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Redeployment of Surgical Trainees to Intensive Care During the COVID-19 Pandemic: Evaluation of the Impact on Training and Wellbeing

Anna Payne, MRCS,* Rafid Rahman, MRCS,† Roberta Bullingham, BMBS, BVSc, BSc (Hons), MRCS,† Sarita Vamadeva, FRCS,*, and Maryam Alfa-Wali, Med, FRCS, PhD†

*Royal London Hospital, Department of Plastic and Reconstructive Surgery, London, United Kingdom; and †Royal London Hospital, Department of General Surgery, London, United Kingdom

OBJECTIVE: The aim of this study was to evaluate the impact of redeployment of surgical trainees to intensive care units (ICUs) during the COVID-19 pandemic—in terms of transferrable technical and nontechnical skills and wellbeing.

DESIGN: This was a survey study consisting of a 23-point questionnaire.

SETTING: The study involved surgical trainees that had been redeployed to the ICU across all hospitals in London during the COVID-19 pandemic.

PARTICIPANTS: The survey was sent to 90 surgical trainees who were between postgraduate years 2 to 4. Trainees in specialty training programs (>5 years after graduation) were not included. Thirty-two trainees responded to the questionnaire and were included in the study results.

RESULTS: All respondents spent between 4 and 8 weeks working in ICU. Prior to redeployment, 78% of participants had previous experience of ICU or an affiliated specialty, and >90% had attended at least 1 educational course with relevance to ICU. There were statistically significant increases in confidence performing central venous cannulation and peripheral arterial catheterisation ($p < 0.05$). With regards to clinical skills, respondents reported feeling more confident managing ventilated patients, patients on noninvasive ventilation, dialysis, and circulatory failure patients after working in ICU. Respondents (97%) felt that the experience would be beneficial to their future careers but 53% felt the redeployment had a negative impact on their mental health.

CONCLUSIONS: Redeployment of surgical trainees to ICU led to increased confidence in a number of technical and nontechnical skills. However, proactive interventions are needed for training surgeons with regard to their psychological wellbeing in these extraordinary circumstances and to improve workforce planning for future pandemics. (J Surg Ed 78:813—819. © 2020 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: COVID-19, Pandemic, Wellbeing, Workforce, Surgical training

COMPETENCIES: Professionalism, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

The World Health Organisation declared the coronavirus disease 2019 (COVID-19) a pandemic on 12 March 2020.¹ The demand for ventilatory support in COVID-19 patients necessitated an expansion of intensive care capacity within weeks. Between early March and mid-April 2020, London’s existing hospitals expanded their combined intensive care capacity from 770 to 1550 beds.² The additional pressure on the National Health Service in the United Kingdom (UK) led to a significant reshaping of the management of non-COVID-19 related conditions in an attempt to preserve intensive care capacity and protect patients and healthcare professionals from viral exposure. The surge in patients with COVID-19 necessitated the cancelling of elective surgical procedures and outpatient clinics. This reduction in surgical activity combined with increased critical care staffing requirements led to the...
redeployment of several surgical trainees to intensive care units (ICU) throughout the UK. London became the epicentre of the UK with the greatest number of COVID-19-related critical care admissions.²

The ICU is a challenging working environment, managing complicated medical and surgical patients whilst also preventing further physiological dysfunction.³ The ICU is often only visited fleetingly by surgeons during a ward round or postoperatively, but with the COVID-19 pandemic it became the new working environment for the re-deployed. A pandemic like COVID-19 disrupts the sense of routine and control, making working environments stressful. This stress is amplified when the lives of the clinicians caring for patients are at risk. Learning how to manage a patient who is critically ill is beneficial to surgeons in training and forms part of the curriculum of core surgical training.⁴ Completion of The Royal College of Surgeons of England Care of the Critically Ill Surgical Patient course is mandatory prior to specialist training in the UK. The membership examinations which are also a prerequisite for starting specialist surgical training test the candidate on critical care.⁴

The aim of this study was to evaluate the impact of the redeployment of surgical trainees to critical care units during the COVID-19 pandemic in terms of transferrable skills, wellbeing and career development. The three core competences assessed in this paper, as per the Accreditation Council for Graduate Medical Education, are practice-based learning and improvement, systems-based practice, and professionalism.⁵ The results may provide insights into how to improve redeployment for future pandemics.

MATERIAL AND METHODS

Study Design

This was a survey study conducted using a questionnaire to explore the research aims. Participants were recruited from London hospitals.

