The Role of Anatomy Demonstrators: Surgical Trainees’ Perspective

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ABSTRACT

Core Surgical Trainees (CST) in the London (UK) Postgraduate School of Surgery receive clinical anatomy teaching in their first year of training, and, in their second year, give thirty sessions of anatomy teaching to medical and other students. This study set out to investigate the role of demonstrators from the perspective of the trainees. A focus group was convened to ascertain trainees’ perspectives on demonstrating anatomy and to identify problems and improvement strategies to optimise their ability to enhance students’ learning. A questionnaire was formulated and all second-year CST (n=186 – from two cohorts) in the London Postgraduate School of Surgery were invited. A total of 109 out of 186 trainees completed the questionnaire. A high percentage (98%) of trainees that completed the questionnaire responded that demonstrating was an invaluable part of their training. Sixty-two per cent responded that anatomy teaching they received in their first year of core surgical training helped them in their teaching role and 80% responded that it helped them prepare for surgical training. The study also revealed the need for improved communication between trainees and the London Postgraduate School of Surgery / Medical Schools / National Health Service Trusts to address issues such as trainees’ perceived difficulty in fulfilling their teaching session requirement. The stakeholders have acknowledged and addressed the outcomes to improve the experience for both surgical trainees and students. The results indicate that anatomy demonstrating delivers important benefits to early surgical trainees, in addition to those received by the students that they teach.
INTRODUCTION

Context

The London (UK) Postgraduate School of Surgery (LPSS) is one of the largest surgical schools in the world, with over 900 trainees. Since 2010, the structure of postgraduate medical and dental training in London has been organized in a commissioner-provider model, through three local Health Education England (HEE) offices: Health Education North Central and East London, Health Education North West London and Health Education South London. Each trust within the HEE local office acts as a Local Education Provider, delivering the training in partnership with the local office. The LPSS involves a prestigious program of surgical training across the following hospitals: Imperial College Healthcare National Health Service (NHS) Trust, Kings College Hospital NHS Foundation Trust, Royal Brompton and Harefield NHS Foundation Trust, University College London Hospitals NHS Foundation Trust (including the Royal National Throat, Nose and Ear Hospital and National Hospital for Neurology and Neurosurgery), Guy's and St Thomas' NHS Foundation Trust, Barts Health NHS Trust, St George's University Hospitals NHS Foundation Trust and Great Ormond Street Hospital for Children NHS Foundation Trust.

After graduation, doctors in the United Kingdom (UK) undertake a two-year Foundation Program (F1 and F2). Doctors then choose a specialist field. Those who wish to pursue a surgical career enter Core Training in surgery. This is a 2-year program and comprises Core Surgical Training 1 and 2. Subsequently, Core Surgical Trainees (CST) can progress to specialist training in a chosen surgical specialty, providing they have passed the intercollegiate Membership Examination of the Royal Colleges of Surgeons (MRCS).
In their first year, CST in the LPSS were given twenty half-day teaching sessions in surgical anatomy by surgeons and anatomists at the Royal College of Surgeons of England. This Core Surgical Anatomy project was funded by Health Education London and the South East as a pilot project and, at the time of writing, has been fully commissioned at Imperial College London. A similar programme could be created for each region of the UK at a total annual cost of approximately £700,000. Most Core Surgical Anatomy teaching sessions involved three, one-hour stations. Trainees rotated through the three stations that typically consisted of prospected human cadaveric material, ‘potted’ specimens including pathology or surgical anatomy. Further sessions involved specifically designed e-learning material e.g., physiology, radiology and embryology relevant to core surgical training. The syllabus for the anatomy component was based on the learning outcomes of the Anatomical Society’s core syllabus for medical students (Smith et al., 2016). Subsequently, CST2 undertook 30 teaching sessions (each approximately half a day) in which they taught medical and other students at Imperial College London, Queen Mary University of London, St George’s University of London, or University College London. The 30 teaching sessions included a range of gross anatomy sessions in the dissecting room, living anatomy, radiological anatomy, clinical skills, and histology/embryology/osteology teaching.

