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Perceptions of healthcare workers in high-risk areas of a Singapore hospital during COVID-19: a cross-sectional study

Phui-Sze Angie Au-Yong^{1,2}, MBBS, MMed, Wee-Ming Peh³, MRCP, EDIC,
Frederick Hong-Xiang Koh⁴, MRCSEd, FRCSEd, Li-Ming Teo^{1,2}, MBBS, MMed,
Siok-Peng Ng⁴, Alina Li-Na Tan⁵, Aven Shan-Hua Ng⁵,
Min-Hoe Chew⁴, MRCSEd, FRCSEd

¹Division of Anaesthesiology and Perioperative Medicine, Singapore General Hospital,
²Department of Anaesthesia, ³Department of Medicine and Intensive Care, ⁴Department of Surgery,
⁵Operating Theatre Services, Division of Nursing, Sengkang General Hospital, Singapore

Correspondence: Dr Phui-Sze Angie Au-Yong, Associate Consultant, Department of Anaesthesia, Sengkang General Hospital, 110 Sengkang E Way Singapore 544886.
Angie.au.yong.p.s@singhealth.com.sg

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ABSTRACT

Introduction: There is worldwide concern over the psycho-emotional impact of COVID-19 on healthcare workers (HCWs). This study aimed to elicit HCWs' perceptions of the adequacy of protective measures in high-risk clinical areas and the factors associated with these perceptions.

Methods: This was a cross-sectional study conducted in April 2020. An anonymous electronic survey was sent via email to operating theatre (OT) and intensive care unit (ICU) staff of Sengkang General Hospital, Singapore.

Results: Of the 358 eligible participants, 292 (81.6%) responded to the survey. 93.2% of the participants felt that precautionary measures at work were sufficient and 94.9% acknowledged that adequate training was provided. More than 60% of the participants opined that their chances of contracting COVID-19 were moderate to high. Female gender, nursing occupation and duration of service < 10 years were significantly associated with increased fear of contracting COVID-19, less control over occupational exposure and lower perceived need to care for COVID-19 patients. Having young children at home did not significantly affect these perceptions. The most important ICU precautions were availability of personal protective equipment outside the rooms of COVID-19 positive patients (95.3%) and having visitor restrictions (95.3%). The most important OT measures were having a dedicated OT for COVID-19 positive patients (91.2%) and having simulation as part of protocol familiarisation (91.7%).

Conclusion: Overall, there was high confidence in the adequacy of COVID-19 protective measures to prevent healthcare transmission in Singapore. The pandemic had a lower degree of psycho-emotional impact on HCWs here as compared to other countries.

Keywords: COVID-19, healthcare workers, pandemic, personal protective equipment, psychological

INTRODUCTION

The COVID-19 outbreak was designated as a public health emergency by the World Health Organization on 11 March 2020.⁽¹⁾ The number of cases in Singapore had reached over 50,000 at the time of this writing. The safety of healthcare workers (HCWs) is paramount, as many HCWs had contracted the disease and perished on the international frontlines. Although the transmission rate among HCWs in Singapore is low, it is still a potentially fatal occupational hazard. Many precautionary measures for infection control⁽²⁾ has been derived from lessons learnt during the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003, but the infectivity of COVID-19 has far exceeded that of SARS, as infected persons can be pre-symptomatic for up to two weeks, leading to the inadequacy of the usual screening measures.⁽³⁾ There is worldwide concern over the psycho-emotional impact on HCWs.^(4,5) Previous post-SARS studies^(6,7) have shown that many HCWs suffered a host of psycho-emotional problems, such as anxiety and depression. This was compounded by problems like shortage of personal protective equipment (PPE) in some countries.⁽⁸⁾ In a large survey of frontline National Health Service doctors, the British Medical Association found that only 31.3% felt fully protected from COVID-19 in their workplaces, and 28.5% felt depressed, anxious, stressed or burnt out, which was made worse during this pandemic.⁽⁹⁾

During the COVID-19 pandemic, Sengkang General Hospital segregated multiple wards and an isolated ICU for known or suspected COVID-19 cases. In the operating theatre (OT) complex (inclusive of the endoscopy centre) and intensive care unit (ICU), multiple precautionary measures were instituted to protect HCWs from healthcare-associated COVID-19 transmission.⁽¹⁰⁻¹³⁾ The SARS-CoV-2 virus is transmitted via droplets, and these areas have the highest number of aerosol-generating procedures (AGPs) in the whole hospital. Some of these measures included segregating doctors and nurses into teams and not allowing these teams to mingle with HCWs who were taking care of non-COVID-19 patients. Training was

provided for the handling of PPE,⁽¹⁴⁾ and simulation training was used to prepare for various emergency situations. Strict personal hygiene practices included regular use of alcohol hand rub, handwashing, donning of surgical face mask in clinical areas, use of N95 mask or powered air-purifying respirators (PAPR) if AGPs were performed, and wearing of eye goggles to prevent infection via conjunctiva.

