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Disruption to Surgical Training during Covid-19 in the United States, United Kingdom, Canada, and Australasia: A Rapid Review of Impact and Mitigation Efforts

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OBJECTIVE: To synthesise the current evidence of pandemic-related impact on surgical training internationally and describe strategies that have been put in place to mitigate disruption.

DESIGN: Rapid scoping review of publically available published web-literature.

SETTING: Five large English speaking countries; United States (US), United Kingdom (UK), Canada, Australia and New Zealand (NZ).

RESULTS: Recruitment and selection to residency programmes in the US, Australia and NZ has been largely unaffected. Canada has implemented video-conferencing in lieu of face-to-face interviews. The UK has relied upon trainee self-assessment for selection. Widespread postponement and cancellation of surgical board examinations was seen across the studied countries. Resident assessment-in-training and certification procedures have been heavily modified. Most didactics have moved online, with some courses and conferences cancelled where this has not been possible. None of the studied countries had a central mandate on resident operating privileges during Covid-19.

CONCLUSIONS: The collective response by international surgical training bodies to the dual challenges of safeguarding residents whilst minimising disruption to training has been agile and resident centred. The pandemic has exposed weaknesses in existing training systems and has highlighted opportunity for future improvement. (J Surg Ed 78:308–314. Crown Copyright © 2020 Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery. All rights reserved.)

KEY WORDS: Covid-19, Specialty selection, Assessment in training, International training

COMPETENCIES: Systems-Based Practice

INTRODUCTION

The Covid-19 pandemic caused by the novel zoonotic coronavirus *SARS-Cov-2* is currently wreaking medical, social, and economic havoc across the globe. The published academic literature of the impact of covid-19 has justifiably concentrated on the global scientific and clinical efforts to address the many threats of the pandemic. No facet of healthcare systems have been untouched by the disruption and this includes postgraduate surgical training, the impact on which has received minimal attention so far.

As surgical educators we are facing a uniquely challenging set of circumstances in delivering effective training, assessment and selection. Healthcare and education systems share a complex interdependent relationship where a delicate balance exists between population needs, health-system demands for professionals and supply of qualified individuals from education programs. As the output from our residency schemes are the future global surgical workforce, it is important to consider the effect of the pandemic on the training of postgraduate surgical residents both in the short and long-term. Selection into training, assessment and progression within residency schemes must continue to be robust despite...
the adverse circumstances, to ensure a continued supply of suitably competent surgeons.

Surgical training bodies have recently faced the considerable and unenviable challenge of having to rapidly mobilise the surgical resident workforce to augment the frontline clinical staffing response, whilst simultaneously safeguarding trainees and minimising disruption to established training systems.

The impact of the pandemic has the potential to lead to significant training disruptions affecting all resident levels and surgical specialties. The aim of this review is to synthesise the current evidence of pandemic-related impact on surgical training internationally and describe strategies that have been put in place to mitigate disruption.

**METHODS**

A rapid scoping review was undertaken of the publically available published pandemic-related web literature from the surgical training bodies of 5 large English-speaking countries; United States, United Kingdom, Canada, Australia and New Zealand (Australasia). Recent press releases, position statements and correspondence from the major training bodies were hand searched (last accessed 09 June 2020). A rapid review method was chosen to deliver a timely evidence synthesis within a quickly evolving situation. By mid-April 2020, 3 months after the director general of the World Health Organization declared a public health emergency of international concern, most surgical training organizations had communicated or published their respective mitigation strategies. This time point in the pandemic was therefore considered optimum to deliver this review.

**RESULTS**

The differences in resident numbers, pandemic epidemiology and status of elective surgical activity by country is summarized in Table 1. The US has by far the largest number of active surgical residents and also the largest Covid-19 burden.

Non-urgent elective surgical activity, a key source of training opportunity for residents, has been entirely stopped in the UK for a minimum of 3 months. The American College of Surgeons and Ministry of Health has recommended reduction of elective surgical activity in the US and Canada respectively, but this mandate is to be implemented regionally based on local healthcare need. Australia and New Zealand, with the smallest Covid-19 disease burden of the included countries, is the first to reopen elective surgical services, in a phased manner from early May 2020.

The current surgical training operational status and mitigation measures by country are presented against 5 key domains of activity; (1) recruitment and selection into residency programmes, (2) board examinations, (3) assessment, progression and certification within residency, (4) resident operating privileges, and (5) didactics (Table 2).

