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Review

Dual surgeon operating to improve patient safety

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Abstract

The COVID-19 pandemic resulted in an unprecedented reduction in the delivery of surgical services worldwide, especially in non-urgent, non-cancer procedures. A prolonged period without operating (or ‘layoff period’) can result in surgeons experiencing skill fade (both technical and non-technical) and a loss of confidence. While senior surgeons in the UK may be General Medical Council (GMC) validated and capable of performing a procedure, a loss of ‘currency’ may increase the risk of error and intraoperative patient harm, particularly if unexpected or adverse events are encountered. Dual surgeon operating may mitigate risks to patient safety as surgeons regain currency while returning to non-urgent operating and may also be beneficial after the greatly reduced activity observed during the COVID-19 pandemic for low-volume complex operations. In addition, it could be a useful tool for annual appraisal, sharing updated surgical techniques and helping team cohesion. This paper explores lessons from aviation, a leading industry in human factors principles, for regaining surgical skills currency. We discuss real and perceived barriers to dual surgeon operating including finance, training, substantial patient waiting lists, and intraoperative power dynamics.

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Reduced operating

The COVID-19 pandemic has had a considerable impact on the provision of surgical services around the world. Redeployment of staff, and the need to maximise bed capacity to deal with increasing demands of the pandemic have resulted in elective surgery being postponed in many hospitals.¹ Some hospitals have created COVID-light sites, often utilising the independent (private) sector which has enabled urgent operations and cancer work to continue, but many have been unable

to achieve this goal amid continued surges of COVID-19 cases.

In a 2020 Royal College of Surgeons of England (RCSEng), 33% of respondents were unable to undertake elective or planned procedures within the preceding four weeks, and 38% had been redeployed to alternative, usually non-surgical roles.^{2–4} The Federation of Surgical Specialty Associations (FSSA) has provided helpful guidance on surgical prioritisation during the pandemic.⁵ The RCSEng issued guidance on how teams can optimise surgical pathways to manage the backlog of operations as efficiently as possible.⁶

The impact of the pandemic on surgical services is likely to be felt for a long time as teams battle the backlog of cases. In November 2020, a record number of patients (4.46 million)

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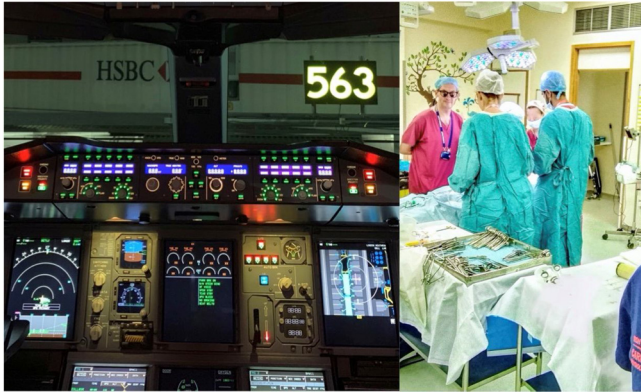


Fig. 1. Pilots, like surgeons, work in high-reliability organisations, where both individual and organisational factors can lead to catastrophic error. Working alongside an experienced colleague may help to minimise these risks and improve safety.

were awaiting hospital treatment in England, with 192,169 patients having waited more than 52 weeks.⁷

Reduced ‘currency’

While high-throughput surgical services work through the backlog of postponed or cancelled operations, patient safety must not be compromised. Some operations may be expedited by the increased use of local and regional anaesthesia, day-case units and extended operating hours, and others including more complex surgery must be approached with more caution.⁶ Many surgeons will have experienced a prolonged period without performing complex non-urgent surgery (a ‘layoff’ period) and may experience skill fade or loss of confidence.^{8,9} An extensive systematic review by the General Medical Council (GMC) highlights the deterioration of both technical and non-technical skills after an extended time without practice.¹⁰ In aviation, this is known as being ‘out of currency’ or ‘not current’.¹¹

Healthcare owes many of its developments in human factors (HF) research and improvements in patient safety to the pioneering work conducted by the airline industry. Despite these being different high-reliability organisations (HRO), parallels can be drawn between individual and organisational factors that can lead to catastrophic error (Fig. 1). As a result, lessons and developments in one industry are often applicable to the other which can lead to valuable change and innovation.

Layoff periods occur more frequently in pilots than surgeons due to aircraft, financial, and organisational factors. After a period of not flying, pilots must be deemed current as well as legal and medically fit to fly. Similarly, surgeons returning to normal operating after the restrictions imposed by COVID-19 may have a valid licence to practice and be on the specialist register through GMC revalidation and appraisal, but may have lost ‘currency’.¹¹

Lessons from aviation for ‘getting current’

Pilots are subject to a formal system of skills currency, mandated by the regulators such as the Civil Aviation Authority (CAA) in the UK. When pilots do not meet currency requirements, they must undergo a period of supervision, flying with a safety pilot/training captain.

