

BJO



■ GENERAL ORTHOPAEDICS

Personal protective equipment during the COVID-19 crisis: a snapshot and recommendations from the frontline of a university teaching hospital

**T. Key,
N. J. Mathai,
A. S. Venkatesan,
D. Farnell,
K. Mohanty**

Cardiff and Vale
University Health
Board, Cardiff, Wales,
UK

Aims

The adequate provision of personal protective equipment (PPE) for healthcare workers has come under considerable scrutiny during the COVID-19 pandemic. This study aimed to evaluate staff awareness of PPE guidance, perceptions of PPE measures, and concerns regarding PPE use while caring for COVID-19 patients. In addition, responses of doctors, nurses, and other healthcare professionals (OHCPs) were compared.

Methods

The inclusion criteria were all staff working in clinical areas of the hospital. Staff were invited to take part using a link to an online questionnaire advertised by email, posters displayed in clinical areas, and social media. Questions grouped into the three key themes - staff awareness, perceptions, and concerns - were answered using a five-point Likert scale. The Kruskal-Wallis test was used to compare results across all three groups of staff.

Results

Overall, 315 staff took part in our study. There was a high awareness of PPE guidance at 84.4%, but only 52.4% of staff reported adequate PPE provision. 67.9% were still keen to come to work, despite very high levels of anxiety relating to contracting COVID-19 despite wearing PPE. Doctors had significantly higher ratings for questions relating to PPE awareness compared to other staff groups, while nursing staff and OHCPs had significantly higher levels of anxiety compared to doctors in relation to PPE and contracting COVID-19 ($p < 0.05$ using a Kruskal-Wallis test).

Conclusion

We believe four recommendations are key to improve PPE measures and decrease anxiety: 1) nominated ward/department PPE champions; 2) anonymized reporting for PPE concerns; 3) formal PPE education sessions; and 4) drop-in counselling sessions for staff. We hope the insight and recommendations from this study can improve the PPE situation and maintain the health and wellbeing of the clinical work force, in order to care for COVID-19 patients safely and effectively.

Cite this article: *Bone Joint Open* 2020;1-5:131–136.

Keywords: COVID-19, Personal Protective Equipment, Healthcare recommendations

Key points

- This evaluation provides an insight into staff awareness of PPE guidance, perceptions of PPE measures, and anxiety regarding PPE use whilst caring for patients during the COVID-19 pandemic.
- These timely and relevant recommendations may help hospitals improve the PPE situation and decrease anxiety amongst

clinical staff, helping them care for patients safely at this challenging time.

Introduction

The COVID-19 pandemic has necessitated unprecedented change within our hospitals across the world. As health care professionals, we are working at a very challenging

Correspondence should be sent to Thomas Key; email: thomaskey88@gmail.com

doi: 10.1302/2633-1462.15.BJO-2020-0027.R1

Bone Joint Open 2020;1-5:131–136.

time to ensure that we are still able to provide safe and effective care to patients. Personal protective equipment (PPE) is important to protect both patients and staff, while caring for those with suspected or confirmed COVID-19 infection.¹ High numbers of healthcare workers infected with COVID-19 have been reported in China (3,300) and Italy (20%).² Devastatingly, NHS healthcare workers have sadly died after contracting COVID-19.³ With the ongoing increase in case numbers of COVID-19, issuing clear PPE guidance and ensuring adequate supply of appropriate PPE for healthcare workers has been an enormous task for our government and healthcare organisations. Criticism has been rampant in the mainstream media, focusing on shortages of PPE for frontline healthcare workers with some staff describing that their lives are at risk due to PPE failings.⁴ The British Medical Association and the Royal College of Surgeons have issued press releases after conducting their own surveys demonstrating shortfalls in the supply of PPE to those caring for patients with COVID-19.^{5,6} Clinicians within our orthopaedic department observed, first-hand, high levels of staff anxiety both on the wards and in the emergency department relating to the PPE use while caring for COVID-19 patients. We planned to formally evaluate this to gain an insight into the wider perception of PPE among staff within our health board. To our knowledge, no studies have been published to date that evaluate, among all healthcare professionals in the clinical setting, the awareness of PPE guidance, perceptions of PPE measures and attitudes and anxiety relating to PPE use while caring for COVID-19 patients. Our objective was to provide this insight by conducting a snapshot evaluation of clinical staff using PPE within our university teaching hospital. We aimed to compare the responses of doctors, nurses, and other healthcare professionals (OHCPs).