Recruitment and selection are pressing ahead for the 2020 residency intake in all reviewed countries. In the United States, residents may start their placements early without any fear of redress from contract breach. In the United Kingdom, the pandemic hit part way through the specialist training recruitment cycle, which forced training bodies to rapidly rewrite the rulebook on selection procedures. This has been streamlined to involve matching residents based solely on self-

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**TABLE 1.** Comparative Surgical Training and Pandemic Demographics for the US, UK, Canada, Australia, and New Zealand

| Administering body for surgical training | United States | United Kingdom | Canada | Australia and NZ |
|----------------------------------------|---------------|----------------|--------|------------------|
| Approximately number of active surgical residents | Accreditation Council for Graduate Medical Education, 19,780*14 | Royal College of Surgeons*, 43718 | Royal College of Physicians and Surgeons of Canada, 2045‡24 | Royal Australasian College of Surgeons (RACS), 2500©45 |
| Current status of elective surgical services | State specific, American College of Surgeons recommends minimizing, postponing or cancelling elective surgery, 22 | All non-urgent elective surgery suspended for >3 months16 | Region specific, Ministry of Health requested all hospitals to reduce, but not necessarily stop, elective surgery18 | Phased reopening elective services from early May 202019 |
| Covid-19 Cases (Deaths) | 1,961,185 (111,007) | 288,834 (40,680) | 97,779 (7910) | 8771 (124) |

*2017-18 figures.
†2018 figure estimate.
‡2015 figures.
§as of 09 June 2020 (to be updated as required).
| Domain                                                                 | Operational Status                                                                 | Mitigation Measures                                                                 |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1. Recruitment and selection to residency programmes                   | US                                   | 2020 main residency match cycle complete<sup>20</sup>                               |
|                                                                       | UK                                   | Interviews cancelled for 2020 recruitment, residency matching based on trainee self-assessment only<sup>21</sup> |
|                                                                       | Canada                               | 2020 Main Residency match (second iteration) is underway as planned. Decision pending re: future match cycles<sup>22</sup> |
|                                                                       | Aus/NZ                               | Selection for 2021 entry to continue subject to further updates<sup>23</sup>           |
| 2. Board Examinations                                                 | US                                   | May general surgery qualifying exam to be delivered virtually<sup>28</sup>            |
|                                                                       | UK                                   | All examinations cancelled until November 2020<sup>15</sup>                           |
|                                                                       | Canada                               | Spring 2020 exams postponed until September 2020<sup>22</sup>.                      |
|                                                                       | Aus/NZ                               | All examinations postponed until mid-september to end-november<sup>27</sup>.         |
| 3. Resident assessment, progression and certification                 | US                                   | ABMS and ACGME to endorse and rely upon judgement of Clinical Competence Committees and Training Directors<sup>30</sup> |
|                                                                       | UK                                   | Annual Review of Competence Progression to take place on a modified and reduced basis<sup>32</sup>. |

(continued)
assessment scores submitted as part of the application, which is a minority part of the usual National interview-based selection process. Canada will be conducting interviews by videoconference for second iteration interviews. All countries that were reviewed had cancelled non face-to-face recruitment methods for the 2021 residency selection process. The 2020 US residency match was completed relatively uneventfully.

Board examinations have been cancelled by all countries that were reviewed. The UK and Canadian Spring 2020 exams are postponed until at least September, and all higher surgical exams are delayed until mid-September to end-November in Australasia. The American Board of Surgery recently announced that the 2020 General Surgery qualifying exam will be administered virtually, with security handled by live video proctoring. Candidates who do not wish to sit the virtual exam may postpone.

Cancelled bookings are to be honored at the next examination diet in the UK and to be given priority booking in 2021 in the United States. In Canada, the oral examination has been rescinded from certification

| Domain                        | Operational Status | Mitigation Measures                                                                 |
|-------------------------------|--------------------|-------------------------------------------------------------------------------------|
| Canada                        |                    | Residents will be credited for redeployment time. Residents should not be required to extend training as a result of redeployment. |
| Aus/NZ                        | Surgical logbooks and competency assessments should be used to judge progress against curricula. | Speciality training boards to consider issues of lost training opportunity in judging progress on a case-by-case basis. Should an extension to training be required, the maximum time to complete training will also be extended. |
| 4. Resident operating privileges | US                 | Locally driven. Early evidence of emergency restructuring of training to preserve resident operating exposure but at a lower frequency. |
| UK                            | Canada             | Locally driven, encouraged to continue where feasible and safe to do so. |
| Aus/NZ                        |                    | No evidence                                                                         |
| 5. Didactics                  | US                 | Programs should continue provision where feasible. Conferences, journal clubs etc should continue wherever possible and utilise remote conferencing technology and web-based resourcing. Programs should document the activities they are providing during the crisis. |
| UK                            | All RCS-led courses postponed until September. Teaching and conferences to continue remotely where feasible | All course bookings cancelled March-August, residents will be deferred to later course date from September onwards. RCS offering Webinar programme and virtual learning environment resources have been made open access. |
| Canada                        | Decisions on provision to be led by individual programmes | Virtual teaching and learning resources are available from the royal college website. |
| Aus/NZ                        | All RACS face-to-face courses and events cancelled until September | Webinar programme available from RACS website. |
requirements for the 2020 resident cohort. The written test is being delivered in compliance with social distancing and personal protective equipment rules, and there are efforts underway to expand test sites to reduce travel burden on candidates.32