The ICU specifically instituted precautionary measures which included limiting the number of HCWs in a room, cohorting suspected/known COVID-19 patients to a special part of the ICU, having relevant PPE placed outside these rooms, supervised PPE donning by senior nurses, and regular infection control audits. There were also designated ICU entrances and exits, and a restriction of visitors to the ICU to control human traffic. Portable medical equipment, such as ultrasound machines were segregated between COVID-19 and non-COVID-19 patients. Staff welfare provided for standardised work clothes with laundry service and catered meals so that working staff did not have to be exposed to public areas.

Measures were also instituted by the OT complex to minimise perioperative risk of COVID-19 transmission. An isolation OT was designated for operating on COVID-19 patients only, and a perioperative protocol was instituted to ensure minimal contact with other patients and HCWs – starting from the transport of patients from the ward to the OT, during surgery and, finally, the postoperative transfer back to the ward. For all routine elective and emergency OTs, turnover time was increased from the usual 5–10 minutes to 30 minutes to allow time for meticulous disinfection. During airway manipulation by the anaesthetic team, all other staff were not allowed to be present in the OT until after a lockdown of 5 minutes post-intubation, to allow for adequate air exchange in the OT.

With the increased preparedness and strict infection control measures instituted, learned from Singapore's experience with SARS and current COVID-19, the degree of confidence of HCWs in the adequacy of these protective measures is yet to be fully explored, as the

magnitude of public fear and anxiety toward contracting COVID-19 is unprecedented. A local study of 500 HCWs conducted⁽¹⁵⁾ from February to March 2020 showed that about one-tenth of HCWs screened positive for anxiety, depression, stress and post-traumatic stress disorder. This rate is lower than that reported in the published literature from previous disease outbreaks (e.g. SARS) and from the current COVID-19 outbreak in China.⁽¹⁶⁾ This may be related to the HCWs' level of confidence regarding protection at the workplace.

This cross-sectional, single-centre study done during the peak of the COVID-19 pandemic in Singapore aimed to elicit HCWs' perceptions about the adequacy of protective measures. We hypothesised that, with a higher perceived adequacy of protective measures, confidence levels among HCWs would be higher. The contribution of this study to the existing literature is its provision of an evaluation of a Singapore hospital's precautionary measure 'bundle'. If HCWs feel that this bundle is adequate for their protection, can it then be implemented rapidly when a similar situation occurs in future.

METHODS

Approval for the study was given by the SingHealth Institutional Review Board, Singapore (CIRB/2020/2221). This was a cross-sectional survey of all employees working in the OT complex (inclusive of the endoscopy centre) and ICU at Sengkang General Hospital, a large tertiary public hospital in Singapore, which was administered in the month of April 2020. The survey (Appendix 1) was developed based on previous SARS literature. Data collected included sociodemographic information of HCWs (7 items), perceptions toward PPE resources (7 items), OT- (7 items) or ICU-specific (11 items) logistical arrangements, training and education in precautionary measures (6 items), and psychological impact of COVID-19 (6 items). It took approximately 5–7 minutes to complete. The anonymous online survey was disseminated via work email. There was no relationship between the study team members and

participants, and no interviewer was required for the study. Participants were free to express their opinions in a comments section. Participation was voluntary and not compensated. Submission of the survey is an indication of consent for the use of data.

The obtained data was analysed using Microsoft Excel (Microsoft Corp, Redmond, WA, USA) and IBM SPSS Statistics version 25.0 (IBM Corp, Armonk, NY, USA). Descriptive analysis was applied to calculate frequencies with corresponding proportions. After univariate analysis was performed, subgroup analysis was performed for occupation type (doctor vs. nurses), gender (male vs. female) and years of experience (< 10 years vs. ≥ 10 years). This dichotomy was chosen to separate HCWs who had experienced the previous SARS and H1N1 outbreaks from those who did not. Subgroup analysis was performed using Pearson's chi-square test, and a p-value < 0.05 was selected as the threshold of significance. To aid in the analysis, responses were categorised into those that showed agreement ('somewhat agree'; 'agree'; 'strongly agree') and those that showed disagreement ('somewhat disagree'; 'disagree'; 'strongly disagree').

