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Simulation-based training in maxillofacial surgery: are we going to be left behind?

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Abstract

Simulation is an important way both to optimise a trainee's learning time and reduce morbidity and operating time for patients. We have reviewed the current use of simulation in training for maxillofacial surgery, and provide an overview of areas of practice where it may be useful. A web-based survey of trainees' opinions of it was made in February 2018, and disseminated using the Junior and Fellows in Training group mailing lists. We also reviewed popular current simulation courses that are available. A total of 45 of the 57 trainees who replied agreed that simulation-based training would be beneficial in maxillofacial surgery, particularly with regard to maxillofacial surgical emergencies. A total of 54 of the 57 also agreed that simulation-based training would be a useful adjunct to their clinical training. However, most of the simulation-based courses available were priced beyond the budgets available to UK-based trainees for study, although funding changed in April 2018. While other surgical disciplines have adopted simulated clinical teaching and its benefits, maxillofacial surgery has limited the use of all types of formal simulation. Surgical simulation training is increasingly being used to complement the traditional surgical apprenticeship in other specialties, and ours needs to consider ways in which we can use it, given that trainees within the specialty think that it would be useful. Other specialties have shown that there is good transfer of skills from simulation to the actual clinical operating environment, and this increases satisfaction, decreases morbidity, and reduces the time required for intraoperative teaching.

Keywords: simulation; training; courses; competence

Introduction

Simulation-based training in surgery is teaching with the aid of a substitute that can be reused repeatedly to aid learning. It is used to educate, and hone the skills of those being taught, and results in improved safety for patients.

The "New Deal" and the European Working Time Directive (EWTD) have shortened the time that surgical trainees spend at work, and require both trainers and trainees to use simulation to maximise the potential learning from "real life" operations and procedures.[1] It is now considered normal in other specialities to have access to simulators, and to undertake simulation-based exercises and assessment as a routine part of surgical training.

Simulation-based training allows trainees to learn a skill without compromising patients.[2] It also allows them to practice their surgical skills outside the operating theatre to improve their ability, and has the potential to reduce both operating time and morbidity. Reducing the learning curve, though an argument for sub-specialisation, does not deal with the impact on training.[3]

Surgical trainees are enthusiastic about simulation, but often describe it as "an adjunct to, not a replacement for"

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clinical operative training.[4] The new Junior Doctors Contract implemented in 2016 specified 48 as the maximum number of hours that trainees may work (and, even with opting-out, they cannot exceed 56 hours). This will have a considerable impact on the time that they can spend in the operating theatre,[5] so there must be an alternative type of training available to allow trainees to maximise all their opportunities to operate under direct supervision.[6] It is acknowledged that the Joint Committee on Surgical Training specifies that, in OMFS, cadaveric and simulation courses should be encouraged. Changes to funding for study were introduced in April 2018, so that funding of study leave is now approved by local trusts, provided that the courses are on a list of compulsory, approved, or recommended lists of training courses for both their year of training and the requirements of the curriculum. Courses that are not on any of these lists must be approved by the Director of the Training Programme, or self-funded (Appendix A).

Surgical simulation training may also have a role in the revalidation of doctors that is being proposed by the General Medical Council (GMC).[7] Many specialties have adopted simulation, and have even made it an essential aspect of the Annual Review of Competence Progression (ARCP). Despite this, however, surgical training by simulation is the not the norm, and the degree of exposure to such facilities and trainers varies across the UK, compared with, for example, the USA.[6,8]

In this paper we review the current use of simulation in training in maxillofacial surgery and give an overview of areas of our practice in which it may be useful. While some published papers may suggest that the use of simulation is recent, it has been used in dental training since 1894 (using phantom heads). The question is: are we lagging behind using this teaching resource in maxillofacial surgery, despite other surgical specialties having adopted it?

Method

We used a web-based survey tool (Survey Monkey) to disseminate, manage, and analyse the results of the survey in which we assessed trainees' opinions of simulation-based surgical training. An initial pilot trial was published online in August 2014, and this was subsequently revised and disseminated using the BAOMS Juniors Trainee Group and Fellow in Training Group in February 2018.

Which are the simulation-based courses in OMFS?

We discuss a number of courses, but it should be noted that these are not endorsed by this Journal or the authors, though they are known to be popular and highly regarded by OMFS trainees in the UK (Appendix A).