The minimum legal requirements for private pilots are less strict than those in military or commercial airline environments to reflect the variety of activity. Pilots and flying organisations must therefore take more responsibility for maintaining their own currency.

A surgical skills currency barometer, adapted from general aviation (GA), prompts surgeons to reflect on their experience over the past 12 months to assess their currency when planning a return to complex non-urgent surgery.¹¹ Given skill fade over prolonged periods without adequate practice and rehearsal of skills,¹⁰ the currency barometer is a useful reflective exercise that could help to highlight areas of currency deficit.

Unlike in aviation, maintaining currency in surgery is not currently mandatory for practice. The NHS Improvement Getting It Right First Time (GIRFT) initiative advocates the introduction of minimum annual operating numbers for consultant and SAS surgeons for each procedure.¹² This remains controversial, but few would deny the benefit of working with an experienced, and current, peer (equivalent of a safety pilot) in undertaking a procedure after months without practice.

Dual surgeon operating

Working closely with experienced peers is not a new concept in healthcare. For many years colleagues have utilised the power of working within multidisciplinary teams (MDT) with good evidence that this improves patient outcomes.¹³ Interaction with other clinicians enables shared decision making, supervision, mentorship, and the combination of skills and experience.¹⁴ These attributes are particularly important when performing unfamiliar, difficult, or less common procedures. Operating with an experienced colleague offers a degree of peer-to-peer support, boosting confidence and reducing cognitive load. It may also prevent fatigue when performing long operations, reducing the risk of error.¹⁵ Just as pilots benefit from a brief period of flying with an experienced training pilot, operating alongside an experienced peer might be judicious when returning to complex surgery after a layoff period. The need for dual surgeon operating is both procedure and operator dependant but can be guided by the surgical skills currency barometer and personal reflection.¹¹ It is unlikely to be required for all procedures but can be highly valuable when planning for long, difficult, complex, less familiar or infrequently performed operations.

The decision to start dual surgeon operating may also be department-led and should be discussed as part of the team’s plan to return to normal operating capacity. This is

already a standard operating procedure (SOP) in some cases; it is not uncommon practice in challenging reconstructive or re-do procedures, transplant surgery, and complex spinal or orthopaedic surgery. In complex knee revision surgery, 40.5% of trusts report that complex work is already undertaken by two operating surgeons, with a further 55% of trusts aiming to introduce this.¹²

Importantly, low currency does not necessarily mean an individual is not capable of performing an operation under routine circumstances, especially after years of experience. Just as a pilot is unlikely to forget how to fly, surgeons are unlikely to forget how to perform procedures. Surgeons and pilots can, however, become deskilled ('rusty'), resulting in slower decision making and technical precision. It follows that if workload increases as a result of adverse or unexpected events, the risk of errors occurring with associated harm would likely increase. In HROs, reduced currency may have considerable consequences for all stakeholders. Just as one would expect pilots to be supervised after a prolonged layoff, most patients would wish the same for their surgeons.

There is currently a paucity of publications assessing the impact of two-surgeon operating on outcomes and safety measures. Such studies are made difficult by the relative rarity of some complications and the heterogeneity of complex procedures. Evidence (mostly from spinal and breast surgery) suggests that dual surgeon operating can reduce the duration of surgery, length of hospital stay, blood loss, and may prevent some postoperative complications.^{16–22}

Dual surgeon operating is useful for sharing updates in technical and non-technical surgical practice, as well as a potential annual appraisal tool. In commercial aviation, all pilots including senior training captains undergo regular simulation assessment to update skills in line with the latest regulations. Single pilot operations, for example bush cargo pilots in austere environments, undergo instructor appraisal, even if they are legal, fit, and current to fly.

Senior surgeons working in NHS organisations operate frequently with senior trainees or post-CCT (certificate of completion of training) fellows. These colleagues may bring knowledge from other surgical practices to allow updating of skills. This may be more difficult to achieve for surgeons working in smaller practices, or predominantly in non-NHS sectors.