Teaching
Junior clinician anatomy teachers / demonstrators have helped teach undergraduate anatomy practical classes for many years and cadaveric dissection remains an
important part of medical education (Green et al., 2014). In many medical schools, demonstrators are a key part of the teaching team. However, there is considerable variability between institutions in the requirements and practical arrangements for such teachers. Some institutions employ these teachers on a fixed-term basis, for example six months, to teach full-time during the busiest parts of the academic year, whilst others have a contract with a local private healthcare provider for Resident Medical Officers to demonstrate on a one in five rota for 12 months. Other medical schools have partnerships with local National Health Service Trusts that facilitate demonstrating roles for Foundation or CT doctors. In the LPSS, all CST2 trainees are required to undertake anatomy teaching as part of their training. In teaching sessions, they typically teach alongside anatomy faculty and retired surgeons.

The role of the anatomy demonstrator is effectively an extension of peer-based teaching, because these teachers are relatively close in age and experience to the students they teach. Furthermore, being active in clinical practice, junior clinician teachers can offer students first-hand experience of why they need, and how they apply, their knowledge of anatomy in clinical practice. Demonstrators need to be excellent communicators, enthusiastic, and have a good foundation in anatomy (Lockwood and Roberts, 2007). Lockwood and Roberts (2017) emphasized that integrating imaging and anatomy teaching is essential for effective application of anatomical knowledge, and that demonstrators are ideally placed to be able to teach image interpretation alongside anatomy. They also highlighted that demonstrators can assist in the vertical integration of anatomy with other disciplines, because many demonstrators also help teach parts of the undergraduate medical course that occur after preclinical anatomy teaching, and they also help with postgraduate programs.
Furthermore, Davis et al. (2014) reported that first and second year medical students and faculty believed students learnt better when taught by demonstrators in a small group setting, compared to being taught by faculty alone. However, this may be due to student preferences for large or small group teaching. The availability of demonstrators may enable small group teaching in institutions where faculty numbers are limited.

Recent research has demonstrated that the ideal experience difference between near-peer teachers and students is two to three years (Hall et al., 2014). However, because the CST2 in the current study typically taught preclinical undergraduates, the experience difference between the CST2 and students was typically six to eight years. Therefore, these demonstrators bridge the gap between true near-peer teachers and anatomy faculty. This can be helpful in aiding students to understand their own learning and to accurately predict their level of knowledge (Hall et al., 2016). Student evaluation consistently shows that students value junior clinician teachers, and benefit from their teaching, advice, and guidance about medical training and career options (Evans and Watt, 2005).

All UK Medical Schools have anatomy in their curriculum as required by the General Medical Council “Outcomes for Graduates” (General Medical Council, 2016); the content can be guided by the Anatomical Society core syllabus (Smith et al., 2016). However, there is considerable variation in how anatomy teaching is delivered (Heylings, 2002). Anatomy is largely taught in the early years of the curriculum, with some curricula offering spiral learning into later years (Evans and Watt, 2005). This spiral learning frequently includes anatomy relating to laparoscopic, endoscopic, and
endovascular approaches (Ahmed et al., 2011). Anatomy demonstrating has proven
to be a successful means of contributing to early postgraduate anatomy education,
especially in terms of improving surgical trainees’ knowledge of surgical and clinical
anatomy (Gossage et al., 2003). Demonstrating offers trainees the opportunity to
consolidate their own knowledge, and to revisit subjects about which, they may have
a poor understanding.

This study was designed to investigate the role of the anatomy demonstrator from
the trainees’ perspective. The research questions included: 1. How do demonstrators
improvements to the demonstrating system would trainees like?

METHODS

A cross-sectional case study of trainees in the LPSS was undertaken, utilising both
qualitative and quantitative data-gathering methods. To facilitate evaluation of the
experience of demonstrators, a progressive focusing approach was adopted (Parlett
and Hamilton, 1977). Informed consent was obtained from all participants. The study
took place in two stages: Stage 1 used a focus group to gain an in-depth
understanding, and Stage 2 was designed to elucidate generalizable findings from
the wider cohorts, using a questionnaire. The participants of Stage 1 were not
involved in Stage 2.