RESULTS

The overall response rate was 81.6% (292 of 358 eligible participants). As the study was voluntary, non-respondents were deemed to have not consented and the reasons were not explored. The majority of respondents were nurses (81.2%) and most worked in the OT (78.1%). The composition of the sociodemographic characteristics between staff in the OT and ICU was similar, as was the ratio of doctors to nurses. There was an almost equal proportion of single and married (46.9% vs. 52.4%) respondents. 38.0% of the respondents had children who were less than 18 years old. Only 14.7% of respondents had been in the healthcare profession for less than one year, and about 30% had more than ten years of experience. Table I shows the sociodemographic characteristics of the respondents.

Table I. Baseline sociodemographic characteristics of the respondents.

Characteristic	No. (%)		
	Overall (n = 292)	OT (n = 228)	ICU (n = 64)
Gender			
Female	227 (77.7)	178 (78.1)	49 (76.6)
Male	65 (22.3)	50 (21.9)	15 (23.4)
Age*	–	34 (28–38)	31 (28–35)
Ethnicity			
Chinese	151 (51.7)	119 (52.2)	32 (50)
Indian	24 (8.2)	20 (8.8)	4 (6)
Malay	40 (14.2)	31 (13.6)	9 (14)
Others	77 (27.3)	58 (25.4)	19 (30)
Marital status			
Single	137 (46.9)	105 (46.1)	32 (50)
Married	153 (52.4)	121 (53.1)	32 (50)
Divorced/separated	2 (0.7)	2 (0.9)	0 (0)
Has children < 18 yr	111 (38.0)	90 (39.5)	21 (32.8)
Occupation			
Doctor	49 (16.8)	37 (16.2)	12 (18.8)
Nurse	237 (81.2)	188 (82.5)	49 (76.6)
Allied health/administrative	6 (2.1)	3 (1.3)	3 (4.7)
Experience in job (yr)			
< 1	43 (14.7)	27 (11.8)	14 (21.9)
1–10	157 (53.8)	133 (58.3)	30 (46.9)
> 10	92 (31.5)	68 (29.8)	20 (31.2)

*Data presented as median (interquartile range). ICU: intensive care unit; OT: operating theatre

There was consensus among the respondents regarding PPE and hygiene measures – the majority of staff from the OT and ICU were confident of the measure that were put in place. With the exception of surgical face mask (< 80% of respondent agreed or strongly agreed that it was protective), more than 85% of the staff agreed or strongly agreed that they were confident that PPE would protect them from viral transmission (Fig. 1). 94.1% of respondents felt that clear policies and protocols had been instituted for HCWs to follow, with 94.5% agreeing that they had someone to turn to when they were unsure of the protocol. 94.9% felt that there was adequate training provided on the use of PPE. Overall, 93.2% of respondents felt that precautionary measures at the workplace were sufficient or more than sufficient. A higher proportion of nurses (12.0%), as compared to doctors (5.0%) expressed that the measures were inadequate.

Most ICU staff generally agreed with the measures taken by the hospital in the ICU. (Fig. 2). In particular, the top four measures that received the highest concurrence were: availability of essential PPE outside a COVID-19 positive or suspect patient's room (95.3%); restriction of visitors to the ICU (95.3%); segregation of portable medical equipment for use on COVID-19 patients to prevent cross-contamination (90.6%); and having a designated entrance and exit for the ICU (87.5%). The measure of limiting a maximum of three HCWs in the room received the most objection (35.9% of respondents from the ICU).

For respondents working in the OT, the top two most agreeable measures (Fig. 3) were: having a dedicated isolation OT for COVID-19 positive or suspect patients (91.2%); and having simulation as part of protocol familiarisation (91.7%). While there were no measures that the respondents particularly disagreed with, there was a higher proportion who chose to remain neutral regarding two measures: segregating staff into different functioning teams (23.2%); and increasing the OT turnover time to 30 minutes between cases (25.9%).

More than half of the respondents perceived that the chances of contracting COVID-19 because of their job were moderate (42.1%) to high (16.1%). While the majority (79.8%) reported being at least somewhat afraid of getting infected with the virus, 68.8% of them at least somewhat accepted the risk of getting infected as being part of the job and 76.7% at least somewhat disagreed that they should avoid caring for COVID-19 patients. Only 6.5% of respondents reported that they are actively looking for another job due to the COVID-19 pandemic (Fig. 4).

Female gender ($p = 0.022$) and being a nurse rather than a doctor ($p = 0.002$) were significantly associated with being more fearful of contracting COVID-19. Female gender ($p = 0.002$), duration of service < 10 years ($p = 0.029$) and the nursing occupation ($p = 0.04$) were also significantly associated with the perception that they should not be caring for COVID-19 patients. A significantly larger proportion of nurses, as compared to doctors, felt that they had

less control over whether they would contract COVID-19 ($p < 0.001$) and indicated that they were looking for another job ($p = 0.043$). There was no significant difference in perceptions between those who have young children and those without.