The three aims of the study were:

- 1) To evaluate the awareness of PPE guidance among staff;
- 2) To explore the staff perception of the PPE measures; and
- 3) To evaluate attitudes and concerns of staff using PPE while caring for patients with confirmed or suspected COVID-19.

The objective was to use the information gained from the clinical workforce of our hospital, to develop recommendations relevant to the workforce caring for patients with COVID-19 in all hospitals to help improve PPE awareness, staff perceptions, and decrease anxiety levels among the hospital workforce at this challenging time.

Methods

This service evaluation was performed among clinical staff at a university teaching hospital by our orthopaedic research team. An online questionnaire was designed and hosted using the online site Survey Monkey (San Mateo,

California, USA). The questionnaire was composed of a series of statements relating to PPE and COVID-19. Participants indicated their response using a five-point Likert scale graded from 5 for strongly agree to 1 for strongly disagree. Questions were grouped into the three key themes, based on the three aims of the study. The study was approved and registered by the hospital research team and following discussion at the hospital executive board meeting. The questionnaire was first trialled with 15 members of staff comprising of doctors, nurses and OHCPs. Open questions relating to questionnaire content, wording, and relevance to clinical practice were asked. Participants were also asked if they believed the study was worthwhile and if any questions should be changed. The overall feedback was that the study was relevant, content was appropriate, and questions were worded clearly. Face validity and relevance of the questionnaire was therefore ensured. As the questionnaire related to the measurement of specific facts rather than underlying trait measurements, no other forms of validity testing were required. Trial participants agreed that the study would provide worthwhile information about PPE awareness, perceptions, and staff anxiety within the health board.

The study was launched online and staff were invited to take part by clicking a hyperlink or scanning a matrix barcode (QR code) shared by email, social media, and posters displayed in clinical areas. An information sheet at the beginning of the questionnaire outlined the background and study aims and included statements about confidentiality, consent, and data use. The inclusion criteria were all staff working in clinical areas of the hospital including doctors, nurses and OHCPs (such as physiotherapists, radiographers, occupational therapists, dieticians, and healthcare assistants). Clear guidance has been issued for clinical staff in secondary care regardless of their role or level of training.⁷ Therefore, no further information such as sub-specialized staff role or level of training was collected. Data was collected over the course of six days in order to present findings at the next executive health board meeting. Data was extracted from the Survey Monkey hosting site and analyzed using the statistic package SPSS V25 (IBM, Armonk, New York, USA). For each question, descriptive statistics were used to analyze the answers. In order to demonstrate subtle shifts in responses, results for both the median and the mean were presented, as well as a measure of spread, namely, the standard deviation (SD). Non-parametric statistical tests were used here because the data was ordinal and so it was not normally distributed. The Kruskal-Wallis test (i.e. non-parametric one-way analysis of variance (ANOVA)) was used to compare results across all three groups for each question. In order to test results for each subject group further (and individually) against the mid-range value for the five-point Likert scale (i.e. 3 =

Table I. Results of questions relating to PPE awareness.

| Question | n | 5 (%) | 4 (%) | 3 (%) | 2 (%) | 1 (%) | Mean (SD) | Median |
|---|-----|-------|-------|-------|-------|-------|-------------|--------|
| I have a good level of knowledge about the COVID-19 pandemic | 314 | 56.1 | 27.7 | 13.4 | 2.9 | 27.7 | 4.09 (0.72) | 4 |
| I am familiar and up to date with the government public health PPE guidelines while caring for patients in hospital | 315 | 51.4 | 30.5 | 11.4 | 5.7 | 1.0 | 4.05 (0.86) | 4 |
| I am aware of the trust PPE guidelines relevant to my clinical area | 315 | 51.4 | 33.0 | 10.2 | 4.4 | 1.0 | 4.11 (0.83) | 4 |

Responses are coded as 5 = strongly agree, 4 = agree (positive response), 3 = neither agree nor disagree (neutral response), 2 = disagree, and 1 = strongly disagree (negative response).

