Twelve tips for medical students to get the most out of an undergraduate neurosurgery placement

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Categories: Educational Strategies, Medical Education (General), Students/Trainees

Received: 23/11/2017
Published: 27/11/2017

Abstract

An understanding of core neurosurgical conditions is essential for medical students and junior doctors. However, little time is devoted to neurosurgery in the medical curriculum. It is therefore important to capitalise on this valuable time and these tips are aimed to make this time educational, enjoyable and productive. Based on the literature and experience of the authors, the tips are to 1) revise neuroanatomy, 2) assess acutely unwell neurosurgical patients on the ward, 3) spend time in theatre, 4) spend time on a neuro-intensive care unit, 5) spend time with the on-call registrars, 6) split time across the subspecialties, 7) go to the MDT meetings, 8) get involved in research, 9) consider neurosurgery as career, 10) consider the work/life balance, 11) observe the life of the consultants and 12) recap knowledge. Before starting your neurosurgery placement, consider when and how you will implement these tips to maximise the educational gains.

Keywords: undergraduate, neurosurgery, practical tips, medical education

Introduction

Twenty-eight of thirty-three UK medical schools are affiliated with a neurosurgical centre (Medical Schools Council; Society of British Neurological Surgeons, 2017). A knowledge of core neurosurgical conditions is important for medical students because approximately 20% of acute medical admissions are due to neurological conditions which are patients they will be caring for as junior doctors (Association of British Neurologists, 2014; Lobel, Kahn, Rosen, & Pilitsis, 2015). Unsurprisingly, most medical students perceive time spent studying the field of neurosurgery as beneficial to their education (Knight, Stroud, Geyton, Stead, & Cock, 2017). Despite this, relatively little time is devoted to the specialty in the modern medical curriculum, and many medical students perceive their neurosurgery teaching as inadequate (Akhigbe & Sattar, 2014; Lee et al., 2016). Medical curricula are unable to devote more clinical time to neurosurgery without impacting the time spent in other specialties, therefore it is important to
optimise learning efficiency whilst in the neurosurgical department. Additionally, students who wish to pursue neurosurgery as a career should undertake an elective in the neurosurgery to evaluate their suitability for the speciality and support their National Neurosurgery Selection application. To maximise students’ learning when on placement or elective in a neurosurgical department, twelve tips have been devised based on the literature and personal experience, on how to make this time educational, enjoyable and productive.

### 1) Revise neuroanatomy

Like any surgical speciality, a good understanding of the relevant anatomy is absolutely fundamental (Turney, 2007). However, a knowledge of neuroanatomy is also important for other specialities including neurology and psychiatry, and clinically relevant neuroanatomy can be tested at finals (Hazelton, 2011). Revising neuroanatomy is therefore a valuable use of time and will substantially improve one’s ability to care for neurosurgical patients, conduct accurate clinical examinations and understand the associated pathology. Seeing clinically-relevant neuroanatomy in a neurosurgical department may help to reinforce this knowledge. A student can assess the level of their neuroanatomy knowledge and identify any gaps in their understanding by presenting patients they have clerked to neurosurgeons and attending theatre sessions. Observing operations allows you to see anatomical structures and relationships in real-life which is often through small surgical corridors that cannot be appreciated through book learning (Cylde, 1993). Using a published neuroanatomy syllabus may help guide your revision and maximise the efficiency of your time spent studying neuroanatomy (Moxham, McHanwell, Plaisant, & Pais, 2015). Brief clinically-relevant neuroanatomy resources designed by fellow students such as TeachMeAnatomy and Soton Brain Hub may also be useful.

### 2) Assess acutely unwell neurosurgical patients on the ward

Considering the wide variety of neurosurgical conditions, it is unsurprising that neurosurgical patients can present in a multitude of ways; including diminished consciousness, focal neurological deficits, personality changes and seizures. Some of these presentations can be subtle and it is only through experience that you can begin to recognise them and understand their implications (Kim & Myung, 2014). A sound knowledge of neuroanatomy can help to localise a lesion clinically and therefore help choose the most appropriate imaging studies. Assessing neurosurgical patients in the emergency department and on the neurosurgical wards, taking a detailed history and performing a comprehensive examination can often indicate a likely location of the lesion and possible causes, although try to see the patient before you read their notes (Bharamgoudar & Sonsale, 2017). Practice this on a number of patients and try to see the core conditions including hydrocephalus, brain tumours, subarachnoid haemorrhages, cauda equina syndrome and infections. A list of core neurosurgical conditions should be available from your university or in any basic neurosurgical textbook. On the wards, the nursing staff and junior doctors are critical to your educational experience; speaking to them will help you identify appropriate patients and present your findings. Similarly, performing neurosurgical observations and becoming au fait with recognising when patients are "not quite right" is a crucial skill for any junior doctor, and working alongside other clinical staff, such as nurses, may prove beneficial in this respect (McGettigan & McKendree, 2015).

