ORIGINAL ARTICLE

Paediatric surgical response to an 'adult' COVID-19 pandemic

Nooraini Bte Mahat, MBBS[1,2], Syukri Ahmad Zubaidi, MBBS[2], Soe Htoo Htoo Kyaw, MBBS[3], Shireen Anne Nah, MSurg[1,2]

[1]Division of Paediatric Surgery, Department of Surgery, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia, [2]Division of Paediatric Surgery, Department of Surgery, University of Malaya Medical Centre, Kuala Lumpur, Malaysia, [3]Department of Community Medicine, Melaka Manipal Medical College, Malaysia

ABSTRACT

Introduction: The Coronavirus Disease 2019 (COVID-19) has dramatically affected global healthcare systems. We aimed to determine the response of our paediatric surgical fraternity to a disease that overwhelmingly affects adults.

Materials and Methods: We conducted a cross-sectional questionnaire-based study over 6 weeks during a federally mandated lockdown. Using snowball sampling, we recruited paediatric surgeons, trainees and medical officers from paediatric surgical units in Malaysia. The anonymous online questionnaire covered sociodemographic information, changes in patient care, redeployment, concerns regarding family members, and impact on training. Mental well-being was assessed using the Depression, Anxiety and Stress Scale (DASS-21). Kruskal-Wallis, ANOVA and multiple regression analysis was used, with significance level 0.05.

Results: Of the 129 eligible participants, 100(77%) responded. Junior doctors had clinically higher levels of depression, anxiety, and stress. Age <30 years was significantly associated with anxiety. Junior doctors believed that redeployment led to loss of surgical skills ($p<0.001$) and trainees felt that clinical application of knowledge had reduced ($p<0.020$).

Conclusion: Specific to our paediatric surgical community, this study highlights areas of concern, particularly among junior doctors. It is likely that recurrent cycles of the pandemic will occur soon. These issues must be addressed to preserve the mental and emotional well-being of all health care workers.

KEYWORDS:
Pandemic; training; psychosocial impact; health care workers; mental well being

INTRODUCTION

The novel coronavirus disease Covid-19 was initially identified in December 2019 as a case of pneumonia in Wuhan, China and has since become a global pandemic, affecting more than 150 countries around the world. To date, it has infected up to 79 million people worldwide and caused up to 1.7 million deaths.[1,2] The World Health Organization declared the outbreak a pandemic on March 11, 2020 and called for coordinated mechanisms to support preparedness and response to the infection across health sectors.[2] A restricted movement order (lockdown) was announced by the Malaysian federal government on 18 March 2020, by which time there was an average of 170 new cases per day, with a total of approximately 1800 cases nationwide.[3]

All areas of health care have been impacted by the Covid-19 pandemic, including paediatric surgery. Since the onset of the crisis, surgical care practices have been adapted in many hospitals, each institution adopting the strategy believed to be the most appropriate according to their available manpower, hospital resources, and limitations.[4] Normalcy of the medical professional and personal lives has changed completely.[5]

In Malaysia, the daily working activities of paediatric surgery services have drastically modified due to the pandemic. These include changes in clinical interaction, where video or phone call follow up became the method of choice in reducing the number of patients coming for face-to-face follow-up.[5] Only a minimum number of essential personnel were involved in daily ward rounds, and surgical procedures were temporarily halted with only emergency cases performed according to strict local triage criteria. In some units, paediatric surgery trainees were redeployed to other critical areas, such as adult emergency and intensive care. Training programs were also overhauled to minimize trainee exposure to Covid-19, and clinical rotas were adjusted to allow for backup teams in the event that health care workers (HCW) became ill, thus leading to decrease in quality of training.[6]

The primary aim of this study was to determine the response of healthcare workers in the paediatric surgical fraternity to the Covid-19 pandemic, a disease that overwhelmingly affects adults compared to children. The secondary aim was to explore the psychosocial implications of Covid-19 on our community, using the Depression, Anxiety and Stress Scale score (DASS-21).