DISCUSSION

COVID-19 has wreaked havoc around the world, with many countries in lockdown. Experts in early hotspots of infection, such as China and South Korea, have warned that a second and third wave of the disease are potentially on the horizon and the fight to contain the pandemic may take a protracted course.^(17,18) With these possibilities in mind, it is important to continually get feedback from staff regarding the utility of precautionary measures. The present study has demonstrated that measures adopted by our hospital has instilled a high level of confidence among ground staff in high-risk patient care areas. This degree of confidence is far higher than those reported in the United Kingdom,⁽⁸⁾ possibly because Singapore did not actualise a shortage in PPE supply and had a much smaller percentage of ICU patients (0.09% of total COVID-19 cases). In addition, many avenues for mental health and psychosocial support have been made available in Singapore during COVID-19, and government schemes, such as the Public Health Preparedness Clinics, promoted primary care clinic response to public health emergencies.^(19,20)

However, compared to doctors, nurses are significantly more fearful of contracting COVID-19 and felt that they had less control over occupational hazards that lead to contracting COVID-19. A higher proportion of nurses also expressed that they should not be caring for COVID-19 patients. This could be multifactorial: inadequate dissemination of correct information regarding the hospital's situation; public fear and anxiety over the national lockdown; and loss of control of the spread of COVID-19 in other countries such as the United States of America. Further qualitative studies are needed to explore these potential reasons.

Interestingly, a service duration of less than ten years was also significantly associated with greater fear and less control – this experience threshold distinguishes HCWs who have worked through outbreaks of SARS in 2003 and H1N1 in 2009. More experienced HCWs may have increased confidence in the hospital's protective measures, as they had seen these infectious diseases being successfully controlled with the existing measures.

Nevertheless, having too many precautions could also result in compliance fatigue. An important role of this study is to identify less useful or redundant measures that could be modified or discarded. While some measures are almost universally agreed upon such as restricting the number of visitors, certain blanket measures are not as well received as others. For example, having a maximum of three HCWs in one ICU patient cubicle drew a 35% disagreement from the respondents. Practically, this could be counterproductive, especially if many patients with acute respiratory distress syndrome secondary to COVID-19 require proning. The weight and number of tubings and pumps on an intubated patient is also difficult to manage, and the equipment could potentially be in danger of dislodgement if manpower is insufficient. Therefore, while the intention behind physical distancing for infection control is relevant, it could, practically, hinder patient care.

Similarly in the OT, a significant number of respondents expressed a neutral stance toward a longer turnover time between cases. This may be due to information asymmetry between those advocating for infection control and those focusing on efficiency of OT utilisation. Additionally, it could reflect a differential perception among HCWs on the risk of asymptomatic transmission from elective patients coming from the community. This can be mitigated with better communication regarding the intentions behind certain measures.

Another salient result is the lowest relative confidence in the surgical face mask compared to other PPE and infectious control measures. Currently, N95 masks are recommended for use in the management of COVID-19 patients in both aerosolising and non-

aerosolising procedures.⁽²¹⁾ However, a systemic review and meta-analysis of randomised trials showed that surgical face mask may be non-inferior to N95 mask in the management of COVID-19 patients in non-aerosolising procedures.⁽²²⁾ This misconception that surgical face mask is inferior may lead to a higher than expected utility of N95 masks; therefore, the reasons for the low confidence should be explored further. Some may argue that if there is no shortage of PPE, using masks that are perceived to provide a higher level of safety (N95, PAPR) will improve staff confidence. Nonetheless, it is still paramount to rationalise valuable resources rather than actualise a shortage in future. Education of HCWs regarding the rationale behind PPE policies is important to tackle the issue of information asymmetry.

The survey included a sizeable number of HCWs, with a response rate of more than 80%. It is representative of various ethnicities and experience on the ground, as well as reflects concerns on the frontline. While the implementation of precautionary measures may vary slightly between public hospitals in Singapore, overall guidance from the Ministry of Health, Singapore has ensured that minimum standards are met and many of the measures listed are used nationwide, increasing the generalisability of the study.