### 3) Spend time in theatre

The neurosurgical theatre represents the crux of surgical management and is what separates neurosurgery from
neurology or other medical specialties. Not all medical students enjoy the visceral nature of the operating theatre therefore it is important to learn early on if you are suited to the surgical environment. However, many students do, and this has been found to improve neurosurgical knowledge (Skarparis, Findlay, & Demetriades, 2016). If you are proactive and engaged, you may be given the opportunity to get involved in practical skills in theatre, such as suturing, which has been shown to positive influence the overall surgical experience (Marshall et al., 2015). Theatre time is difficult to obtain as a junior doctor due to demands on your time for service provision, demonstrated by the fact that graduates are more likely to attend theatre opportunities than undergraduates (Marshall et al., 2015), and so you should get this experience as a medical student (Black & Jones, 2010). Neurosurgical operations are different from other specialties in that they are often longer and sometimes more intricate which does not suit all surgical personalities.

By seeing what is involved during the operation, you can develop a better understanding of what is required for the post-operative management of these patients and which complications to be mindful of. The most useful operations to see as a medical student are the common ones such as: trauma craniotomies, burr holes, tumour resections, spinal decompression/fixation and ventricular procedures (such as ventriculoperitoneal shunting and endoscopic third ventriculostomy).

4) Spend time on a neuro-intensive care unit

Given the potential severity of neurosurgical conditions, many regional centres will also have a dedicated neurosciences intensive care unit. Observing and discussing the management of these patients will help enhance your appreciation for how debilitating and life threatening neurosurgical conditions can be. This is something that cannot be understood by only seeing the clinically well patients on the wards. Neurointensivists are also experts in physiology and pharmacology and will be able to teach you how blood pressure, electrolytes, intra-cranial pressure and sedation are optimised; skills that are transferable between all specialties. Experiences in an intensive care setting can improve your general ability to manage patients effectively (Rogers, Grenvik, & Willenkin, 1995). This knowledge will help you be able to stabilise patients you may be dealing with in district general hospital emergency departments who are waiting for transfer to a neurosurgical unit.

5) Spend time with the on-call registrar

On-call neurosurgical registrars are often the frontline for neurosurgical patients. They are the central point of communication which keeps the emergency neurosurgical service running on a day-to-day basis. The on-call registrar is responsible for assessing acute admissions, performing emergency operations and triaging referrals. This is a crucial role in neurosurgery because a large proportion of the patient workload is emergency care (Mukerji, Paluzzi, Crossman, Mitchell, & Nissen, 2013). Spending time with the registrars is a good way to see patients with core neurosurgical conditions and appreciate what a career in neurosurgery entails (Clark et al., 2016). The difficulties of work-life balance, time pressured emergency surgical management and the associated stresses it places on the neurosurgeon are best observed through shadowing the on-call registrar (Fargen & Friedman, 2012). It may be valuable to discuss the impact of the European Working Time Directive on surgical training with the registrar, and consider the implications of this should you choose to pursue a career in neurosurgery (Cowie, Pešić-Smith, Boukas, Nelson, & Association, 2013; Stienen et al., 2016). You can offer to assess patients to test your ability and ask for feedback on your performance.
In addition to the personal educational gains, you will learn what information the on-call registrars want to hear when taking referrals which will help you communicate more efficiently with them when it is your turn to refer patients to the service. The on-call neurosurgeon is notoriously busy and insight into this will make you more understanding of their situation when making these referrals.

6) Split time across the subspecialities

Subspecialities within neurosurgery include vascular, oncology, paediatrics, skull base, trauma, functional neurosurgery and spinal surgery (General Medical Council, 2010). Within each subspecialty, there will be conditions which are relevant to a junior doctor such as headache, stroke and back pain – all common medical conditions. Assessing these patients within a specialist team will improve your confidence and help you better care for these patients in the future. Spending time in different subspecialties, so called ‘mini-rotations’, may help to balance your learning opportunities and improve your breadth of knowledge in that specialty (Weber, Fergestad, Lewis, Tefera, & Chen, 2005). Not only is there educational benefit in splitting your time across subspecialties, but it also gives you the opportunity to network with new people who may be able to offer your new clinical or academic opportunities that can enhance your knowledge and portfolio.