MATERIALS AND METHODS

Study setting

This study was carried in Malaysia and included all hospitals providing paediatric surgery services. The hospitals consist of publicly funded hospitals, private hospitals, and university-affiliated academic centres. A total of 8 hospitals are recognised as training centres for paediatric surgery, staffed

This article was accepted: 09 March 2021
Corresponding Author: Associate Professor Dr Shireen Anne Nah
Email: shireen.nah@ummc.edu.my

by HCW consisting of approximately 40 fully trained paediatric surgeons, 39 trainees, and 50 non-trainee medical officers (MO). In addition, during the Covid-19 pandemic, 23 hospitals were designated as Covid-19 hospitals, with the facilities to provide the full range of care for Covid-19 patients, including intensive care.

Study design and sampling method
A cross-sectional study design was used. This study was carried out between 1st April to 15th May 2020, in the midst of a federally mandated national lockdown. A self-administered electronic questionnaire was distributed to all paediatric surgical units. Participants were recruited via snowball sampling and representative sampling.

We categorised our respondents as follows.
1) Paediatric surgeons: those who had completed specialist training in paediatric surgery. When evaluating the impact of the pandemic on surgical training, this group was referred to as 'Trainers'.
2) Trainees: All those registered in a paediatric surgery training programme at the time of the survey.
3) Medical officers (MO): Non-specialist and non-trainee doctors whose primary duties were in a paediatric surgical unit.

Respondents were contacted via a number of different channels, including the national paediatric surgical association, local trainee representatives, hospital and social network. A web-based data collection tool (Google Forms), which was anonymous was used to collect data.

Questionnaires
We devised the questionnaire based on our literature review of issues highlighted by HCW in previous pandemics to guide the areas of focus.[7-9] The questionnaire was pilot tested on 10 respondents prior to full execution.

The questionnaire consisted of 4 parts:
Part 1: Sociodemographic data
Part 2: Respondent response towards (a) changes in provision of patient care, (b) redeployment to other departments and (c) concern about family members. Five-point Likert scale questions, with response options ranging from 'strongly agree' score '5' to 'strongly disagree' score '1', were utilised to assess respondents' agreement with statements.
Part 3: Exploration of the impact of Covid-19 on training and education from perspectives of different roles – trainer, trainee and non-trainee medical officer.
Part 4: Psychological assessment using the Depression Anxiety Stress Scale-21 (DASS-21 score). The DASS-21 is a 21-item scale that provides independent measures of three self-report subscales such as depression (7 items), stress (7 items), and anxiety (7 items). Scores for each subscale were calculated by summing the scores for the relevant items and then multiplied by 2 to calculate the final score (Table I).[10] The DASS-21 score has been validated in multiple studies around the globe.[11-13]

Content validity was checked with experts regarding attitudes towards provision of patient care, redeployment of manpower to other departments, concern about patient care and family members, research regarding COVID-19 pandemic as well as attitudes towards training among consultants and attitudes towards skills, learning, clinical application knowledge among trainee and MO. Face validity was also checked with the participants in the aspect of clarity of the questions, likelihood the target audience would be answering the questions, and layout and styles off the questionnaire. Cronbach's alpha coefficient was calculated for internal consistency of the questionnaire. The Cronbach's alpha coefficient of attitudes towards provision of patient care was 0.516, attitudes towards redeployment of manpower to other department during the pandemic was 0.258, concern about family was 0.619, and attitudes towards research regarding COVID-19 pandemic was 0.283. The Cronbach's alpha coefficient of attitudes towards skills, learning, clinical application knowledge among trainee and medical officer was 0.690

Data processing and analysis
SPSS version 18.0 was used for data analysis. Descriptive statistics such as frequency and percentage, median and quartiles (1st and 3rd) were calculated. Kruskal-Wallis test was used to determine the difference of attitudes between surgeon, trainee and medical officer, towards provision of patient care, redeployment of manpower to other department, concern about patient care and family member, ANOVA was calculated to determine the difference of stress, anxiety and depression between groups. Multiple regression analysis was also used to determine the factors associated with depression, anxiety, and stress. Level of significance was set at 0.05.[10]