PPE, personal protective equipment.

Table II. A comparison of PPE awareness between staff groups.

| Questions | Nurse (n = 113 or 114) | | Doctor (n = 110) | | OHCPs (n = 91) | | p-value* |
|---|------------------------|----------------|------------------|----------------|----------------|----------------|----------|
| | Mean | Median | Mean | Median | Mean | Median | |
| I have a good level of knowledge about the COVID-19 pandemic | 3.92 | 4 [†] | 4.34 | 4 [†] | 3.99 | 4 [†] | < 0.001 |
| I am familiar and up to date with the government public health PPE guidelines while caring for patients in hospital | 3.91 | 4 [†] | 4.26 | 4 [†] | 3.96 | 4 [†] | 0.003 |
| I am aware of the trust PPE guidelines relevant to my clinical area | 4.03 | 4 [†] | 4.34 | 4 [†] | 3.95 | 4 [†] | 0.001 |

*Kruskal-Wallis test; †highly significant differences with Wilcoxon signed rank test (i.e. $p < 0.001$) to the mid-range value of 3 (i.e. still significant even after Bonferroni corrections).

OHCPs, other healthcare professionals; PPE, personal protective equipment.

“neither agree nor disagree”), the Wilcoxon signed-rank test was carried out for each question. Each subject group (doctors, nurses, and OHCPs) were compared separately against this “test value” of 3.

Results

Overall, 315 staff participated in the study comprising of 110 doctors (34.9%), 114 nurses (36.2%), and 91 OHCPs (28.9%).

1) Awareness of PPE guidance. Results showed high levels of awareness of the PPE guidance among all three groups of staff relating to knowledge of COVID-19 (83.8% responded “agree or strongly agree”), familiarity with government public health PPE guidelines (81.9% responded “agree or strongly agree”), and awareness of the health board’s PPE guidelines (84.4% responded “agree or strongly agree”). Results are shown in more detail in Table I.

As shown in Table II, the Kruskal-Wallis test indicated that significant differences ($p < 0.05$) occurred across the three subject groups, where doctors had significantly higher ratings for all three questions relating to COVID-19 knowledge and PPE awareness compared to nurses and OHCPs.

2) Perception of PPE measures. In all, 52.4% of staff responded that they either agreed or strongly agreed that they were provided with adequate PPE in their field of work as per the government public health guidelines. Similarly, 55.2% of staff stated that they either agreed or strongly agreed that they had received formal PPE training and 45.1% responded that they either agreed or strongly agreed that they felt well supported by the hospital with

any concerns or requirements they had. These results are shown in Table III.

Significant differences occurred across all groups ($p < 0.05$, Kruskal-Wallis test), Table IV. Doctors again had significantly higher ratings for all three questions relating to perception of the health board PPE measures and perceived support from the health board. Indeed, doctors demonstrated median scores that were significantly ($p < 0.05$) higher than the mid-range value of 3 (i.e. “neither agree not disagree”) via the Wilcoxon signed-rank test, whereas nurses and OHCPs were not significantly ($p \geq 0.05$) different to this mid-range value using the same test. Nursing staff demonstrated mean and median values that are lower than this mid-range value of 3 for the question relating to formal training, although again this was not significant. This result indicates an unfavourable outcome here, i.e. that they were dissatisfied with the level of formal PPE training.

3) Attitudes towards PPE and COVID-19. Staff demonstrated a strong work ethic with 67.9% saying that they either agreed or strongly agreed that they were still keen to come to work despite COVID-19. Staff showed high levels of anxiety with 87.4% responding that they either agreed or strongly agreed that they were worried about contracting coronavirus despite wearing PPE and 81.8% saying that they either agreed or strongly agreed that they were worried about transmitting the disease to their family by coming to work. These results are shown in Table V.