Eligibility Criteria

Doctors working at postgraduate years 2 to 4 who were redeployed from surgical specialties to ICU during the COVID-19 pandemic were included. This encompassed core surgical trainees, foundation year 2 doctors and junior clinical fellows. All surgical specialties, and those redeployed for greater than 4 weeks between the months of March and May 2020 were included. Exclusion criteria included those already in specialty training (postgraduate year 5+) and those working at registrar (senior clinical fellow) level.

Pre-redeployment Training

All participants received training in both technical and non-technical skills, arranged by the intensive care department, prior to redeployment. The technical skills training included patient proning, insertion of central venous catheters and insertion of peripheral arterial lines in a simulated session. Teaching in non-technical skills included breaking bad news and discussion of resuscitation and ceilings of care with patients and relatives.

Questionnaire Design and Distribution

A novel 23-point survey questionnaire was devised to evaluate trainee experience, clinical skills, procedural skills, and nontechnical skills (Supplement 1). Practical skill competency was self-assessed by trainees evaluated using an arbitrary scale from 0 to 6 (0 being never observed the skill before and 6 being able to perform the skill independently). Pre- and post-redeployment skills were evaluated by trainees, who were asked to reflect on their skills prior to redeployment as compared to post-redeployment. A 5-point Likert scale⁶ was utilized to evaluate mental health and wellbeing. The questionnaire was distributed through online and paper format to 90 doctors redeployed to ICU in London hospitals as part of the COVID-19 pandemic.

Data Analysis

Normal continuous data are summarized as mean and standard deviation. Categorical data are presented as numbers and percentage (%). Continuous data were compared between pre- and post-deployment groups using Mann-Whitney U tests. A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS V.20 (SPSS Inc, 2012, Chicago, IL).

Ethics

With the recent guidance from the Governance arrangements for research ethics committees,⁶ the study involves a survey of staff of the services who are recruited by virtue of their professional role, no formal ethical approval is required by the research ethics committee. Completion of the questionnaire was taken as implied consent to participate in the study.

RESULTS

Trainee Demographics

The response rate was 36% (n = 32). This included 19 males (59%) and 13 females (41%), of whom 2 were foundation year doctors (FY2), 9 were clinical fellows, and 21 were core trainees both first and second year (CT1 and CT2). The surgical specialties of the trainees are shown in
Figure 1, including general surgery (41%), orthopaedic surgery (18%), plastic surgery (12%), and trauma (6%). The other surgical specialties made up the remaining 23%. The duration of redeployment varied from 4 to 8 weeks. Ninety-four per cent (n = 30) of the respondents were aiming for a career in a surgical specialty. Of the remaining 6 per cent (n = 2), 1 was undecided and the other wanted to pursue a career in general practice.

Prior Specialty Experience
Seventy-eight per cent (n = 25) reported previous experience in ICU and affiliated specialties including anesthetics, emergency medicine, and respiratory medicine. Time spent in these specialties ranged from 4 months to 2 years. Only 13 per cent (n = 4) had previous healthcare assistant or nursing experience prior to being redeployed.

Resuscitative Courses
Prior to the redeployment most trainees had taken a course in life support or managing the critically ill patient (Fig. 2). Over 90% of the participants had certification in Advanced Life Support. Seventy per cent (n = 21) had completed Advanced Trauma Life Support, which provides training on the management of acute trauma cases and involves practical skills teaching on vascular access, airway management and chest drain insertion. Forty per cent (n = 12) had completed Care of the Critically Ill Surgical Patient, which provides instruction on the care of critically ill surgical patients and includes ventilatory and tracheostomy management. Other courses included Basic Assessment and Support in Intensive Care, aiming to teach participants to rapidly assess seriously ill patients and provide initial treatment and organ support. The Emergency Neurological Life Support enables individuals to improve patient care and outcomes during the critical first hours of a patient’s neurological emergency, and the European Trauma Course is an alternative or adjunct to the Advanced Trauma Life Support course.

Technical Skills
Participants were asked about their confidence levels in selected practical skills (insertion of arterial lines, central lines, chest drains, and nasogastric tubes) before and after redeployment (Figure 3). A significant improvement was seen in the insertion of peripheral arterial catheters, with an increase in average score from 2.12 to 4.10 (p-value = 0.03). Respondents also reported increased confidence in central venous catheterisation, with an average predeployment score of 1.91 increasing to 3.60 (p-value = 0.01). Chest drain insertion increased from 2.48 to 2.84 and nasogastric tube insertion from 3.59 to 4.97, although these results were not statistically significant (p-value 0.99 and 0.09 respectively).