Attendance at a microvascular course is compulsory, and a requirement of the OMFS Certificate of Completion of Training. There are number of other courses that provide basic microvascular training in the UK including the Northwick Park Institute for Medical Research, University of Liverpool, and the Newcastle Surgical Training Centre. Most of these cost over £1000 and have previously been self-funded by trainees, although they are now supported as they are on the approved list of OMFS courses.[9]

Other courses that involve simulation include cadaveric dissection. An example of this is the Bochum course for microsurgery and raising flaps, which is highly regarded. This course uses "pulsatile" cadavers, is organised at least four times a year in different cities in Germany, and costs about €2000. Corporate support can reduce these costs – as illustrated by the East Grinstead Form and Function Group: in 2018 it ran an over-subscribed course on free flaps for a fraction of the cost of comparable courses.

Simulation is not just concerned with microsurgery and reconstruction in our specialty. The LOBSTER course (The Bruges 3D Orthognathic Surgery Course) guarantees delegates exposure to at least 25 orthognathic operations together with instructions on planning, pitfalls, and model surgery.

Closer to home, the West Midlands hosts the Craniomaxillofacial Operative Surgery Cadaver workshop, which covers a wide range of surgical techniques and approaches to facial surgery. This allows attendees to practice their chosen techniques on a cadaver with the promise of only one dissecting delegate at each operative site.

There are obviously many other providers of maxillofacial-themed courses and a popular introductory course, again compulsory for the Certificate of Completion of Training, is a plating course.[9] The AO Foundation through the AOCMF arrange one that is often attended by new trainees in OMFS, although guidelines have changed and the JCST checklist now states that this course can be either local or regionally arranged.

Most of these courses (particularly ones that involve cadavers) were previously beyond the price of the trainee's annual budget for study leave.[10] The Association of Surgeons in Training has pointed out that the costs associated with training in OMFS are considerably higher than those for any other surgical speciality.[11]

Results

Health Education England indicated in April 2017 that there are 96 trainees in maxillofacial surgery in the UK, which is lower than that reported in the last BAOMS Workforce Survey.[12]

From these 96, a total of 57 responses were received.

Forty-three respondents had previously had some simulation-based training.

However, only 11 reported any that was specific to maxillofacial surgery. A total of 45 of the 57 felt that simulation-based training would be useful in our specialty, with 50/57 agreeing that surgical training could be improved by the use of simulation. A total of 54 agreed that simulation-

Table 1
Response to question about use of simulated patients for an Annual Review of Competency Progression (ARCP)/exit examination (more than one response was allowed).

Answer	Responses
Think it would improve objectivity in the assessment process	17
Think it would allow equal comparison between trainees (and regions if in the ARCP)	19
Don't have an opinion/would not mind either way	14
Would not be beneficial	9
People with previous experience of simulation would have an unfair advantage	10

based surgical emergencies relevant to maxillofacial training would be helpful – the difficult airway, rapid access to the neck, and management of retrobulbar haemorrhage being the most commonly-stated examples.

The responses to the question "How would you feel about simulated patients and scenarios being used in formative assessments for the ARCP or exit exam?" are shown in Table 1. The response that is of concern is the assumption that those with previous experience would have an advantage during assessment, which suggests that trainees are aware of the benefits and advantages of simulation-based training.

Discussion

Presumably, simulation training of any description is better than no training, particularly when, to date, there have been no published studies to contradict this statement.[13] As one of the smaller specialties within surgery we seem to be lagging behind in seeing the benefit of surgical simulation and need to be encouraged to use this type of training. This may partly be because our specialty trainers see no flaws in the current traditional apprenticeship model. Our smaller number of trainees and the expense associated with developing a simulator programme may mean that cost-effectiveness cannot be immediately quantified or justified.[14]

Given that all dental undergraduate trainees use the phantom head to train, it is surprising that respondents did not cite 100% as the response to previous exposure to training by simulation. Much of this disparity in responses can be explained by the perception of what simulation-based training involves, and the difference between simulation models and techniques. Previous publications have shown that trainees prefer and enjoy high fidelity simulation techniques, but high fidelity comes at a price.[15] The recently-developed "Touch Surgery" programme was developed to help provide online training that is easily available, but the value for maxillofacial surgery is limited because of its low definition modules.[16]