Nursing staff and OHCPs had significantly higher levels of anxiety compared to doctors relating to concerns about contracting COVID-19 and anxiety about transmitting the

Table III. Results of questions relating to perceptions of PPE measures.

| Question | n | 5 (%) | 4 (%) | 3 (%) | 2 (%) | 1 (%) | Mean (SD) | Median |
|--|-----|-------|-------|-------|-------|-------|-------------|--------|
| I am provided with adequate PPE in my field of work as per the government public health guidelines | 315 | 17.5 | 34.9 | 18.4 | 21.6 | 7.6 | 3.33 (1.21) | 4 |
| I have received formal PPE training including donning/doffing and fit testing if applicable to my area of work | 315 | 27.9 | 27.3 | 9.8 | 20.6 | 14.3 | 3.34 (1.44) | 4 |
| I feel well supported by the hospital/health board with any concerns and requirements I have at this time | 315 | 11.1 | 34.0 | 25.4 | 21.0 | 8.6 | 3.18 (1.14) | 3 |

Responses are coded as 5 = strongly agree, 4 = agree (positive response), 3 = neither agree nor disagree (neutral response), 2 = disagree, and 1 = strongly disagree (negative response).
PPE, personal protective equipment.

Table IV. A comparison of PPE measures between staff groups.

| Questions | Nurse (n = 114) | | Doctor (n = 110) | | OCHPs (n = 91) | | p-value* |
|--|-----------------|------------------|------------------|----------------|----------------|----------------|----------|
| | Mean | Median | Mean | Median | Mean | Median | |
| I am provided with adequate PPE in my field of work as per the government public health guidelines | 3.14 | 3 [‡] | 3.67 | 4 [†] | 3.15 | 3 [‡] | 0.001 |
| I have received formal PPE training including donning/doffing and fit testing if applicable to my area of work | 2.88 | 2.5 [‡] | 4.05 | 4 [†] | 3.05 | 3 [‡] | < 0.001 |
| I feel well supported by the hospital/health board with any concerns and requirements I have at this time | 2.89 | 3 [‡] | 3.49 | 4 [†] | 3.16 | 3 [‡] | 0.001 |

*Kruskal-Wallis test; †highly significant differences with Wilcoxon signed rank test (i.e. $p < 0.001$) to the mid-range value of 3 (i.e. still significant even after Bonferroni corrections); ‡non-significant differences with Wilcoxon signed rank test (i.e. $p > 0.05$) to the mid-range value of 3.
OCHPs, other healthcare professionals; PPE, personal protective equipment.

Table V. Results of questions relating to staff attitudes and anxiety.

| Question | n | 5 (%) | 4 (%) | 3 (%) | 2 (%) | 1 (%) | Mean (SD) | Median |
|---|-----|-------|-------|-------|-------|-------|-------------|--------|
| I am keen to come to work in the hospital at this unprecedented time | 315 | 33.3 | 34.6 | 15.2 | 11.4 | 5.4 | 3.79 (1.18) | 4 |
| I am worried about contracting COVID-19 myself in spite of wearing PPE | 314 | 44.1 | 43.3 | 6.7 | 5.1 | 1.0 | 4.24 (0.86) | 4 |
| I am anxious or worried about transmitting the disease to my family by coming to work | 315 | 47.1 | 34.7 | 10.5 | 5.7 | 0.9 | 4.19 (0.97) | 4 |

Responses are coded as 5 = strongly agree, 4 = agree (positive response), 3 = neither agree nor disagree (neutral response), 2 = disagree, and 1 = strongly disagree (negative response).
PPE, personal protective equipment.

disease to their family. However, the Wilcoxon signed-rank test indicated that all three subject groups had median values that were significantly greater than the mid-range value of 3 for questions relating to anxiety. These results are shown in Table VI. This indicates again that all subject groups demonstrated high levels of anxiety.

