

# **RACS Medical Student Award Annual Essay Competition 2023**

“All surgeons should maintain trauma skills: Debate”

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## **Introduction**

When, if ever, does specialisation go too far? While it allows physicians to grapple with the rapid growth of medical knowledge, it comes at the expense of broader skills<sup>1</sup>. The specialty of general surgery, for example, has fractured into a variety of subspecialties with most fellows pursuing further training in colorectal, breast, endocrine and upper gastrointestinal surgery to name a few<sup>2</sup>. Traumatology has also become more specialised. While not officially recognised as a specialty by the Royal Australian College of Surgeons (RACS), Australia has followed the lead of the United States in training a small core of trauma specialists. This has complemented the rise of Major Trauma Centres (MTC), which concentrate the best resources and expertise into one location and then, via a hub and spoke model, services a wider geographical area via either inter-hospital transfers or retrieval services directly bypassing less resourced hospitals<sup>3,4</sup>.

Despite this, it is unclear whether traumatology can truly develop as a separate field. RACS's workforce projection into 2025 has predicted a shortage of surgeons that will not be able to "service the community safely and effectively" in any specialty domain<sup>5</sup>. Given the current strain on the system, the natural question is: can trauma specialisation be maintained? Or should we instead expect all surgeons to maintain some level of trauma competency? Who we train depends on the type of training offered, the needed workforce size, and the individual surgeon's scope of practice. Every single specialty manages the consequences of some type of trauma and their respective colleges mandate a level of proficiency relevant to their scope of practice. Yet the volume of trauma is not shared equally, particularly in the case of hyperacute, polytrauma patients requiring early resuscitation, haemostatic control and complex physiological management<sup>6</sup>. Before the advent of trauma specialists, these patients were typically managed by the admitting general surgical registrar<sup>7</sup>. Following the lead of the USA, hospitals worldwide, including many in Australia, are now adopting an Acute Surgical Unit (ASU) model of care which can first stabilise patients and then send them off for definitive management<sup>8</sup>. This model improves outcomes for the patient whilst reducing the need for many surgeons to maintain skills in hyperacute trauma management.

When debating this topic, it's also vital not to forget more junior members of the surgical team. Whilst not qualified "surgeons", prevocational junior doctors, from interns to unaccredited

registrars, make significant contributions to patient care. They serve multiple roles, being a point of contact between departments, fulfilling administrative tasks, and assisting in theatres. Their role is equally important in trauma teams. As such it is important for them to acquire basic trauma skills and, via maintaining them, solidify these skills into competent practice.

With these considerations in mind, I will argue that who we train to maintain their trauma skills should depend on the most optimal way to support an ASU model of care. This would rely on three categories of trauma competency. The first category would be a core of surgeons, including trainees and junior medical officers on surgical rotations, with strong foundational skills in basic trauma management. This core would support the second category, dedicated teams of trauma specialists in MTCs with the skills to make rapid operative decisions to save life or limb. With the patient stabilised, the ASU can then rely on the third category of surgical specialists who do not require quite a breadth of training in traumatology, yet who maintain skills relevant to their specialty area in order to give the patient definitive management. This structured specialisation of skills would maximise the practical benefits of training and would best serve the community in the face of system-wide strain.

## **Who Treats Trauma?**

To understand where trauma training is required, we should first analyse who treats trauma. Trauma has a trimodal distribution of mortality with the first peak of deaths occurring immediately following the mechanism of injury. The second peak, typically 30% of mortality, happens hours after the injury and is managed by the trauma team at the receiving hospital. The second peak is critical for the patient's outcome and failure to give effective resuscitation or poor operative management will either be immediately catastrophic, or raise mortality rates during the third peak days later<sup>9,10</sup>. The traditional trauma team consists of: a team leader, airway and breathing physicians, a general surgical registrar, trauma nurses, a scribe and trauma fellows (if available) with additional, supporting specialist surgeons off site but on-call<sup>11,12</sup>. The registrar surgeon is usually in charge of cardiovascular management and

procedure-based tasks<sup>12</sup>. They are also vital in identifying any investigations or surgical management needed. They also liaise between other surgical departments to deliver definitive care and follow-up<sup>13</sup>.