Some limitations of the study should be considered while interpreting the results. As this is a single-centre survey of HCWs at one point in time, the directional inference of causation is limited. In addition, the survey was designed to elicit breadth and not depth of the psychological impact on HCWs; further research using validated tools to assess psychological morbidity, stress and anxiety should be conducted, and participants should also be re-evaluated at regular points over the prolonged course of the COVID-19 pandemic, as burnout may impact psycho-emotional states. Also, the study surveyed only nurses, doctors and administrative staff. Emergency department staff and allied HCWs (such as pharmacists, physiotherapists, cleaning staff) were not included. Finally, extrapolation of the bundle of precautionary measures to other countries may be limited, as there are different standards of PPE and resource availability in

different countries. The current standard of PPE in Singapore includes N95 masks, PAPR for AGPs, gowns, goggles and surgical face masks. Full body hazmat suits, which are used in some medical facilities, were not explored in the local setting.

In conclusion, maintaining the morale of HCWs cannot be over-emphasised during such a large-scale outbreak. A safe working environment is an important motivation to continue clinical work and to avoid a vicious cycle from attrition. This survey clearly shows that most HCWs fear contracting COVID-19 but are still committed and willing to accept the risk of viral transmission, despite the perception of a moderate-to-high risk of contracting the disease during the course of their work. This validates the bundle of precautionary measures instituted by the hospital and ensures that the frontline remains functional.

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REFERENCES

1. World Health Organization. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Available at: [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)). Accessed March, 2020.
2. Imai T, Takahashi K, Hasegawa N, Lim MK, Koh D. SARS risk perceptions in healthcare workers, Japan. *Emerg Infect Dis* 2005; 11:404-10.

3. Wei WE, Li Z, Chiew CJ, et al. Presymptomatic transmission of SARS-CoV2 – Singapore, January 23-March 16, 2020. *MMWR Morb Mortal Wkly Rep* 2020; 69:411-5.
4. World Health Organization. Mental health and psychological resilience during the COVID-19 pandemic. Available at: <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/mental-health-and-psychological-resilience-during-the-covid-19-pandemic>. Accessed April, 2020.
5. Wu P, Fang Y, Guan Z, et al. The psychological impact of SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* 2009; 54:302-11.
6. Tng XJJ, Chew QH, Sim K. Psychological sequelae within different populations during the COVID-19 pandemic: a rapid review of extant evidence. *Singapore Med J* 2020 Jul 30. <https://doi.org/10.11622/smedj.2020111>. [Epub ahead of print]
7. Chan AO, Chan YH. Psychological impact of the 2003 severe acute respiratory syndrome outbreak on healthcare workers in a medium size regional general hospital in Singapore. *Occup Med (Lond)* 2004; 54:190-6.
8. World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages. Available at: [https://www.who.int/publications-detail/rational-use-of-personal-protective-equipment-for-coronavirus-disease-\(covid-19\)-and-considerations-during-severe-shortages](https://www.who.int/publications-detail/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages). Accessed April, 2020.
9. British Medical Association. BMA COVID-19 tracker survey. Available at: <https://www.bma.org.uk/media/2404/embargoed-04052020-bma-covid-19-tracker-3-1.pdf>. Accessed April, 2020.
10. Chew MH, Ong LW, Koh FH, et al. Lessons in preparedness – the response to the COVID-19 pandemic by a surgical department in Singapore. In: *Cutting Edge: the surgical blog*

- from BJS [online]. Available at: <https://cuttingedgeblog.com/2020/03/29/guest-post-lessons-in-preparedness-the-response-to-the-covid-19-pandemic-by-a-surgical-department-in-singapore/>. Accessed April, 2020.
11. MH Chew, FH Koh, KH Ng. A call to arms: a perspective of safe general surgery in Singapore during the COVID-19 pandemic. *Singapore Med J* 2020; 61:378-80.
 12. Au Yong PS, Chen X. Reducing droplet spread during airway manipulation: lessons from the COVID-19 pandemic in Singapore. *Br J Anaesth* 2020; 125:e176-8.
 13. Chew MH, Chau KC, Koh FH, et al. Learning experience on sentinel case of COVID-19 acute appendicitis and validation of OR processes. In press.
 14. Koh FH, Tan MG, Chew MH. The fight against COVID-19: disinfection protocol and turning over of CleanSpace® HALOTM in a Singapore hospital. *Updates Surg* 2020; 72:311-3.
 15. Tan BYQ, Chew NWS, Lee GKH, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med* 2020; 173:317-20.
 16. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020; 3:e203976.
 17. Xu S, Li Y. Beware of the second wave of COVID-19. *Lancet* 2020; 395:1321-2.
 18. Shin H. South Korea's Moon warns of COVID-19 second wave as cases rebound. In: *The Jakarta Post* [online]. Available at: <https://www.thejakartapost.com/amp/news/2020/05/10/south-koreas-moon-warns-of-covid-19-second-wave-as-cases-rebound.html>. Accessed May, 2020.
 19. Sim HS, How CH. Mental health and psychosocial support during healthcare emergencies – COVID-19 pandemic. *Singapore Med J* 2020; 61:357-62.
 20. Public Health Preparedness Clinic (PHPC). In: MOH National Schemes, Primary Care Pages [online]. Available at: <https://www.primarycarepages.sg/practice->

management/moh-national-schemes/public-health-preparedness-clinic-(phpc). Accessed October 17, 2020.