Discussion

The orthopaedic clinicians within our research team had all observed first-hand, the concerns of clinical staff members across the hospital surrounding PPE during the COVID-19 pandemic. Our evaluation provided live feedback to the executive board to allow recommendations to be rapidly implemented to improve the clarity of guidance and PPE measures and decrease staff anxiety levels. We think it is a testament to the strength of character and strong work ethic of the hospital workforce that despite the challenges and adversity we face in the current health

climate, 67.9% of clinical staff are still keen to work in the hospital to help win the battle against the biggest healthcare challenge of our generation. We work with highly educated colleagues with a strong commitment to continued professional education as evidenced by the high level of knowledge staff reported about COVID-19 and a high level of awareness of both the government and local PPE guidelines. It is of concern, however, that only 52.4% of staff felt adequate PPE was provided in their clinical area. Additionally, a low percentage of the workforce felt supported by the health board with their concerns or requirements. We believe this represents the current level the anxiety and vulnerability experienced by our healthcare workers caring for the sickest patients on the clinical frontline in the fight against coronavirus. With reports from China outlining the more drastic PPE measures they implemented, staff may simply believe that some of the recommended measures in the UK,

Table VI. A comparison of attitudes and anxiety between staff groups.

| Question | Nurse (n = 114) | | Doctor (n = 110) | | OHCPs (n = 90 or 91) | | p-value* |
|---|--------------------|--------|---------------------|--------|-------------------------|--------|----------|
| | Mean | Median | Mean | Median | Mean | Median | |
| I am keen to come to work in the hospital at this unprecedented time | 3.45 | 4† | 4.2 | 4† | 3.73 | 4† | < 0.001 |
| I am anxious or worried about transmitting the disease to my family by coming to work | 4.34 | 5† | 3.94 | 4† | 4.33 | 5† | 0.001 |
| I am worried about contracting COVID-19 myself in spite of wearing PPE | 4.44 | 5† | 4.09 | 4† | 4.19 | 4† | 0.003 |

*Kruskal-Wallis test; †highly significant differences with Wilcoxon signed rank test (i.e. $p < 0.001$) to the mid-range value of 3 (i.e. still significant even after Bonferroni corrections).

OHCPs, other healthcare professionals; PPE, personal protective equipment.

provide inadequate levels of protection.^{7,8} It is a recognized part of human nature that inadequate education combined with uncertainty can lead to fear which in turn can manifest in anxiety.⁹ Based on the insights of our study exploring the responses of all groups of clinical staff, we make four recommendations applicable to all hospitals. We believe these measures can heighten PPE awareness, improve staff perceptions of PPE measures taken in the hospital, and lower anxiety levels among the clinical workforce.

1) Nominated ward/department PPE champions. As demonstrated by the introduction of flu jab champions, we know that empowering hospital staff can lead to higher compliance and increased engagement with new hospital measures.¹⁰ We believe the same model can be applied to PPE in clinical areas of the hospital. We advocate each ward nominating a PPE champion. This would provide a known point of contact for staff in their clinical area. We know that COVID-19 does not discriminate and that all staff in contact with confirmed or suspected COVID-19 patients are at risk. Many in the OHCPs group visit multiple areas of the hospital. We recommend that the nominated PPE champion should engage with each healthcare worker entering their clinical area. This should not only ensure appropriate awareness for all staff regarding the PPE relevant to their clinical area by providing clear and consistent advice, but also reassure staff, alleviating any anxiety they may have, at the first point of contact.

2) Anonymized reporting for PPE concerns. It is reported that participant anonymity can improve study response rates.¹¹ Our study has demonstrated that staff are willing to give their opinion freely when they understand that results are anonymised for the purpose of data analysis. Unfortunately, within the healthcare system there is still a degree of fear about whistleblowing and its potential consequences for the individual as demonstrated by a recent landmark case.¹² We believe that it is of paramount importance that any staff, regardless of their grade or role should be able to report any PPE concerns directly to hospital management. We recommend an online or paper system for anonymously reporting concerns relating to PPE supply or the implementation of PPE guidelines.

This should allow issues to be highlighted early and in real-time so that issues can be addressed in a timely manner to ensure that neither patients nor staff are put at risk.