## **Preparing the Junior Surgeons**

As Professor Balogh, director of Trauma at John Hunter hospital, noted in 2010, there is a paradox in our current reliance of inexperienced surgical trainees to manage complex major trauma in stressful, time critical scenarios<sup>13</sup>. In reviews conducted on Australian trauma teams, none have had an in-house attending surgeon available after regular hours<sup>8</sup>. Instead, it's the junior, perhaps even unaccredited, registrar acting as the initial surgical representative during trauma calls<sup>14,15</sup>. This is despite the fact that up to 75% of trauma patients present between the hours of 5pm and 9am<sup>10</sup>. This makes it critical for all junior doctors to be proficient in providing at least basic levels of trauma care. In Australia, junior doctors typically rotate in and out of surgical specialties. While they're able to preference rotations or apply for positions, no placement is guaranteed. The unpredictable nature of these placements makes it harder to target training towards individuals likely to participate in trauma, thus a blanket approach is more suitable.

Currently it's compulsory for all basic surgical trainees to undergo Early Management of Severe Trauma (EMST) training. EMST was derived from the Advanced trauma life support (ATLS) program developed in the USA. It's designed to train medical staff in the effective management of the "*golden*" first hour post-trauma, the timeframe most correlated with patient outcomes, and to help clinicians develop strong communication and organisational skills in the trauma setting<sup>9,16</sup>. The EMST/ATLS courses aren't without controversy, however. Despite costing each participant \$3,310 for their first course and \$2,460 for each refresher<sup>17</sup>, systematic reviews have failed to show ATLS courses providing significant improvements in patient morbidity and mortality<sup>18</sup>. Furthermore, most surgical registrars do not report ATLS meaningfully contributing to their training, claiming they already gained the clinical and surgical skills necessary via their specialty training<sup>19</sup>. Why then, some would argue, should we waste time and resources on a course that has contentious value for patients and staff?

These arguments miss the value EMST provides more junior doctors, as seen in their huge demand for these courses. Lately there has been a rush of prevocational junior doctors eager for the course, pushing waiting list times by up to 18 months<sup>16</sup>. It's easy to see why they are so keen. Lack of experience can result in disastrous consequences in trauma and is correlated with lower physician confidence and slower times to surgical management<sup>20-22</sup>. Training compensates for this. There is strong evidence that EMST/ATLS courses provide trainees with a solid foundation in the clinical, organisational and critical thinking skills needed in early trauma management<sup>18</sup> and they have been shown to increase the confidence of trauma care providers<sup>19</sup>. Evidently, the value of EMST comes from training inexperienced staff members, who lack the confidence and expertise needed to manage a trauma call. Shifting maintenance requirements of basic trauma skills to more junior staff members would then also ensure that basic surgical trainees, who will inevitably be more active in trauma management, enter the workforce prepared with proficiency in trauma care.

### **Advanced Training: Who are the Experts?**

So far, we have seen how maintaining basic trauma skills is necessary for junior doctors and pre-vocational surgeons. But as these trainees progress, should we expect them to maintain more advanced skills? Specifically, should all surgeons maintain the skills to stabilise a hyperacute, polytrauma patient? The answer depends on two factors, geography and our system of care.

Australia's geography has always posed a challenge to its healthcare systems. Australia is roughly the size of the continental United States, with a third of the population living in regional or rural communities. For these communities the local rural generalist surgeon may be the only available option for hundreds of miles<sup>23,24</sup>. In extreme cases, surgical specialists act on-call for a geographical area so vast they fly to each case<sup>4</sup>. While Australia's trauma hospital network ensures that most patients can be transferred to high volume centres, at extreme distances or in hyperacute situations this isn't feasible. At these distances, interhospital transfer is a major risk factor for mortality in trauma patients<sup>24</sup>. Accordingly, it is critical for rural generalist surgeons to maintain the highest level of trauma specialisation in order to adequately provide for their

communities. This would enable appropriate stabilisation of trauma patients and minimise the need for riskier interhospital transfers.