Stage 1
A focus group (n = 13) was convened, comprising a convenience sample of CT2 trainees teaching at Imperial College London. The aim of the focus group was to ascertain the surgical trainees’ perspectives on teaching anatomy, and to identify key problems and improvement strategies to enhance their experience, and to optimise the use of the trainees’ skills to enhance students’ learning. The focus group was designed using a grounded theory approach (Glaser and Strauss, 1967), to allow the features and perceptions of the experience of teaching anatomy to be established. A focus group guide sheet was created, and an expert in this methodology unknown to the CST2 led the focus group, rather than their ‘employer’, to optimise the trainees’ willingness to talk freely about their experiences. The output of the focus group was transcribed verbatim, and the data reviewed, categorised, patterns delineated and themes developed. The data were analysed using thematic analysis. Line-by-line coding generated codes that were brought together into themes. Blind triangulation by another researcher then checked the themes. The main themes were discussed by the research team and fed into the design of a quantitative questionnaire.

Stage 2

Two successive cohorts of trainees in LPSS were invited to complete the questionnaire (Table 1) arising from Stage 1, at the end of their second year of Core Surgical Training. The questionnaire (questions = 25) utilised a mixture of Likert scale questions and free text responses. Data were entered into Excel and analysed using descriptive statistics.

RESULTS

Stage 1. Focus Group
Thematic analysis of the focus group discussions revealed four emerging themes: *positives, negatives, teaching, and logistics*. The principal positives highlighted the trainees’ enjoyment of teaching, and that teaching was a privilege, as reflected by the statement ‘*It’s a fantastic opportunity and a privilege to have it and I love teaching*’. The negatives focused on the trainees’ perception that the requirement to complete 30 sessions of anatomy teaching was unrealistic, reflected by statements such as ‘*they want 30 sessions, no less, that’s too much*’. When discussing teaching, the trainees reflected on different teaching techniques, how to teach most effectively using cadaveric specimens, student issues they had encountered during teaching and how they had developed as educators. Two major areas for improvement were suggested: 1) better course information from the host Medical School, e.g., how does a teaching session fit into a course overall, and 2) structured feedback was desired, to help demonstrators improve and reflect on their development as educators. The major logistical theme highlighted by the trainees centered around their difficulty in planning and booking into teaching sessions, as reflected by the statement ‘*it’s an exercise in organizational ability*’. Figure 1 displays the key positive and negative themes arising from the focus group.

**Stage 2. Questionnaire**

A total of 109 out of 186 trainees completed the questionnaire (59%) either online or on paper at the time of their Annual Review of Competence Progression meeting. The most important factor influencing the responding trainees’ choice of Medical School at which to teach, was its proximity to their clinical workplace (68%). In addition to medical students (both undergraduate and graduate entry), the trainees also taught a range of other students, including: biomedical science (55%), biology
Trainees were required to participate in a wide variety of teaching, including dissecting room classes, living anatomy, imaging, clinical skills and osteology. Class sizes were typically up to 100 students and the commonest ratio of faculty to trainees was 1:8 (64%). Training prior to beginning teaching was largely in the form of induction sessions, but some (37%) trainees also participated in teaching workshops, tutorials and/or used online teaching resources. Fifty-six per cent of trainees agreed and 5% strongly agreed that this training prepared them for teaching. Evaluation of trainees’ teaching was mainly given verbally by faculty and by student feedback. The majority (94%) of trainees agreed (48%) or strongly agreed (46%) that their ability to relate the anatomy they taught, to clinical scenarios they had experienced, helped students learn. In addition, the majority (88%) spent one (48%) or two (40%) hours preparing for a teaching session (Figure 2). Most trainees (89%) reported that they had taught students after having worked a clinical shift the night before; over a third of respondents (36%) felt that teaching after a night shift was not productive and the teaching suffered.