Ethics Approval
This study was approved by the Medical Research Ethics Committee, University of Malaya Medical Centre (UMMC) (No 2020515-8625)

RESULTS

A total of 100 respondents participated in the study, consisting of surgeons (n=28), trainees (n=34) and MOs (n=38), representing approximately 77% of all eligible participants (Table II). The majority of trainees (97.1%) were aged 31-40 years. The majority of all respondents (64%) were from public hospitals, and nearly half (47%) were not living with vulnerable household members.

Table III describes the responses to the areas covered in the questionnaire. Of note, trainees and MOs were more likely to report concern regarding loss of surgical skills due to manpower redeployment, and more likely to find it important to have preferential Covid-19 testing for their family members.

Stress was three times more likely to be present among trainees and MOs in comparison to surgeons, while anxiety and depression were two times more likely (Figure 1). Multiple linear regression analysis of factors associated with depression, anxiety and stress in all the groups found only age <30 years was significantly associated with anxiety. No other factors such as sex, marital status, and place of practice showed significant association with depression, anxiety, and stress.

When surveyed for their opinion on the impact on training, trainers were happy with how the academic programme was coping with the changes demanded. Trainees were significantly more concerned than MOs that the clinical application of knowledge was reduced (Figure 2).

DISCUSSION

Paediatric surgery around the world has been profoundly impacted by the Covid-19 pandemic. To our knowledge, this is the first study exploring the response of the paediatric surgical fraternity to the pandemic. The key finding in our study was that the prevalence of stress was three times more likely to be present in surgical trainees and MOs in comparison to surgical trainers while anxiety and depression were two times more likely. Although this did not reach statistical significance, we believe that it is clinically significant. Similar patterns of psychosocial impact have been reported in many other studies done during previous pandemics.[14,15,16] A few factors are possible reasons. Junior doctors are prone to be redeployed to non-surgical areas, with little autonomy over their daily clinical duties compared to senior surgeons, taking them to unfamiliar clinical environments. Younger doctors are also more likely to have domestic obligations such as the care of smaller children.[7] We recommend that hospital administrators recognize the challenges faced by junior doctors and provide practical support, such as childcare and mental well-being care. In UMMC, regular online townhall sessions were organised to provide HCW an avenue to obtain updates, provide feedback and put forth questions to the management.[17] Unsurprisingly, none of the doctors working in non Covid-19 hospitals were affected psychosocially as their daily activities remained unchanged[9,15,19] We also explored the issue of manpower redeployment to other non-paediatric surgical areas, which was a practice commonly described in other centres.[20-22] Some were also assigned for specific tasks such taking pre-procedural swabbing in children which would normally be out of their scope of training but was necessary during the pandemic.[18] While the majority agreed that this was appropriate in these unique circumstances, a concern about losing surgical skills was significantly higher (P< 0.001) among paediatric surgical trainees and MOs (Table III). This is unsurprising as junior doctors are in the process of developing surgical skills. Moulton et al reported that consistent exposure to skills training in smaller aliquots over time resulted in superior retention of surgical skills, compared to intense and concentrated exposure over a short period. On the other hand, expert or trained personnel usually have superior retention of surgical skills.[23]

With regards to views on the impact of Covid-19 on the surgical training programme, paediatric surgeons agreed that operative volume was reduced. In UMMC our operative

Table I: DASS 21 score

	Depression (D)	Anxiety (A)	Stress (S)
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely Severe	28+	20+	34 +