While those in support of simulation-based training are strong advocates, others have suggested that simulation has not been proved to be better than any other forms of training.[17] Research that is critical of simulation is often not clear as to whether the criticism is of the process of simulation training or the simulator itself. Many people who think of simulation training criticise the tool being used to provide the training, but fail to appreciate that this training and learning evolves from attempting to recreate an isolated clinical skill or operation for the purposes of improving management or surgical dexterity. If one tries to replicate this practical learning through, for example, problem based learning, it is clear that simulation-based training is more effective.[18]

The new Junior Doctors Contract imposed in 2016 has shortened the working day in many specialties, which surgeons at all levels feel is detrimental to surgical training and gaining experience.[19,20] How are we to train surgeons then, who will complete training without abiding by the "10 000 hours required to mastery" rule?[21] In the US, increased simulation has led to reduced opportunities for independent operating, although trainees there get more teaching opportunities.[22]

A number of surgical bodies have adopted assessment processes that use surgical simulation training in the form of Objective Structured Assessment of Technical Skills.[23] While surgeons in the US have adopted it, currently in the UK only the Royal College of Obstetricians and Gynaecologists have authorised its use as part of the requirements of the annual work-based assessment.[24] Given that trainees in all deaneries will at some stage rotate through a major trauma centre, it seems logical to formulate an emergency training assessment for maxillofacial surgery that would help prepare trainees for such clinical conditions. They should be familiar with the use of the Objective Structured Clinical Examination as a method of assessment, because it is now used as part of the national recruitment process for OMFS.

By introducing the concept of simulation to all core surgical trainees at the start of their training, and by insisting that at least one, work-based assessment be simulation-based for the annual ARCP, we can help to increase the profile of simulation-based training and encourage deaneries that now have poor and limited access to improve their resources. The Association of Surgeons in Training is actively campaigning for this to become a compulsory training requirement.[17]

Intensive refresher courses that deal with core clinical skills after any break in training (similar to training courses before deployment as practised by military medical personnel), may be another way of increasing the access to, and the profile of, simulation-based training. Many of the core basic surgical courses already use simulation (such as Basic Surgical Skills (BSS), Advanced Trauma Life Support (ATLS) and Care of the Critically Ill Surgical Patient (CCrISP)). Whilst these courses are compulsory in surgical training, they are also expensive (because of the simulation component) and self-funded by trainees. The power of simulation on such courses is that it gives trainees confidence, and if a spin-off of these courses was to encourage trainees to use local skills laboratories and simulators in their own deanery, the profile of simulated surgical training would improve dramatically. Currently, 71% of trainees in the East of Scotland report that

they have access to a simulator, while only 12% of trainees in the North West Deanery report the same. Such inequality of access is clearly not acceptable, and must have an impact on the skills and learning of trainees within those deaneries.[6]

Given the need to be accountable at all levels of clinical expertise, it may well be that simulation will become a routine part of revalidation, so that skills that are not often used are maintained for emergencies.[25] The limited resources available also means that operative contact with patients and allocated teaching time need to be used to their maximum, which simulation-based training would allow.

Conclusion

The benefits of simulation-based surgical training are apparent, and access to such training methods must improve. In maxillofacial surgery our trainees are supportive and can see the benefits of simulation-based surgical training, so we now need to use and improve current training resources. Core surgical and specialty training interviews have started to use simulated clinical conditions and low-definition simulators as part of national assessment and recruitment. Surgical dexterity and competence in procedural skills are readily and frequently evaluated, but those with previous access to simulators will fare better in this assessment, which therefore (inadvertently) introduces bias.

Conflict of interest

Nabeela Ahmed has an interest in simulation and it was the subject of her MMedSci dissertation.

Ethics statement/confirmation of patients' permission

Not required.

Appendix A.

Further Information on Courses

Northwick Park Microvascular Course.
http://www.npimr.org/event/basic-microsurgery-workshop/

Liverpool Microvascular Course.
https://tp:/www.liverpool.ac.uk/medicine/study-with-us/cpd/courses-and-modules/.

Newcastle Surgical Training Centre.
http://www.nstcsurg.org/courses/plastics/microsurgery.aspx.

East Grinstead Form and Function Series.
http://www.egheadandneck.com/.

Bochum Course.
www.eacmfs.org/event/61st-international-course-for-flap-raising-microsurgery/.

Lobster Course.
www.mka-azsintjan.be/en/courses/lobster_course.

Midlands Surgical Courses.
https://wmstc.co.uk/wp-content/uploads/2017/05/CMF-flyer-17.pdf.

AO Foundation.
www.aocmf2.aofoundation.org/eventdetails.aspx?id=1457.

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