This blanket approach to advanced training, however, is not appropriate in urban settings. In better resourced communities, specialisation improves patient outcomes and lowers mortality rates<sup>25,26</sup>. This is especially true of trauma surgery. Most urban surgeons have minimal exposure to operating on hyperacute, polytrauma patients. This inexperience has been accelerated by the recent trend of decreasing surgical management in major trauma<sup>27</sup>. Improvements in diagnostic imaging, emergency specialist care and interventional radiology techniques have eroded into trauma surgery case volume<sup>21,28,29</sup>. Experience is one of the strongest correlates to surgeon performance and outcomes<sup>28,30,31</sup>, and skills tend to depreciate at faster rates when they're not exposed to higher case volumes<sup>18</sup>.

The development of ASU teams has solved this issue for many MTCs. Staffed by in-house traumatology specialists, these ASU teams are tasked with efficiently managing all hyperacute presentations. By directing all major polytrauma towards one team, volume and experience is maximised for team members. Experience is correlated with improved practice and efficiency and so ASU's have been shown to both reduce complication rates and times to intervention<sup>21,32</sup>. ASU's also provide stable leadership for the team via a roster of fully qualified trauma specialists. Liverpool hospital, the largest trauma centre in Sydney, has structured its own Trauma and Acute Care Surgery team (TACS) to include 4 full time surgical specialist consultants, 2 visiting medical officers (VMOs) and 2 fellows who rotate in-house responsibilities in order to balance their elective commitments<sup>33</sup>. The stability in this team structure does two things. It firstly ensures instantaneous access to specialist care is always available via predictable rostered commitments. And secondly, it fosters familiarity and cohesion between team members. This has been shown to improve patient outcomes as compared to a model of on-call, primarily non-trauma, specialists brought in for the rare hyperacute presentation<sup>34</sup>. Yet these benefits have not been fully realised Australia-wide due to the unpopularity of traumatology. Trauma surgery subspecialisation has had slow growth in Australia since its introduction. The hours can be irregular and the opportunity to practice surgical skills is often unpredictable. These factors have made it unpopular as a career choice, robbing many hospitals of the benefits of a fully staffed ASU<sup>2</sup>. Despite these issues, trauma is still the largest cause of mortality in those aged under 44 years<sup>23</sup>. While the overall volume of trauma in Australia is small, these patients, in the prime of their lives, still deserve the benefits of specialist

attention. Thus, we should look for ways to make ASU teams more feasible, rather than discount them entirely as impractical.

So the question now is, who should be trained to make up these ASU teams? In a survey of Australian surgical trainees, orthopaedic surgeons vastly outcompete all other specialties in attendance of traumas, operating on more cases than all other specialties combined. General surgery trainees were the most likely to lead a resuscitation. In the case of cardiothoracic, neurosurgical and paediatric surgical trainees, the trauma they do see is usually major, requiring resuscitation and invasive intervention<sup>13</sup>. Given that these surgeons, in particular orthopaedic surgeons, are so heavily involved in trauma care, I would argue that it makes most sense for these specialists to maintain the highest level of competency in trauma care.

This can be done via mandating participation in more advanced courses such as the Definitive Surgical Trauma Care course (DSTC). The DSTC is regarded by RACS as an essential qualification to guarantee competence in the operative management of unstable polytrauma patients. It provides surgeons with the cognitive and diverse technical skills required to make management decisions under pressure. It also teaches the surgeon, no matter their specialty background, skills for controlling haemorrhages and trauma to the thorax, heart and abdomen<sup>4,35</sup>. Studies have shown that DSTC covered skills can be effectively taught to surgeons outside of their normal scope of practice. Furthermore, surgeons typically maintain these skills for extended periods time with almost 90% of surgeons performing to military standards after 18 months<sup>36</sup>. As an added incentive for the trainee, trauma management techniques may carry over to their elective practice. Skills such as non-trauma vascular exposures and colon mobilisation can improve after advanced trauma management courses<sup>36</sup>.