21. Mermel LA. Respiratory protection for healthcare workers caring for COVID-19 patients. *Infect Control Hosp Epidemiol* 2020; 41:1064-5.
22. Bartoszko JJ, Farooqi MAM, Alhazzani W, Loeb M. Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: a systematic review and meta-analysis of randomized trials. *Influenza Other Respir Viruses* 2020; 14:365-73.

FIGURES

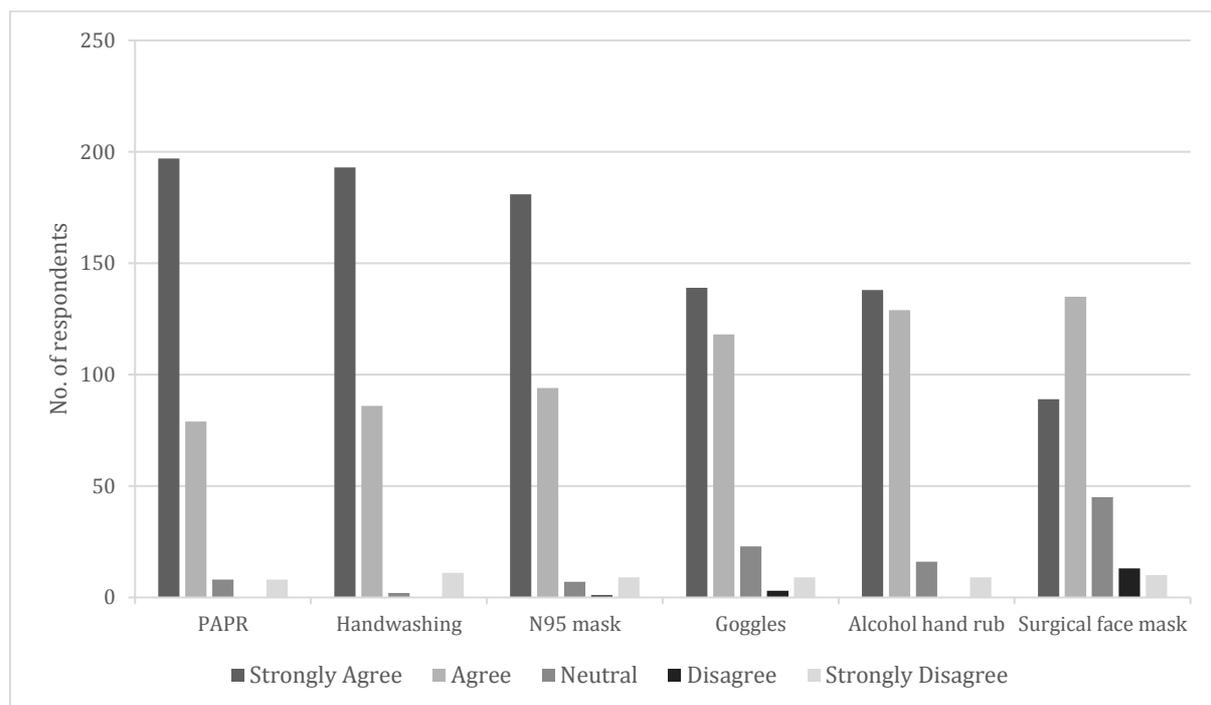


Fig. 1 Graph shows respondents' confidence in personal infection control and protective equipment. PAPR: powered air-purifying respirators