3) PPE education sessions. The Latin phrase 'ipsa scientia potestas est' (knowledge itself is power) is more pertinent than ever. The huge number of scientific publications since the start of the COVID-19 pandemic is testament in itself to the role of evidence-based medicine from the scientific community in the race to understand and combat the coronavirus. Misinformation or fake news has already had huge implications in the COVID-19 pandemic, as shown, for example, by the 5G coronavirus conspiracy.¹³ It is a crucial that all hospitals ensure their staff are adequately trained and educated about COVID-19 and PPE. We believe that the high levels of anxiety surrounding the perception of hospital PPE measures is due, in part, to a perceived lack of training among staff. We recommend that all hospitals highlight the department of health PPE training videos to their staff and offer educational drop-in sessions for any healthcare workers requesting more formal training.¹⁴ We must ensure that all clinical staff are encouraged to understand the scientific evidence behind the PPE recommendations and are able use PPE correctly.

4) Drop-in counselling sessions. Most hospitals have cancelled planned outpatient clinics and elective activities in preparation for caring for COVID-19 patients. As a result, large numbers of clinicians are being redeployed to other areas of the hospital. Among these workers are psychiatrists and psychologists. Hospitals in parts of the world that have been hit hardest by the coronavirus have recognized the importance of mental health support for their clinical staff.¹⁵ Hospitals, particularly at this time, have a duty to support their staff not only by protecting their physical health with PPE, but also by protecting their mental health. We encourage hospitals to run drop-in counselling sessions for staff to assist the mental wellbeing of those working to help others during this pandemic. The concern is that high anxiety levels may result in staff sick leave, which may compromise the ability of hospitals to provide an adequate level of care for patients. Counselling sessions to alleviate staff anxiety can help to reduce this problem. We must, after all, protect the

health and wellbeing of the staff in our hospitals in order to care for our patients safely and effectively.

Conclusion

During the COVID-19 pandemic, our hospitals have made huge adaptations in order to care for patients with coronavirus while maintaining a service for patients with other healthcare emergencies. Day-to-day and week-to-week, we have been faced with new challenges within our different departments, specialities, and healthcare disciplines. PPE arguably represents one of the most significant challenges that has faced our healthcare system during the coronavirus pandemic. It has presented challenges both with supply and implementation of safe PPE measures in order to protect the health of our staff caring for COVID-19 patients. We aimed to provide a snapshot insight of the live PPE situation for our clinical staff to enable us to make recommendations to improve the PPE situation for staff within our hospital and across the NHS. During a period of huge change within the hospital system, particularly with dynamic rota changes for all staff, fluctuating levels of staff illness and significant departmental restructuring, we acknowledge that this study does not represent a comprehensive evaluation of PPE across all staff in the hospital. However, we aimed to adopt a pragmatic approach to data collection during this unprecedented time, in order to provide an insight and make timely, relevant recommendations regarding PPE. We hope these recommendations can benefit clinical staff working in NHS hospitals by increasing the clarity and consistency of PPE guidance, hospital PPE measures and most importantly, decrease staff anxiety levels surrounding PPE use. We believe that these measures have an important role in helping staff to care for patients safely and effectively for the remainder of the COVID-19 pandemic.