With more surgeons completing this level of specialisation we could then cover the current gaps in the trauma service. As an example, the projected number of orthopaedic surgeons in 2025 is estimated to be 1756<sup>5</sup>. If all of them had undergone DSTC training, a mere 3-day course, and actively maintained that level of training, there would be 2.5 fully trained trauma surgeons in every public hospital in Australia and more than enough to fully staff every MTC<sup>37</sup>. This is with orthopaedic surgeons alone. Evidently, increasing the number of surgeons maintaining DSTC qualifications would increase the feasibility of ASU teams.

Detractors may say that it would be unreasonable to expect every single orthopaedic specialist to maintain this level of competency. But, as explained before, general, paediatric, cardiothoracic and neurosurgeons would also be encouraged to participate in advanced trauma

skill maintenance given their past strong involvement in major trauma. A mixture of strong encouragement and mandated maintenance of advanced, polytrauma training in such a diverse array of surgical practitioners, would provide a deep well of specialists ready to staff and support the ASU team on a rotational basis, perhaps making traumatology specialisation a more attractive prospect.

A fully staffed ASU model of care also ensures that other specialists are able to focus on their own specialised trauma skill set without the need to maintain competency for hyperacute, polytrauma stabilisation. The case load for specialties such as plastics, urology, and ENT is dominated by minor trauma, and these surgeons are rarely exposed to major, unstable cases<sup>12,13,38</sup>. Inexperience in major trauma is associated with worse patient outcomes. Duke et al.'s study into the management of severe trauma found that 74% of errors made by medical staff were due to divergences from accepted guidelines. They attributed these findings to lower experience levels of treating staff who lacked adequate access to specialist advice<sup>31</sup>. If these surgeons were expected to stabilise complex polytrauma, then their inexperience would necessitate a higher dependence on training programs to maintain competency. These training courses are not cheap, both to individual surgeons and the hospital system. A single DSTC course costs \$4150 for each participant<sup>39</sup>, and they often rely heavily on the generous volunteer work of fellows and consultant traumatologists<sup>16</sup>. These costs should not be forced on the surgeon who wouldn't see benefit to their practice. They also necessitate prioritisation of training resources for those most likely to need these skills.

At this point, critics would argue that it would be more beneficial to focus training these specialists due to their inexperience not in spite of it. They would highlight that while these specialists rarely see major trauma, what they do see can have catastrophic consequences if not managed effectively by an expert in that field. The benefit of the ASU model of care, however, is that there is an in-house team of surgeons, trained via DSTC standards, who are already organised to receive the polytrauma patient and prepared to effectively manage any life or limb threatening scenario.

What's more, dedicated teams can make more effective use of complementary educational techniques such as simulation and videotaped reviews. These techniques have been found incredibly effective in identifying weaknesses in team members and correcting mistakes via personalised feedback<sup>9</sup>. But they are most effective when used repetitively, compounding gains



from experience with individualised training and review, which then feeds back to improve their practice in a virtuous cycle. This is harder to do for on-call surgeons who, with more sporadic trauma experience, have no guarantee of being able to implement feedback within a suitable timeframe to consolidate their learning. Thus, rather than mandating all surgical specialties maintain advanced polytrauma skills, fully staffed ASU teams can instead be used to adequately stabilise life and limb threatening trauma before liaising with other specialists in a collaborative approach to coordinate care based on competing priorities<sup>10</sup>.

## **Conclusion**

Ultimately the debate over trauma skill maintenance depends on what the community needs and who can best service those needs. The advent of ASU teams and MTCs have allowed for the concentration of a small volume of operative trauma under a single team, wherein members can improve their practice through reviewed experience, simulation and targeted training. Thus, it's most practical for only the specialties most typically involved in major trauma to be expected to maintain the skills needed for complex, polytrauma cases with urgent, time critical needs. Conversely, the same cannot be true for more junior doctors on surgical rotation. These junior "surgeons" can be called upon at any time to help, under the leadership of more senior trauma specialists, in the early management of trauma, particularly when hospital systems are strained. It is therefore vital that all junior members of surgical staff should be expected to maintain basic trauma skills, especially if they have surgical ambitions. By balancing the needs of junior and senior members of staff, we can then create a system that fully optimises patient care.

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