Scoring system: 0 = never observed, 1 = observed only, 2 = performed 0 to 4 times with supervision, 3 = performed 5 to 10 times, 4 = performed >10 times, 5 = performed unsupervised, and 6 = confident to perform unsupervised.

Clinical Skills
Clinical management skills in the context of recognising a clinical problem requiring treatment and/or treating a patient with a systemic issue were evaluated. Intensive care-specific clinical skills improved after redeployment. Respondents reported feeling more confident managing ventilated patients, patients on noninvasive ventilation, those with tracheostomies, dialysis, and circulatory failure patients after working in ICU. Only 19% (n = 6) of participants had assisted in proning a patient prior to the pandemic. After their redeployment, 72% (n = 23) participants had been actively involved in the proning of patients in a team-based setting.

Non-technical Skills
Although the majority of participants felt confident breaking bad news and discussing do not resuscitate orders before their redeployment, there was a small overall increase in confidence after working in ICU. Increased confidence was also reported for receiving critical care handover after working in ICU.

Wellbeing
When questioned about the impact of redeployment on their future surgical careers, 31% (n = 10) thought it would be extremely beneficial, 65% (n = 21) thought it would be of some benefit and only one person thought it would not be beneficial at all. Respondents (59%) were generally satisfied with the level of support they received throughout their time on ICU. Additionally, over 50% of the respondents felt the redeployment had a negative impact on their mental health (Fig. 4). The main themes of the areas
causing a negative impact on mental health are detailed in Figure 5. The majority (84%) of participants did not feel that they were more likely to pursue ICU as their specialty of choice after their redeployment. One participant reported wanting to change from surgery to intensive care medicine and four would consider a career in intensive care medicine as a result of their ICU redeployment.

DISCUSSION

The COVID-19 pandemic has irrefutably had an impact on surgical training and education. This study shows that redeployment of surgical trainees to ICU is beneficial in some domains. It demonstrates an improvement in technical skills, such as insertion of arterial and central lines, as well as complex communication with relatives and senior colleagues. Redeployment of surgeons to other specialties to deal with critically ill patients is inevitable when surgical services are reduced and there are increased staffing needs in other specialties such as ICU. A pandemic unites individuals and breaks down barriers between specialties, highlighted by surgeons working closely with colleagues from ICU and medical specialties during and following redeployment. If there are future waves of COVID-19 infection or any other future pandemic it is likely that surgeons will need to return to ICU. Our study aims to highlight lessons learnt and aid strategic workforce planning for any future pandemics. Prior to any redeployment, introductory training and availability of senior support is essential to ensure individuals work effectively and within their limitations. Reassignment of the members of the workforce should be based on their various competencies to other specialties such as the emergency department and ICU.

Rotation of trainees to other hospitals and specialties within the same hospital were halted to simplify staff allocation, reduce infection spread and minimize the training burden, both for the trainees and trainers. The Royal College of Surgeons of England issued guidance on the matter stating “additional opportunities for training and more surgical and clinical exposure should be identified.” The redeployment of trainees to ICU did allow development and improvement of technical and non-technical skills. Ghosh et al. have previously demonstrated that a high dependency unit attachment provided a valuable teaching and learning resource for surgical trainees. Therefore, whilst working in ICU, redeployed trainees should continue to work as part of the team with the opportunity to perform procedures and perform tasks in line with that of an ICU trainee.

Communication is a crucial part of working in ICU, especially during the COVID-19 crisis, as relatives were not allowed into hospitals in order to minimize spread of infection.
infection. Working in ICU was an opportunity to improve communication skills with patients, relatives and other senior decision makers as during each shift there were regular board rounds, ward rounds, and daily telephone conversations with relatives. Surgeons learnt how to conduct difficult and complex conversations by observing the ICU team, especially how to conduct non-face-to-face conversations with relatives where there is a loss of nonverbal communication adjuncts. The use of structured handovers used in ICU provided the opportunity to improve handover skills and to contribute to complex team decision-making. There have been no large studies on difficult communication skills training at present,9 as most teaching is delivered at undergraduate level. There have been opportunities during this redeployment period for surgical trainees to build on core competencies focused on communication skills and certain critical care procedures while addressing the clinical demands of ICU. Courses that focus on non-technical skills such as the Non-Technical Skills for Surgeons by the Royal College of Surgeons of Edinburgh and the Anaesthetic Non-Technical Skills course outline interpersonal and cognitive skills such as communication, leadership—task management, teamwork, situation awareness, and decision making10 should be undertaken by surgeons in training.

