A limitation of the questionnaire was that it did not assess exactly how the PPE was being reused (e.g. 72 hour cycles or reused daily) and the period of reuse. The reuse of PPE at the time of the study is explained by guidance from the hospital IPC team.
at the time of the survey. Reuse of N-95 masks was advocated due to uncertainty surrounding the ongoing availability of PPE.

A strength of this study was that the majority of the participants were involved in the care of COVID-19 patients. Therefore, the questions that were posed were relevant to their immediate practice. A limitation of this study was that doctors involved in the study were not assessed for the acquisition of COVID-19, and thus no correlation between IPC practise and COVID-19 infection could be drawn. Another weakness of this study was that the non-probability sampling methods (convenience sampling) used for this study may have resulted in less accurate and rigorous sampling. Because of the study design (questionnaire), the study was susceptible to recall bias and non-response bias: the characteristics of non-responders differed from responders in level of seniority and there were more intern responders than consultants. The use of questionnaires to reach our sample group could have also resulted in lower response rates as participants had to voluntarily complete and submit questionnaires during work hours.

CONCLUSION
This study contributes to the knowledge of IPC practices among doctors in South Africa during the COVID-19 pandemic and highlights areas of improvement that can be addressed in future policy and local protocol development. We suggest making compulsory formalised IPC training across all departments, with a focus on interactive discussion with doctors and other healthcare workers and objectively assess baseline knowledge of staff both before and after IPC training. This would assist the IPC team in assessing whether training given was adequate, and to inform ongoing training strategies. We recommend identifying IPC champions in wards who will continue to reinforce IPC principles as well as continue an open dialogue with heads of departments and hospital management regarding the concerns of doctors and suggestions as to how they may assist them in feeling more prepared to handle COVID-19 or any future pandemics. There should also be more uniform and widespread active screening of healthcare workers. These policies should specifically target junior staff members, as they are at higher risk for poor IPC practices due to lack of previous experience and IPC training.

Conflict of Interest: None
Funding sources: None

REFERENCES