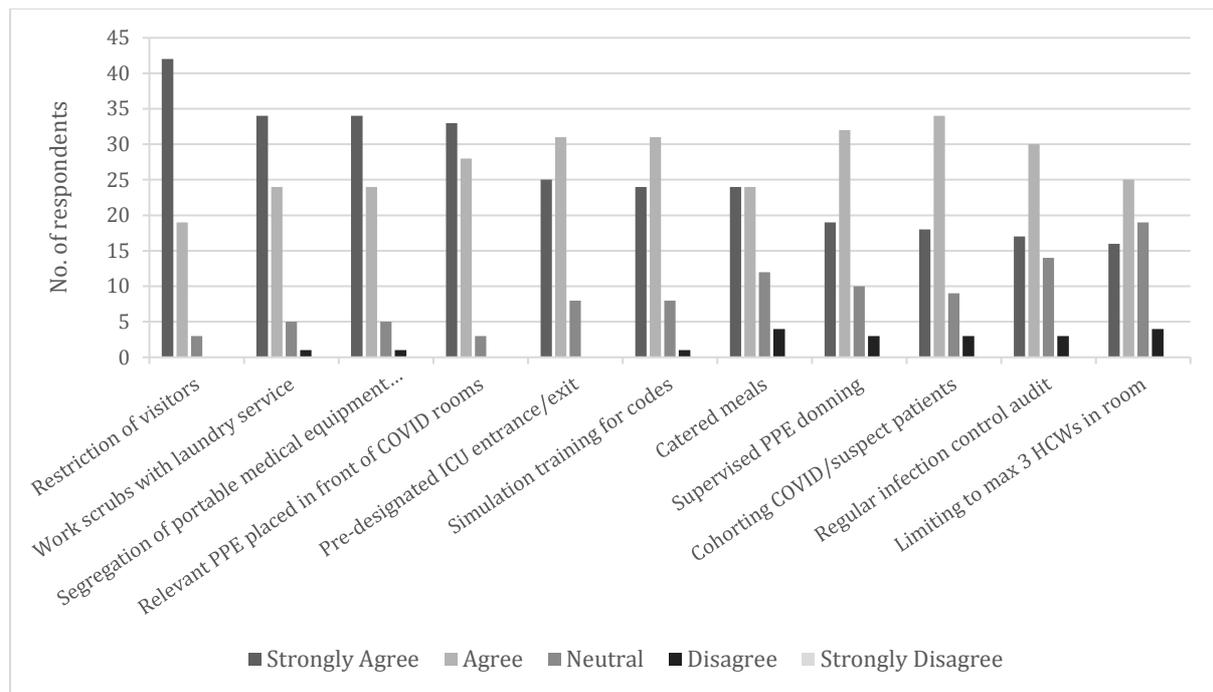


Fig. 2 Graph shows responses toward ICU-specific precautionary measures. HCW: healthcare worker; ICU: intensive care unit; PPE: personal protective equipment

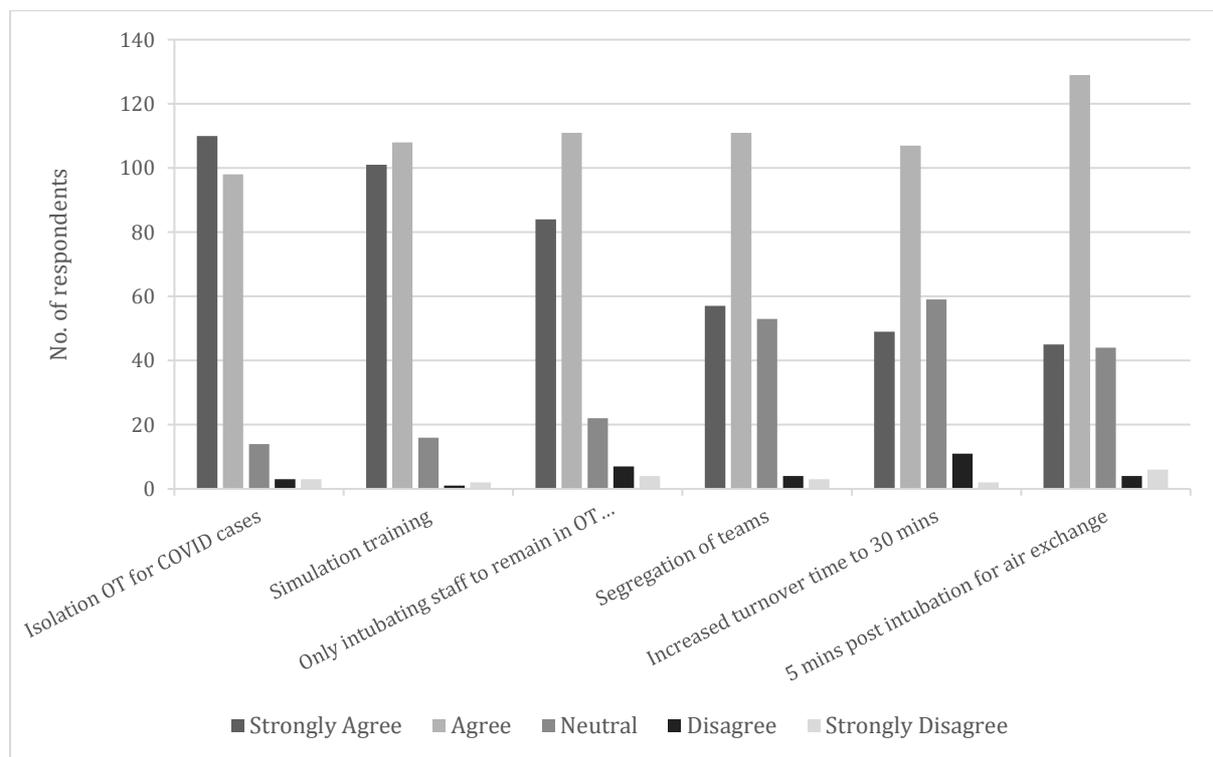


Fig. 3 Graph shows responses toward OT-specific precautionary measures. OT: operating theatre