Twitter

Follow T. Key @tomkey88

References

- Public Health England.** COVID-19: Infection prevention and Control. Available from <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control> (date last accessed 21 April 2020).
- Listed AN.** COVID-19: protecting health-care workers. *The Lancet.* 2020; 395(10228):922.
- Marsh S.** Doctors, nurses, porters, volunteers: The UK health workers who have died from COVID 19. Available from. <https://www.theguardian.com/world/2020/apr/16/doctors-nurses-porters-volunteers-the-uk-health-workers-who-have-died-from-covid-19> (date last accessed 21 April 2020).
- Roberts M.** Are NHS staff getting the protective gear they need? Available from. <https://www.bbc.com/news/health-52254745> (date last accessed 21 April 2020).
- Royal College of Surgeons.** 'Postcode lottery' of PPE, survey of surgeons finds. Available from. <https://www.rcseng.ac.uk/news-and-events/media-centre/press-releases/postcode-lottery-of-ppe/> (date last accessed 21 April 2020).
- Bateman M.** BMA survey finds doctors' lives still at risk despite PPE pledges. <https://www.bma.org.uk/news-and-opinion/bma-survey-finds-doctors-lives-still-at-risk-despite-government-pledges-on-ppe> (date last accessed 21 April 2020).
- England PH.** Recommended PPE for healthcare workers by secondary care inpatient clinical setting, NHS and independent sector. Available from. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879107/T1_poster_Recommended_PPE_for_healthcare_workers_by_secondary_care_clinical_context.pdf (date last accessed 21 April 2020).
- Ligen Y.** Editor-in-Chief. Handbook of COVID-19 Prevention and Treatment, 2020.
- Steimer T.** The biology of fear- and anxiety-related behaviors. *Dialogues Clin Neurosci.* 2002;4(3):231–249.
- Aziz A-M.** Improving influenza vaccine uptake in frontline staff. *Br J Nurs.* 2013;22(21):1214–1220.
- Saleh A, Bista K.** Examining factors impacting online survey response rates in educational research: perceptions of graduate students. *Journal of Multi-Disciplinary Evaluation.* 2017;13(29):63–74.
- Dyer C.** Junior doctor withdraws claim that whistleblowing ruined his career. <https://www.bmj.com/content/363/bmj.k4356> (date last accessed last accessed 21 April 2020).
- Mintz L.** The 5G coronavirus conspiracy theory: anatomy of a fake news virus. <https://www.telegraph.co.uk/health-fitness/body/5g-coronavirus-conspiracy-theory-origins-anatomy-fake-news-virus/> (date last accessed 21 April 2020).
- England PH.** COVID-19: Donning of Personal Protective Equipment (PPE). Available from. https://www.youtube.com/watch?v=kKz_vNGsNhc&feature=youtu.be (date last accessed 21 April 2020).
- Chen Q, Liang M, Li Y, et al.** Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry.* 2020;7(4):e15–e16.

Author information:

- T. Key, BSc, MBChB, MRCS, Orthopaedic ST5 Wales Deanery
- N. J. Mathai, MS Orthopaedics, DNB Orthopaedics, MRCS, Senior Clinical Fellow
- A. S. Venkatesan, MBBS, Dip Orthopaedics, DNB Orthopaedics, Junior Clinical Fellow
- K. Mohanty, MBBS, D Orthopaedics, DNB Orthopaedics, MSc, FRCS Ortho, Consultant in Trauma and Orthopaedics
- D. Farnell, BSc, PhD, Senior Lecturer in Medical Statistics, School of Dentistry, Cardiff University, Cardiff, UK.

Author contributions:

- T. Key: Led and designed the study, Designed questionnaire and questionnaire piloting, Collected and analyzed the data, Wrote and revised the manuscript.
- N. J. Mathai: Study design, questionnaire design, data collection and manuscript editing.
- A. S. Venkatesan: Designed questionnaire, Collected data, Edited the manuscript.
- D. Farnell: Designed the study, Designed questionnaire, Carried out statistical analysis, Edited the manuscript.
- K. Mohanty: Designed the study, Designed questionnaire, Collected the data, Edited the manuscript, Supervising consultant.

Funding statement:

- No benefits in any form have been received or will be received from a commercial party relating directly or indirectly to the subject of this article.

ICMJE COI statement:

- T. Key reports being an Orthopaedic ST5 training Registrar employed as a surgeon by Cardiff & Vale University Health Board, which is unrelated to this article. N. Mathai reports being a Senior Clinical Fellow employed as an Orthopaedic Registrar Surgeon by Cardiff & Vale University Health Board, which is unrelated to this article. K. Mohanty reports being a Trauma & Orthopaedic Consultant employed as a Pelvic Trauma Surgeon by Cardiff & Vale University Health Board, which is unrelated to this article. A. Venkatesan reports being a Junior Clinical Fellow employed as an Orthopaedic SHO Doctor by Cardiff & Vale University Health Board, which is unrelated to this article.

Acknowledgements:

- We would like to thank the 315 staff members who took part in the survey.

© 2020 Author(s) et al. This is an open-access article distributed under the terms of the Creative Commons Attribution licence (CC-BY-NC-ND), which permits unrestricted use, distribution, and reproduction in any medium, but not for commercial gain, provided the original author and source are credited.