Table II: Demographic profile of respondents

Variables	Surgeon n (%)	Trainee n (%)	Medical officer n (%)
Age			
≤30	0 (0)	1 (2.9)	16 (42.1)
31-40	12 (42.9)	33 (97.1)	22 (57.9)
>40	16 (57.1)	0 (0)	0 (0)
Sex			
Male	15 (53.6)	19 (55.9)	16 (42.1)
Female	13 (46.4)	15 (44.1)	22 (57.9)
Place of practice			
Private	5 (17.9)	0 (0)	0 (0)
Public	20 (71.4)	16 (47.1)	28 (73.7)
University Hospital	3 (10.7)	18 (52.9)	10 (26.3)
Working in a COVID-19 hospital			
Non COVID-19 hospital	7 (25.0)	3 (8.8)	1 (2.6)
COVID-19 hospital	21 (75.0)	31 (91.2)	37 (97.4)
Marital status			
Single	9 (32.1)	9 (26.5)	16 (42.1)
Married	19 (67.9)	24 (70.6)	22 (57.9)
Divorced/widowed	0 (0)	1 (2.9)	0 (0)
Currently living in a household with			
Senior members	4 (14.3)	6 (17.6)	3 (7.9)
Children	15 (53.6)	10 (29.4)	11 (28.9)
Immunocompromised/ chronic medical condition	2 (7.1)	0 (0)	2 (5.3)
None of the above	7 (25.0)	18 (52.9)	22 (57.9)

Table III: Attitudes towards provision of patient care, redeployment of manpower to other department, concern about patient care and family member

No	Variables	Median (Q1, Q3)			p value
		Consultant (n=28)	Trainee (n=34)	Medical Officer (n=38)	
	Changes in provision of patient care				
1.	My daily working schedule has changed	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	4.0 (2.0, 5.0)	0.703
2.	There are changes to my routine patient care (eg. ward rounds, clinic, operating time)	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	4.0 (2.0, 5.0)	0.912
3.	I think the quality of patient care I provide is not affected	3.0 (1.25, 3.0)	2.0 (2.0, 3.25)	2.0 (2.0, 3.25)	0.865
4.	Lack of face to face patient interaction during follow up is detrimental for my patient care	4.0 (3.0, 4.0)	4.0 (3.0, 4.0)	4.0 (2.0, 4.0)	0.931
5.	Patients can be followed up optimally by phone/video call	4.0 (3.0, 4.0)	4.0 (3.0, 4.0)	4.0 (2.0, 4.0)	0.810
6.	I feel that multidisciplinary care of my patients is compromised	4.0 (2.25, 4.0)	4.0 (2.0, 4.0)	4.0 (2.0, 4.0)	0.859
7.	I feel that some patients are not getting the care that they need	4.0 (2.25, 4.0)	4.0 (3.0, 4.0)	3.5 (2.0, 4.0)	0.069
	Redeployment of manpower to other department during the pandemic				
8.	I think redeployment is appropriate during the covid-19 pandemic	4.0 (4.0, 4.0)	4.0 (3.0, 4.0)	4.0 (3.0, 4.0)	0.139
9.	I prefer to choose where I am redeployed as I know where I will be useful	4.0 (4.0, 4.0)	4.0 (4.0, 4.25)	4.0 (4.0, 4.0)	0.978
10.	Hospital authorities have the right to decide where I am deployed	2.0 (2.0, 3.75)	3.0 (2.0, 4.0)	3.0 (2.0, 4.0)	0.232
11.	I will lose my skills if I am redeployed	2.0 (1.0, 2.75)	3.0 (2.0, 4.0)	3.0 (2.0, 4.0)	<0.001
12.	I do not feel confident in treating patients out of my specialty	4.0 (2.25, 4.0)	4.0 (4.0, 4.0)	4.0 (2.0, 4.0)	0.167
	Concern about family members				
13.	Due to concerns regarding covid-19, I try to avoid direct contact with senior family members	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	0.262
14.	Due to concerns regarding covid-19 I avoid direct contact with children	4.0 (2.0, 4.0)	4.0 (4.0, 5.0)	4.0 (3.0, 5.0)	0.094
15.	I am not concerned about interacting with my family members	4.0 (2.0, 4.0)	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	0.074
16.	I have changed my routine on arrival home after work to avoid infecting my family members	4.0 (3.0, 5.0)	4.0 (4.0, 4.0)	4.0 (3.0, 5.0)	0.926
17.	Priority testing for covid 19 should be given to family members of healthcare workers	3.5 (2.0, 4.0)	4.0 (4.0, 4.25)	4.0 (3.0, 4.0)	0.036
18.	Treatment for covid 19 should be prioritised for family members of healthcare workers	3.0 (2.0, 4.0)	4.0 (3.0, 4.0)	4.0 (3.0, 4.0)	0.171
	Research regarding covid-19 pandemic				
19.	I am involved in covid-19 research	2.0 (1.0, 30)	2.0 (1.0, 2.0)	2.0 (2.0, 3.0)	0.186
20.	I feel that covid-19 related research is important	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	4.0 (4.0, 5.0)	0.481
21.	I think it is not important to do research regarding covid 19 pandemic	4.5 (4.0, 5.0)	4.0 (4.0, 5.0)	4.5 (4.0, 5.0)	0.361