Some trainees raised concerns about the difficulty of obtaining release from clinical duties to attend teaching sessions. Free text comments from the questionnaires revealed that some trainees perceived that their NHS employers or colleagues were not accommodating with regards to allowing time out of their clinical day for demonstrating, and felt that the LPSS should better communicate the importance of teaching to their employers. Furthermore, some trainees considered that the LPSS requirement for the number of teaching sessions they were expected to complete was ambitious and that it should be flexible, depending on the individual trainee’s circumstances.
Thirty-six per cent of trainees agreed and 15% strongly agreed that the existence of Core Surgical Anatomy teaching in the first year of Core Surgical Training and the subsequent opportunity to teach students, influenced their application to train in the LPSS. Furthermore, many trainees (79%) agreed (62%) or strongly agreed (17%) that the anatomy teaching they received as CST1 helped to prepare them for their teaching role, and 56% agreed and 24% strongly agreed that this teaching helped prepare them for surgical training. Overall, 62% agreed and 13% strongly agreed that the teaching program in anatomy for CST lived up to their expectations.

DISCUSSION

The focus group and questionnaire results of the current study revealed that the CST2 trainees in the LPSS found teaching anatomy to medical and other students to be valuable for improving their own anatomy knowledge, and hence a positive contribution to their overall surgical training, especially as it was not limited to gross anatomy. Anatomy education and medical education in general has changed in recent years, and in some institutions, this has meant the decision to teach anatomy without human cadavers (Willan, 1996; Older, 2004; Hanna and Tang, 2005; Ullah et al., 2012). The results of the current study have shown anatomy demonstrating using cadavers to be of benefit to trainees, and the opportunity to teach anatomy was one of the reasons that trainees applied to join the London Core Surgical Training Program.

Demonstrator Training

Most surgical trainees in the current study considered that they had received adequate training at CST1 level to teach anatomy to undergraduates as CST2. In addition, they reported that the CST1 Core Surgical Anatomy teaching helped
improve their own knowledge and understanding of anatomy, and support the spiral
notion of learning anatomy, as described by Evans and Watt (2005). However,
additional learning aids, to be used in conjunction with their host institution’s course
guide, would be welcomed by trainees. Medical Schools may find it productive to
provide a ‘demonstrator’s workbook’ indicating key anatomical structures and the
clinical / functional significance that should be highlighted to facilitate delivery of the
learning outcomes identified in the students’ course material.

A major problem highlighted by the CST2s was that their clinical timetable meant
that they could rarely teach a whole course from start to finish. Therefore, trainees
considered that more background information was required to allow an individual
teaching session to be delivered in context. This reflects a wider issue in anatomical
education that demonstrators may teach on one component of a course, without an
understanding of the program as a whole. Whilst the perspective of students on this
issue was not investigated, it is important for teachers to feel that they have an
understanding of the sequence of material within an individual course, and what else
students are learning.

There is an increasing trend for junior doctors to undertake formal qualifications in
teaching or undergo training in pedagogical theory. Many CT2s demonstrated a
willingness and indeed keenness, to learn more about educational theory to help
underpin their teaching. “Trainees may not be naturally born teachers” (Beaton et
al., 2016); therefore, providing them with an introduction to anatomy education
theory would be beneficial and would, for example, allow them to understand that
individual students, on different courses, adopt a variety of approaches to learning
anatomy (Smith and Mathias, 2011; Smith et al., 2014). In this way, trainees would be better placed to provide high quality personalized education for students.

Mentorship

The free text comments from the questionnaire revealed that feedback on teaching performance from a senior colleague was welcomed by trainees. There may be logistical considerations that make this difficult, but it was suggested that a rota system could be introduced, whereby a senior colleague could be paired up with a trainee for three to four sessions, for example, at the beginning, middle and end of the term/semester, to provide progressive one-to-one feedback. This feedback would be a valuable component of trainees’ surgical portfolios, to demonstrate the development of their teaching skills. Trainees also recognized the value of references provided by the Head of Anatomy for their future careers. From a wider perspective, it is important that all teachers receive regular peer review, and demonstrators could use the same systems that the institutions have in place for their faculty.