Implications for training

Changes to healthcare services in response to the COVID-19 pandemic has had an unprecedented impact on surgical training.²³ Redeployment of trainees to non-surgical roles is common, with up to 57% of trainees being redeployed in some locations.^{23,24} Many trainees will require extensions to their specialty training programs due to lost training opportunities and operative experience. A recent audit of surgical trainees in the UK found a 50% reduction in trainee logged operations across surgical specialties during the COVID-19 pandemic.²⁵

Care must be taken to ensure that dual surgeon operating remains a valuable training experience for the entire surgical team. Complex and challenging operations present an opportunity for multiple trainees to learn from the combined experience and expertise of two senior surgeons. Before a procedure, trainers should discuss learning objectives, as well as discussing the operative plan, possible perioperative challenges and how these will be mitigated or managed. Following the procedure, debriefing and thanking the team, a further debrief should take place with trainees. This should include an overview of operative events, the postoperative plan, discussion of learning objectives and suggestions for further education. Trainees must also take advantage of dual surgeon operating scenarios to observe and develop non-technical skills including communication, team-working, and leadership.

Dual surgeon operating is not synonymous with two-consultant operating. Over-learning or the amount a skill has been practised beyond initial mastery can reduce skill fade over time.²⁶ Trainees may therefore experience greater skill fade having consolidated less operative experience than more senior colleagues prior to a prolonged layoff.²⁷ Conversely, in some situations, a consultant may be less current than a senior trainee, for example if they have experienced a longer layoff period. Trainers must therefore consider the currency and capability of both operating and assisting surgeons when planning operative lists.

The need for dual surgeon operating in high-volume procedures will be required more initially, but is likely to reduce rapidly for many procedures as surgeons become more practised on their return to normal operating. While some may worry that this could impact training case numbers, it is anticipated that there will be a steady return to normal operating, except for the most complex and challenging cases. For low-volume, complex operating, routine dual surgeon operating allows surgeons to remain current for cases they would otherwise rarely encounter.

Cost

The potential benefits of dual surgeon operating on return to work from a period of layoff could justify both the financial cost of two senior clinicians' time as well as the impact on theatre throughput when trying to manage backlogs. Dual surgeon operating is a temporary investment in time and money, to potentially improve patient safety, outcomes, and surgeon confidence. The need for dual surgeon operating is surgeon, unit, and operation dependant, being most applicable to larger more challenging operations and is unlikely to be required for less complex procedures. Additionally, the pooled expertise of two experienced surgeons decreases operating time.^{16,17,19–22}

For low-volume complex procedures, routine dual surgeon operating may reduce costs over the entire duration of the patient's treatment by reducing the number of sub-

sequent operations or non-operative treatment for surgical complications, as well as the length of hospital stay.^{16–19,22}

Implementation

Loss of surgical currency is not synonymous with loss of capability, but surgeons are human, fallible, and can experience skill fade after a prolonged layoff. All stakeholders should recognise the value of dual surgeon operating in the acute phase of returning to normal surgical capacity and how its implications for patient safety justify the temporary investment. Although some studies could be used to guide the definition of a ‘prolonged’ layoff period using skill fade over time, this evidence is often based on simulation, operation or surgeon specific practice, and does not adequately reflect the heterogeneity and complexity of surgical skills. The period of time required to experience skill fade and loss of confidence will differ between each team, individual, and operation. Tools such as the surgical skills currency barometer can help surgeons reflect on their level of currency after any period of time away from operating, or between low-volume complex procedures.

Dual surgeon operating requires departmental preparation and planning to allow for rota changes and optimal utilisation of theatre time. Potential barriers include anticipated difficulties in intraoperative communication between operating surgeons, and power dynamics. To avoid these pitfalls, communication must be prioritised throughout the procedure, starting at the briefing. In aviation, if two captains fly together one must be designated as legal Pilot in Command of the flight, therefore being legally responsible for the safe conduct of the flight. Likewise, one peer operator should be chosen as the ‘responsible or lead surgeon’, to avoid confusion. To ensure synchronous operating, the briefing should include a detailed account of the operative plan, anticipated challenges and strategies to overcome these.

Unlike in aviation, advanced high-fidelity simulation is less accessible in healthcare, but the merits of simulation training as a supplement to experience in theatre have been widely reported.^{28,29} Virtual reality surgical simulation software is becoming increasingly accessible on mobile phones, tablets, and home computers. Simulation technology and bench-top training models are also available at most hospitals. Simulation training should be utilised by surgeons during and following a layoff period to minimise attrition of surgical skill which may support a faster return to currency and confidence.

Wider implications

These recommendations are not restricted to operating following the COVID-19 pandemic, though this represents the largest simultaneous reduction in activity for surgeons worldwide. Many surgeons will experience a prolonged layoff

during their career and some may experience several. A few examples include time out for research or out of programme experiences, parental leave, and sickness. On return-to-work, surgeons that have experienced a loss of currency, may have also experienced skill fade, and a loss of confidence.³⁰ Any surgeon returning to work from a prolonged layoff should benefit from a collaborative and supportive team-working environment. A period of dual surgeon operating is likely to improve confidence and patient safety while surgeons regain currency.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients’ permission

Not required

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