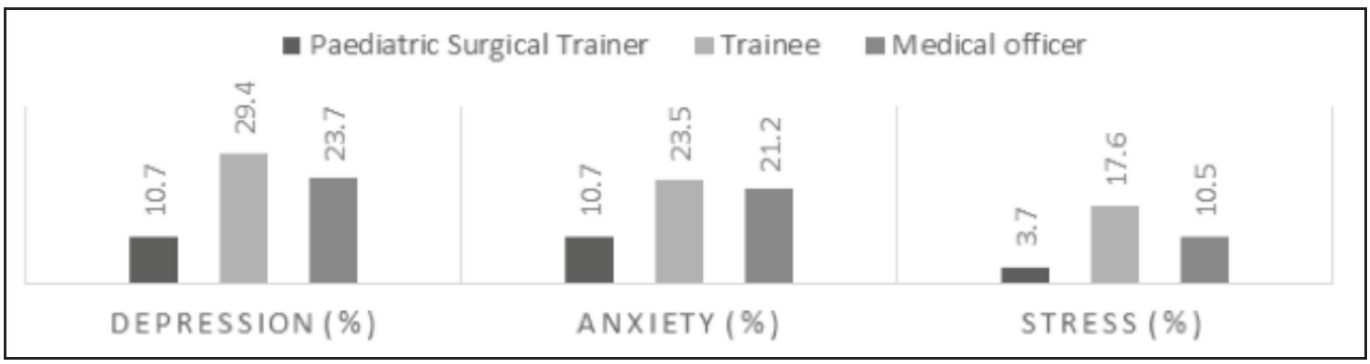

Fig. 1: Prevalence of depression, stress and anxiety among respondents.