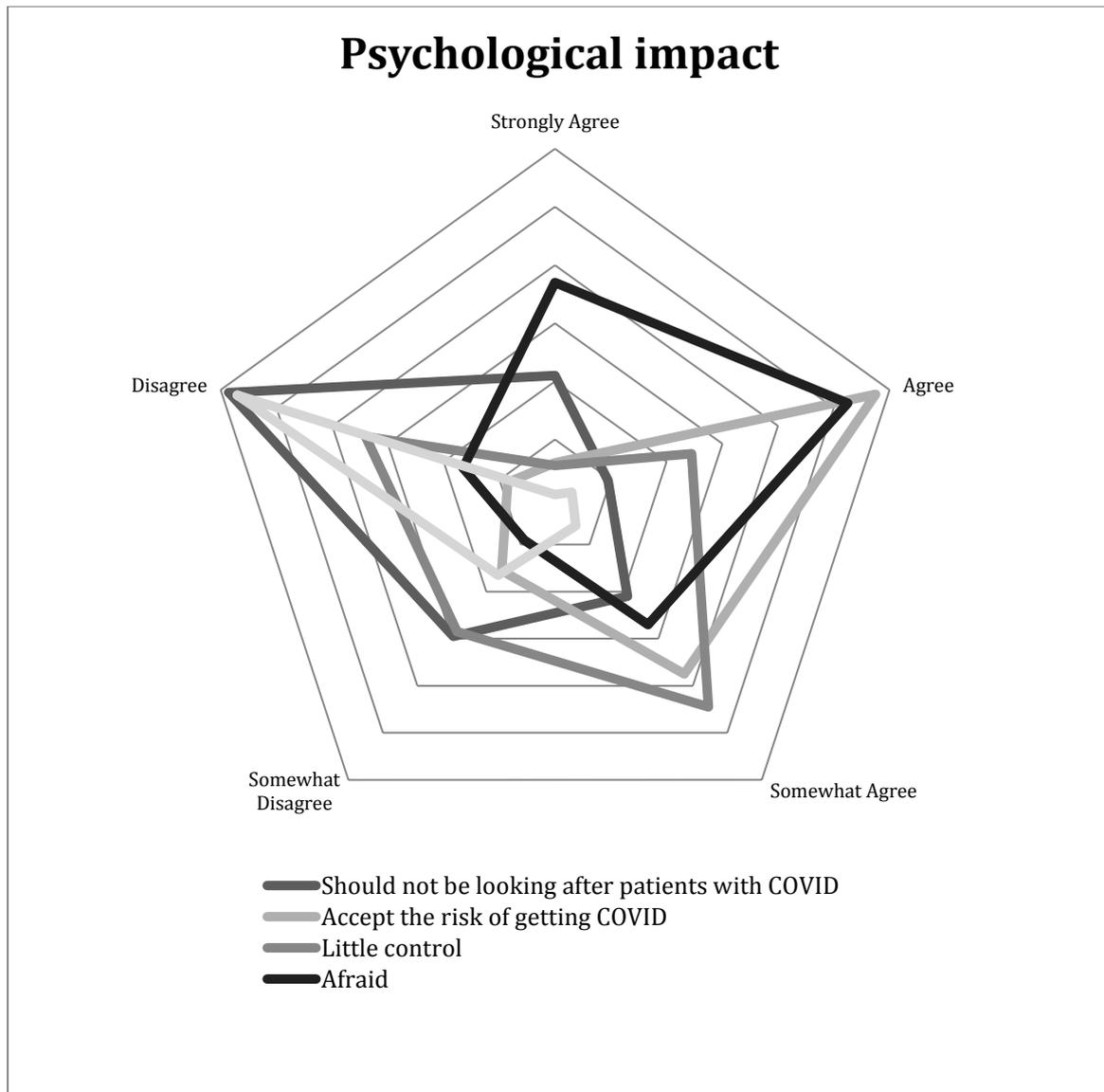


Fig. 4 Chart shows psychological impact of COVID-19 on healthcare workers.