Concerns about future training are universal among surgical trainees. However, the Royal Colleges of Surgeons and Health Education England, which both oversee surgical training in the UK, have reassured trainees that the disruptions caused by the pandemic will be taken into account during appraisals11 and measures will be taken in future to address additional training needs precipitated by the COVID-19 pandemic. Post redeployment debrief sessions would allow surgical trainees to address concerns such as obtaining the necessary competencies to progress in their surgical career.

Whilst our study demonstrated an improvement in clinical skills, trainees reported a negative impact on mental health. A surgeon’s comfort zone is the operating theatre and working in an unfamiliar environment, such as the ICU, with new colleagues can be stressful. In addition to this, COVID-19 poses additional risks to personal safety and necessitates the use of personal protective equipment which causes discomfort and can damage the skin of the face.12 Surgeons should receive appropriate training and support when working in nonsurgical areas.11 Dewey et al.13 recognized “a supportive work culture is vital to maintaining resilience” during stressful times. The perceived lack of support reported by our respondents may have contributed to the negative impact on mental health. This is in addition to the emotional toll of the high mortality witnessed working in COVID-19 units. Education was perhaps placed on the back burner as the service needs were the main emphasis, but learning did come from redeployment as shown in this study.

Support of the wellbeing of trainees is of crucial importance and cannot be overstated.14,15 There is significant variation in the delivery of wellbeing support throughout

FIGURE 5. Mindmap diagram illustrating the main causes of a negative impact on mental health.
CONCLUSION
A pandemic with a novel disease, such as COVID-19, introduces many challenges to healthcare professionals and shifts focus from patient-centred to population-centred care. This includes the redistribution of health care workers in alignment with public health needs. Both the technical and nontechnical skills developed from the redeployment of surgical trainees to ICU will form part of their professional armamentarium for the future. Proactive rather than reactive wellbeing interventions are essential for surgeons in training with regards to their psychological health. The long-term impact of COVID-19 pandemic on surgical education is yet to be fully evaluated and more research will be required in the long-term. Close monitoring of trainees’ surgical development and mental health will be essential in alleviating the effects of this pandemic and improving our response in the future.

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the National Health Service, even between departments within the same hospital. Studies have suggested the introduction of a definition of wellbeing, with tangible outcome measures, may be useful in enabling staff to make better use of the wellbeing resources available to them. The prevalence of psychological morbidity is growing among doctors in the UK, and the report of burnout among doctors before the COVID-19 crisis was between 50% and 80%. Among the surgical workforce poor mental health conditions has been reported to be approximately 30% but this is possibly an underestimation. Burnout is associated with being undervalued and may become more apparent following the pandemic. It is important to assess and address the issues of burnout to mitigate against the potential sequelae of anxiety, depression, substance misuse, poor patient care, and clinician suicide. The symptoms of burnout which can become evident are emotional exhaustion and reduced sense of accomplishment. These symptoms should be assessed at regular intervals in surgical trainees during and after the pandemic. Surgeons should be encouraged to express their feelings of stress and not suppress them in the false perception that it will provide both individual and team benefit. Prevention of burnout and mental health sequelae after the pandemic will require leadership from the top down. Surgeons need to be more transparent about their psychological needs, and senior leaders should be encouraging and supportive of this. Structured leadership programmes should be incorporated into surgical training curricula, rather than courses that trainees are expected to attend of their own accord. Shared responsibility to support colleagues and encourage them not to continue working in the face of personal risk as selfless acts is essential.

The limitations of this study include the small number of participants resulting in the low response rate. Despite this, important aspects of the redeployment of surgical trainees to critical care have been elucidated. The reasons for the non-participation are multifactorial and may be due to fatigue, exhaustion, time constraints or a general decrease in participation. Wellbeing has not been extensively explored in this study but highlights areas of concern among surgical trainees. Another potential limitation is response bias, particularly in the context of reported improvement in technical and nontechnical skills. The Dunning-Kruger effect may play a role with some respondents whereby there is cognitive miscalibration with individuals overestimating their abilities and reporting more confidence in the presence of less experience. The evaluation of resuscitation skills was difficult to perform in this study as trainees had high levels of supervision and most decisions on clinical management were made by consultant-grade doctors. However, increased understanding of the acute presentations of COVID-19 and the management of its complications were reported.

CONTRIBUTIONS
AP - Conceptualisation, Methodology, writing, review and editing, RR - Methodology, data collection and analysis, editing, RB - Methodology, data collection, editing, SV - Conceptualisation, review and editing, MAW - Conceptualisation, methodology, writing, supervision

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SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jsurg.2020.09.009.