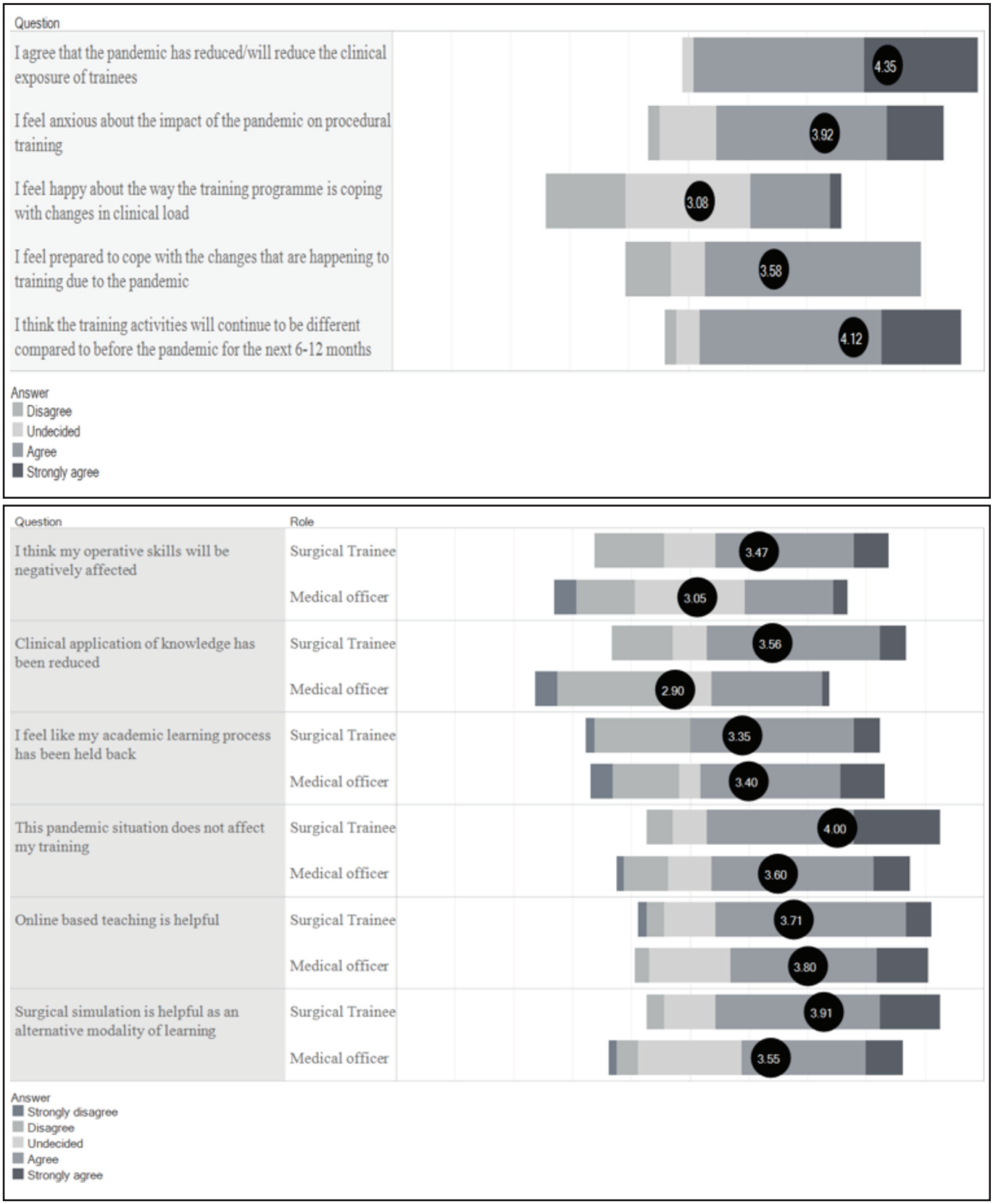

Fig. 2: Attitudes towards training programme and skills, learning, and clinical application of knowledge among paediatric surgeons, paediatric surgical trainees and medical officers with the mean value in circle.

load was reduced by more than 80%.[17] There were no significant differences between trainees and MOs in terms of attitudes towards surgical training except that trainees agree that clinical application of knowledge had been reduced (p=0.02). This current Covid-19 pandemic has provided trainees and MOs with opportunities to explore different virtual learning options, including surgical simulation-based training as an adjunct to other teaching tools for surgical training.[24]

We also found that trainees and MOs were more concerned about transmission of Covid-19 to family members, especially the elderly, the immunocompromised, or those with chronic medical conditions.[25] This is similar to other previous outbreaks such as the H1N1 influenza in the United Kingdom in 20077 and China's severe acute respiratory syndrome (SARS) outbreak in 2003.[26] However, adequate PPE provision can help to alleviate anxiety levels. we could A study conducted in UMMC reporting early results of routine pre procedural swabbing for all operative cases, showed that no low risk patients were positive for COVID. Dissemination of these results would also reduce the level of anxiety.[18]

