

HANDLING THE UNEXPECTED: A VASCULAR AND TRAUMA SURGEON'S PERSPECTIVE

The operating theatre, like the flight deck or control room, involves predictable work, but with unexpected moments that demand expertise from all team members. Trauma surgeon **Mark Edwards** emphasises the importance of experience in the operating theatre, illustrated with a hypothetical scenario.

KEY POINTS

- **We cannot predict when something unexpected will occur, but we know that we need to be ready for it and trained with this in mind.**
- **Time and exposure in the operating theatre are critical during surgical training. Thousands of new or unexpected events are encountered in the many years of surgical training that precede independent practice in surgery.**
- **Greater experience in practice increases understanding and cognitive skills, and blunts the stress response to novel circumstances.**
- **Being able to respond effectively to the unexpected requires training that focuses on the task, the team, and how we integrate the two.**

Anaesthetist: "The blood pressure is dropping quickly now. I'm putting up the next bag of red blood cells. Call the transfusion team. We're going to need more."

Surgeon 1: "I can't see where the bleeding is coming from, but it's arterial... no wait, I can see it now, it's close to the left kidney. I've found it. There's an injury to the aorta."

Surgeon 1 (to Surgeon 2 – trainee): "Press firmly here over the aorta. OK, good, that's slowed it right down. OK, we've improved things, the bleeding from that injury has slowed."

Anaesthetist: "No change to the blood pressure yet, we've got more blood on the way from the lab, which the theatre runner has told me will be here in 3 minutes. I've just got one more unit of plasma left. I'm running a blood gas now. Oxygen saturations are lower now despite being on 100%."

Surgeon 1: "Acknowledged. Team, let's improve the lighting. Can you bring that overhead light to focus here? I'll take that retractor now. OK, give me slightly more view of the aorta above the kidney beneath the vein. Good, I can see it now. Let me have the aortic clamp."

Surgeon 2: "I think a second retractor would improve our view here."

Surgeon 1: "OK, good idea, let's get that there...better, I've got a good view of the aorta...clamp going on, now."

Anaesthetist: "No change here, blood pressure still low, pulse rate is still rising despite that plasma."

Surgeon 1: "Acknowledged. Let's take stock of where we are now that the bleeding is controlled. ABC: from the top..."

Anaesthetist: "A – Airway – secured, B – Breathing – those oxygen sats are much lower now and that gas shows marked hypoxia, C – Circulation – blood pressure low and pulse rate high. Something's not right."

Anaesthetist: "The chest drain that was put in ED has stopped swinging and there's fresh blood in it. The left lung has collapsed, I think."

Surgeon 2: "There's now bleeding coming from around the drain site on this side."

Surgeon 1: "We're going to open the chest. Scrub team and anaesthetics, are you prepped and set?"

Scrub practitioner: "Set and ready."

Anaesthetist: "Ready."

Surgeon 1: "Knife to skin..."

Life as a surgeon is, in most respects, a routine existence and much of what we do is predictable. Operations are undertaken by a highly skilled multidisciplinary team of surgeons, anaesthetists, and theatre practitioners. A theatre represents a system within a nest of systems (an operating department, and a larger healthcare organisation) that collectively functions to produce several outputs, a successful operation being just one. On a typical day, this work is undertaken with high levels of predictability and minimal variation, and these systems usually work seamlessly, albeit under considerable pressure.

But, as illustrated in the hypothetical example above, life as a surgeon also involves managing the unpredictable in volatile, uncertain, complex and ambiguous (VUCA) conditions. We cannot predict when something unexpected will occur, but we know that we need to be ready for it and are trained with this in mind.

Training as a surgeon is a long-haul journey. For me, the journey from medical student to consultant vascular and trauma surgeon took almost 20 years. During the many years of surgical training, most of the focus is on operative experience; time and exposure in the operating theatre are critical. Unlike in aviation, we have yet to develop a simulator with enough fidelity to reproduce the conditions of theatre such that the next generation of surgeons could be trained well enough outside of a real-world environment to operate safely and handle unexpected events as a team.

There are three areas that need to be captured in training, all of which are covered through exposure to theatre over those two decades: a) development of the individual knowledge and skills to complete surgical tasks, b) development of the skills needed to work effectively within a multidisciplinary team, c) testing these

skills under increasingly challenging conditions, including surprises.

The Austrian philosopher Victor Frankl said: *"Between stimulus and response, there is a space. In that space is our power to choose our response."* In a surgical theatre, when providing resuscitative trauma care, these stimuli are many, and can change unexpectedly and rapidly. The outcomes as a team will depend on how we detect and understand these changes and manage our responses.

While much of this comes down to those decades of individual training, all of it directly relates to the way that we work as a team. The interface between the task and the team is where our training comes together; our self-awareness and self-management as individuals help to ensure that we perform well together. So how do we create the right conditions for this?

"The interface between the task and the team is where our training comes together."



Over the decades of training that precede independent practice in surgery, there will be thousands of moments when the surgical trainee encounters operative scenarios where they will meet, for the first time while supervised, a new or unexpected event in theatre. In that moment, a space for learning is created and a new response is generated. These responses are embedded through repeated exposure and eventually become a matter of 'instinct'. Those patterns of response need to be supported and assessed at an early stage.

Novel circumstances can, however, come with a stress response. The years of exposure serve to blunt this stress response. This is partly because the surgeon increases their understanding of pathology (disease), operations, outcomes, and interactions between members of the theatre team. In doing so, the surgeon generates iteratively a unique personal repertoire of associated cognitive skills. The greater the exposure, the greater the opportunity to consider alternatives and options.

Also relevant to handling the unexpected is the fact that traumatic injuries might encompass any part of

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the body and present in a seemingly infinite array of combinations. The apparent complexity at any given point in time is high: the patient who needs our help has a unique injury burden and physiology, the composition of the group of people who will come together as a flash team to provide care across the patient's care pathway will be unique. These elements all need to be factored into the way that we undertake treatment, and all add to mental workload and thinking in the moment.

To summarise, in trauma surgery there are few surprises as such – with the typical emotion involved – just the predictably unpredictable. Being able to respond effectively to rapidly changing information and situations as they develop requires training that focuses not only on the task, but also the team and our roles as individuals to integrate the two. **S**