Resident assessment, progression and certification are key functions of surgical training providers. Significant departures from usual practice are occurring by virtue of necessity to ensure continued throughput of residents. In the US, the American Board of Surgery is accepting a 10% decrease in time requirement for the 2019-20 year,20 and nonvoluntary offsite educational activity can be counted towards clinical time.40 In Canada residents will be credited for redeployment time and should hence be relatively protected from training extensions.31 In the United Kingdom32 and Australasia,23 specialty training boards are considering issues of lost-training opportunity on a case-by-case basis. If training extensions are required, these will be non-punitive and the maximum time to complete training will be extended.

No statements on resident operating privileges during the pandemic were found for any country. In the United States, there is a recent report of an emergently reconfigured surgical residency program,25 which has been skillfully designed to maximize training opportunity, including OR time, and minimize risk to residents. The American Board of Surgery has said they will accept a 10% reduction in logbook numbers for the 2019 to 2020 training year in recognition of the difficulties residents may have in accessing the OR.20

Face-to-face didactics such as courses and conferences have been widely postponed across the included countries until at least September 2020.25,34 Curricular teaching provision is being made available using webinars or remote conferencing technology, and appears to be locally driven by individual training programmes. In the UK, the Royal College of Surgeons virtual learning environment resources have been made open access during the pandemic to facilitate e-learning.35 The American College of Surgeons has recommended that programmes document their didactic provision during the pandemic.36

**DISCUSSION**

Surgical residency in the included countries remains largely time based rather than competency based, with the notable exception of Canada11 who have a thriving portfolio of competency based residency programmes.38 Assessment for progression in time-based models of training is highly dependent on exposure to, and performance of, a prescribed ‘minimum indicative’ number of surgical procedures during residency training.39

Surgical residents may be particularly badly affected by pandemic related service reconfiguration as compared to their medical counterparts, as many of the required competencies for surgery can only be obtained in the elective setting. The widespread suspension of elective surgical services in the United States, United Kingdom, and Canada, and a rumored unofficial moratorium on residents operating during the pandemic will inevitably jeopardize the attainment of competencies required for progression within surgical training programs.

Despite widespread assurance21,40 that surgical training bodies do not wish to penalise residents for situations beyond their control, training extensions will be inevitable in a prolonged epidemic scenario. Clearly a balance needs to be struck between ensuring quality and maintaining progression without any imposed extensions being unduly burdensome. The introduction of a special covid-19 ‘no-fault’ training extension outcome code for the Annual Review of Competency Progression assessment in the United Kingdom is a creative example of how the traditional stigma associated with training extensions can be avoided. It is anticipated that in the United Kingdom training extensions will be largely restricted to residents at critical progression points or at the very end of training.41

Accreditation bodies will need to demonstrate flexibility in how they sign off residents who are at the end of their training but who have been denied the opportunity to sit board examinations in the conventional timeframe. Whilst passing these exams continues to be a requirement for completing training in Canada,22 local mechanisms can be invoked to provide graduating residents with provisional licenses until they can be given the opportunity to sit examinations.

Similarly, recruitment into residency has had to continue to ensure an uninterrupted supply of doctors. The pandemic has exposed weaknesses in the recruitment systems in the United Kingdom, who have become suddenly reliant on using self-assessment scores alone to appoint new residents.21 The predictive validity of self-assessment from previous recruitment rounds has not been formally examined or reported, which has led to concerns amongst prospective UK surgical residents that selection may be unconsciously biased. Canada42 has managed to set up remote interviews for prospective residents, and fortunately the US20 and Australasia23 resident recruitment rounds were largely complete before the onset of the pandemic and have hence been relatively unaffected.

**CONCLUSION**

The principle challenges for surgical education bodies in a rapidly evolving pandemic are to safeguard residents
whilst minimizing disruption to training in the short term and to continue to recruit, assess and certify residents to ensure the supply of high-caliber surgeons in the long term. The collective response to these challenges by the main surgical training bodies in the United States, United Kingdom, Canada, and Australasia has been agile and resident-centered.

Positive change in the postgraduate surgical education community may result from this difficult time. Perhaps the convenience of using webinar to deliver some aspects of didactic teaching in surgical residency will continue once life returns to normal. The pandemic has also exposed the continued reliance on time-based training, the weaknesses in existing recruitment systems and has brought the gift of opportunity to study the progress of the "Covid cohort" of residents. This is certainly fertile ground for training systems improvements once the pandemic is over.

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