Trainees and MOs were significantly more likely (p=0.036) to agree that their family members should receive priority testing for Covid-19 compared to the surgeons (Table I). This might be because paediatric surgeons consist of senior doctors who are less likely to be on the clinical frontline, while trainees and MOs are deployed to critically need areas such as the emergency department. All participants agreed that provision of patient care has been affected during the Covid-19 pandemic. Many from other countries have described measures similar to those practised in the UMMC setting which have affected patient care, such as limiting the number of HCW performing clinical duties, postponement of elective surgeries, and conversion of clinic sessions from face to face to telemedicine.[5] A study by the CovidSurg collaborative projected that up to 70% of electives surgeries were postponed and that it would need up to 45 weeks to clear the backlog.[27]

While it was necessary for the protection of HCW and for resource preservation, some of these measures also profoundly affected academic training activities. There were restrictions placed on the number of HCW in the operating theatre, and face-to-face teaching was replaced by video-conferencing sessions. Similar changes have also been seen in other countries e.g. in UK, US, China, European, Italy, Latin America, Finland.[6]

There are several limitations in the present study. Firstly, this is a cross sectional study, and we therefore cannot determine the temporal relationship of the exposure to Covid-19 pandemic and the outcome or response towards it. On-response bias is a limitation in conducting a survey-based data collection. It must be recognised that inherent bias present in surveys may have selected those with more interest in this outbreak, inflating the levels of reported knowledge and confidence. The small sample size of 100 respondents clearly affected our statistical analysis; however, it reflects the small paediatric surgical fraternity in Malaysia and represents 77% of them.

CONCLUSION

During this challenging time changes are inevitable, but the outcome will be defined by our action and ability to adapt today. Specific to our paediatric surgical community, this study highlights areas of concern, particularly among junior doctors. It is likely that recurrent cycles of the pandemic are likely to occur in the near future, and these issues must be addressed to preserve the mental and emotional well-being of all health care workers. Thus, we suggest for a follow up study once there is restoration of services. This pandemic is far from over despite many countries being able to rebuild their economy. Issues that we have highlighted here, such as the differences in response by roles have to be addressed more vigilantly to be prepared to respond to future new public health threats.

ACKNOWLEDGMENT

We would also like to show our gratitude to our supervisor Professor Dr Thambidorai A/L Rajendra Rao, Dr Srihari Singaravel, Dr Anand A/LSanmugam and Dr Ganesh A/L P. Vythilingam for sharing their expertise with us during the course of this research.

Disclosure, Conflicts of Interest and Source of Funding: The authors have nothing to declare. There has been no prior publication of the included data.

REFERENCES

1. Reeves JJ, Hollandsworth HM, Torriani FJ, Taplitz R, Abeles S, Tai-Seale M, et al. Rapid response to COVID-19: health informatics support for outbreak management in an academic health system. J Am Med Inform Assoc 2020; 27(6): 853-9.
2. Coronavirus disease (COVID-19). Situation Report – 149 : World Health Organization : December 29, 2020.
3. Shah AUM, Safri SNA, Thevadas R, Noordin NK, Rahman AA, Sekawi Z, et al. COVID-19 Outbreak in Malaysia: Actions taken by the Malaysian government. Int J Infect Dis 2020; 97: 108-16.
4. Zhao S, Zhuang Z, Cao P, Ran J, Gao D, Lou Y, et al. Quantifying the association between domestic travel and the exportation of novel coronavirus (2019-nCoV) cases from Wuhan, China in 2020: a correlational analysis. J Travel Med 2020; 27(2): taaa022.
5. Steward JE, Kitley WR, Schmidt CM, Sundaram CP. Urologic surgery and COVID-19: How the pandemic is changing the way we operate. J Endourol 2020; 34(5), 541-9.
6. Davenport M, Pakarinen MP, Tam P, Laje P, Holcomb III GW. From the editors: the COVID-19 crisis and its implications for pediatric surgeons. J Pediatr Surg 2020; 55(5): 785.
7. Draper H, Wilson S, Ives J, Gratus C, Greenfield S, Parry J, et al. Healthcare workers' attitudes towards working during pandemic influenza: a multi method study. BMC Public Health 2008; 8(1): 192.
8. Charney RL, Rebmann T, Flood RG. Hospital employee willingness to work during earthquakes versus pandemics. J Emerg Med 2015; 49(5): 665-74.
9. Aoyagi Y, Beck CR, Dingwall R, Nguyen-Van-Tam JS. Healthcare workers' willingness to work during an influenza pandemic: a systematic review and meta-analysis. Influenza Other Respir Viruses 2015; 9(3): 120-30.
10. Dreyer Z, Henn C, Hill C. Validation of the Depression Anxiety Stress Scale-21 (DASS-21) in a non-clinical sample of South African working adults. J Psychol Afr 2019; 29(4): 346-53.
11. Tran TD, Tran T, Fisher J. Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. BMC Psychiatry 2013; 13(1): 24.