7) Go to the MDT meetings

Multidisciplinary team (MDT) meetings are recommended as one location for learning in the Royal College of Surgeons National Undergraduate Curriculum in Surgery (Royal College of Surgeons, 2015). Multidisciplinary team meetings in neurosurgery are frequent and regular due of the complexity of the cases and inherent risks of neurosurgery. Care of the neurosurgical patient is often about when not to operate as the risks can outweigh the benefits and this is only be appreciated by seeing the cases which do not go to the operating theatre. These meetings will expose you to a variety of neurosurgical cases in a short space of time, allowing you to capitalise on your time in the department. In addition, these opportunities will introduce you to patients who may be worth seeing on the ward. For example, they may have a condition that you have not yet seen, or may have a particularly interesting story to tell. Also, these meetings will offer insight from various specialities and professions which will allow you to appreciate the importance of holistic care for the neurosurgical patient.

8) Get involved in research

Given the evolving and academic nature of neurosurgery, consultants and registrars often run projects and audits which students may be able to get involved with. Your role in research may begin with simple data collection but can progress to presenting research findings at a national or even international conference (Clark et al., 2016). This opportunity will boost your CV, enhance your academic portfolio, and build a positive reputation for yourself within the department, and is true for not only neurosurgery but all undergraduate placements (Bharamgoudar & Sonsale, 2017). Conference presentations and journal publications will give you a competitive advantage for your National Neurosurgery Selection application (Saeed & Anderson, 2016). The benefits of this are not limited to those who wish to pursue a career in neurosurgery, but will also earn points on the UK Foundation Programme Application Scheme. However, it is important to ensure that time spent doing research does not impact on your placement, studies or upcoming exams.
9) Consider neurosurgery as a career

After completing an elective in neurosurgery, students are more likely to consider neurosurgery as a career and believe it is achievable to have a family alongside it (Zuckerman et al., 2016). Neurosurgery is a competitive career, but it is a rewarding and interesting speciality and it is therefore unfortunate that medical students often dismiss it as a potential career (Hill, Dias, & Kitchen, 2011). Neurosurgery offers a lifetime of studying fascinating anatomy, caring for patients with a wide variety of conditions, and has a large scope for teaching and academia. Articles may give you an idea of what a career in neurosurgery entails (Jonathan R, 2009), but talk to consultants and registrars during your time in the department to understand their perspective and personal experiences on neurosurgery as a career. You could consider attending or organising a neurosurgery career event at your medical school (Myers, Shkanov, Rae, Mahoney, & Hall, 2017).

Students interest in a surgical speciality are often positively influenced by a mentor at some stage during their training. By engaging with registrars and consultants on your placement or elective, you may meet someone who will inspire your future career (Marshall et al., 2015).

10) Consider the work/life balance

The lifestyle of a trainee and registrar in neurosurgery can be challenging and they are often required to work long hours. Many of these hours are additional to the on-call rota and elective operating due to the requirements to participate in extracurricular research and teaching to build a portfolio. The lifestyle will be similar to that of other surgical specialities, which may not suit everyone. Given the increase in the number of neurosurgical referrals, it is possible that this workload will increase over time (Mukerji et al., 2013). The level of commitment and personal sacrifices necessary for a career in neurosurgery are often not truly appreciated until you start work but you should aim to educate yourself as much as possible so that you can chose another specialty before it is too late should you wish to. Despite the long hours, neurosurgeons love their work and enjoy the effort required to be successful (Klimo et al., 2013).

11) Observe the life of the consultants

As with any specialty, the hard work does not stop when you become a consultant. Neurosurgical consultants will often be called in out of hours for operations, face challenging demands from patients and the hospital, and have a great burden of responsibility considering the high morbidity associated with neurosurgical operations. Being a consultant in neurosurgery can clearly be very rewarding, and it is important to consider the lifestyle of a consultant when you are considering a career in neurosurgery given that it's how you will spend the majority of your working life.

12) Recap knowledge

At the end of your placement, recap and reflect on what you have seen and learned. It is important to reinforce this knowledge as this may be the last time you get neurosurgical teaching before you graduate and start working. When you come across neurosurgical patients in the future, either as a student or as a doctor, do not be afraid to assess
them – you can draw on past experiences and rely on knowledge gained during your neurosurgical placement or elective.

**Conclusion**

In conclusion, time spent in neurosurgery is often limited in the undergraduate curriculum but can be beneficial to medical students regardless of their interests or career aspirations. Having an appreciation for this specialty can improve confidence in assessing and managing the neurological patient both as a student and doctor. Neurosurgical placements also give the opportunity to consider this exciting and advancing specialty as a potential career option. As with any speciality, preparing well and having a broad range of experiences will make this time as beneficial as possible.

**Take Home Messages**

**Notes On Contributors**

Matthew A. Myers is a fourth-year medical student at the University of Southampton, UK. He is involved in teaching junior medical students and has undertaken several electives in neurosurgery.

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**Acknowledgements**

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Appendices

Declaration of Interest

The author has declared that there are no conflicts of interest.