Organization

Trainees reported that their clinical employers were not always supportive of allowing them time out of their clinical duties for anatomy teaching, which is evident from the large number of trainees who taught directly after having worked a night shift. However, despite working the night before, two thirds of trainees still reported that they were effective in their teaching. Trainees considered that improved communication would help to ensure that NHS employers understand the LPSS’s requirements of the trainees, and that protected time should be provided for
education. Clinical pressures within the NHS cannot be overcome easily, but the fact that the demonstrators turned up ready to teach after a night shift reflects their dedication to teaching and ‘giving back’ to medical education. It also reflects that they clearly gain from the experience, because it was made clear that they did not need to teach after a night shift.

The expanding the role of demonstrators

The role of demonstrators has evolved from the traditional focus on teaching anatomical facts in the dissecting room. Trainees explained how they provided several key support systems for students, which are unique to the role of demonstrating. For example, they provided key tips on learning resources such as mobile applications and key web links that they use in clinics. Trainees also provided career advice to students, and informal network contacts. They are ideally placed in the early part of an anatomy course to help students who have difficulty with the dissecting room environment. Demonstrators also provided students with informal advice and support about several issues including learning difficulties, career breaks and maternity leave. This informal curriculum provides many of the benefits associated with near-peer teaching. Current demonstrators were students who were part of the early digital generation, and are involved in developing digital literacies within medical schools to assist with learning. Demonstrators also undertook teaching involving emerging methodologies, for example, the use of ultrasound in living anatomy teaching.

LIMITATIONS
The authors acknowledge that the current study has limitations. First, it only investigated the demonstrator experiences of trainees in the LPSS, and this may not reflect the situation elsewhere. However, the LPSS is the largest postgraduate school of surgery in the UK and is currently responsible for the education of approximately 27% of UK surgical trainees, who qualified at a wide variety of medical schools in the UK and are therefore, likely to be representative of the UK as a whole.

Second, the study did not investigate the experiences of students or faculty. However, research highlighted in the Introduction to this paper has already drawn out perspectives from these interest groups.

CONCLUSION

Our research suggests three key conclusions:

1. Trainees thoroughly enjoyed the experience of teaching anatomy.
2. Several strategies could be employed to improve the quality and efficacy of teaching.
3. The role of anatomy demonstrators is not just of a teaching role but also that of mentorship.

The results of the current study emphasize the reciprocal relationship between teacher and student, and that demonstrator teaching could be further improved by the implementation of a teaching evaluation system, enhanced demonstrator training and the provision of more information about how a teaching session fits into the wider curriculum. The themes generated and the strategies proposed to rectify perceived problems have been relayed to stakeholders, including anatomy
departments / teaching institutions and the LPSS. Thus, it is hoped that the results of the current study will help enhance surgical trainees’ experience and indirectly help to improve the experience of medical and other students taught by them. Demonstrators bring a wide range of benefits to the student experience and the results of this study indicate that the demonstrators also benefit from the teacher-student partnership.
REFERENCES


Table 1. Questionnaire

Figure 1. Key positive and negative themes identified from the focus group

Figure 2. Likert responses to selected questions
Positives

Great for CV
Enjoy dissection preparation
Want to develop 3D understanding of body
Great opportunity to give back to medical school
Good relationship with students
Trying new techniques
Privilege

Negatives

Fear of failure in front of students
Own insecurities
Feeling like doing a disservice if not prepared
Lack of feedback on teaching
30 sessions too much
Not being able to see the whole framework
Missing the preparation session due to clinic
Q12. Anatomy teaching in CT1 helped me prepare for anatomy demonstrating.

Q15. Existence of the demonstrating programme influenced my application to the Postgraduate School of Surgery, London.

Q16. Demonstrating in anatomy lived up to expectations.

Q17. The ability to relate anatomical knowledge to clinical scenarios helped students learn.

Q22. Anatomy teaching received as a Demonstrator helped prepare for surgical training.

GLOSSARY OF TERMS AND ABBREVIATIONS

CT: Core Trainee (the first two years of postgraduate surgical training)
GMC: General Medical Council (regulatory body)

HEE: Health Education England

LPSS: London Postgraduate School of Surgery

MRCS: Member of the Royal College Surgeons

NHS: National Health Service

UK United Kingdom