12. Xavier S, Bento E, Azevedo J, Marques M, Soares MJ, Freitas V, et al. Validation of the Depression, Anxiety and Stress Scale–DASS-21 in a community sample of Portuguese pregnant women. Eur Psychiatry 2016; 33(S1): s239.
13. Lovibond SH, Lovibond PF. 1996. Manual for the depression anxiety stress scales. 2nd Edition. Psychology Foundation of Australia.
14. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic–A review. Asian J Psychiatr 2020; 51: 102119.
15. Tsamakis K, Rizos E, Manolis AJ, Chaidou S, Kympouropoulos S, Spartalis E, et al. [Comment] COVID-19 pandemic and its impact on mental health of healthcare professionals. Exp Ther Med 2020; 19(6): 3451-3.
16. Brooks SK, Dunn R, Amlôt R, Rubin GJ, Greenberg. A systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. J Occup Med 2018; 60(3): 248-57.
17. Sanmugam A, Vythilingam G, Singaravel S, Nah SA. Assess, adapt and act: a paediatric surgery division's initial approach in a rapidly evolving pandemic. Pediatr Surg Int 2020; 36(8): 925-31.
18. Sii CK, Lee JA, Nah SA. Early experience with universal preoperative and pre-procedural screening for COVID-19 in low-risk pediatric surgical patients requiring general anesthesia. Pediatr Surg Int 2020; 36(12): 1407-11.
19. Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. JAMA 2020; 323(15): 1439-40.
20. Sarpong NO, Forrester LA, Levine WN. What's important: redeployment of the orthopaedic surgeon during the COVID-19 pandemic: perspectives from the trenches. J Bone Joint Surg Am 2020; 102(12): 1019-21.
21. Shipchandler TZ, Nesemeier BR, Schmalbach CE, Ting JY. Otolaryngologists' role in redeployment during the COVID-19 pandemic: a commentary. Otolaryngol Head Neck Surg 2020; 163(1): 94-5.
22. Sheth PD, Simons JP, Robichaud DI, Ciaranello AL, Schanzer A. Development of a surgical workforce access team in the battle against COVID-19. J Vasc Surg 2020; 72(2): 414-7.
23. Moulton CA, Dubrowski A, MacRae H, Graham B, Grober E, Reznick R. Teaching surgical skills: what kind of practice makes perfect?: a randomized, controlled trial. Ann Surg 2006; 244(3): 400.
24. Khunger N, Kathuria S. Mastering surgical skills through simulation-based learning: practice makes one perfect. J Cutan Aesthet Surg 2016; 9(1): 27.
25. Vargo E, Ali M, Henry F, Kmetz D, Drevna D, Krishnan J, et al. Cleveland clinic akron general urology residency program's COVID-19 experience. Urology 2020; 140: 1-3.
26. Liu X, Kakade M, Fuller CJ, Fan B, Fang Y, Kong J, et al. Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic. Compr Psychiatry 2012; 53(1): 15-23.
27. Negopdiev D, Collaborative C, Hoste E. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Br J Surg 2020; 107(11): 1440-9.