

What have human factors got to do with surgical trainees?

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That is exactly the question Pilots asked themselves over 40 years ago, when the aircraft Captain had absolute authority and power but unfortunately was not always right. The consequences of a wrong decision were often career and life ending! The understanding, recognition and management of human error in healthcare is improving, but we still have much to learn about safety from other high-risk organisations (HROs) where errors can be devastating on a even larger scale.

Medical error is usually multifactorial with contribution from the employing Trust as well as those at an operational level. Human factor (HF) issues that affect the operational team members include tiredness, emotional state, situational awareness, effective team working, communication and being able to challenge hierarchy without fear of retribution.

Threat and error management (TEM) is a key part of any high performing safety critical team. Threats can be identified and avoided; errors

are an accepted part of complex human systems and therefore their identification and management is critical rather than an implication that errors don't occur. It is vital that we care for our own wellbeing to ensure we are best placed to look after our patients.

Over 70% of air crashes are due to human error rather than technical failure. Blame is often attributed to pilots but others such as ground engineers and the company itself may have had a crucial part in the incident.¹ Personal factors resulting in error including tiredness, emotional status, stress, ineffective or unclear communication, poor leadership and being unable to challenge hierarchy are all recognised in aviation and other HROs, with appropriate measures in place to improve safety.

Mistakes in surgery and medication issues are the most common causes of error-related deaths.²⁻⁴ While 1 in 10 UK hospital admissions has some form of error (albeit minor), the risk of death from a major error is 1 in 300.⁵ In the UK, over 4,000 deaths per year are

due to medical error, not to mention Never Events including wrong site surgery.

How does human error arise?

Human failure can be divided into four main areas; organisational influences, unsafe supervision, preconditions, and the unsafe act itself, well known in the "Swiss cheese model" where these factors (holes in the cheese) align to cause an error (Figure 1).⁶

There are active (the error itself) as well as latent failures, e.g. from the employing Trust. The latter include issues such as pressure from hospital managers, working long hours, and no rest provision after night shifts.

Latent failures: organisational influences

Senior executives have a major leadership role in addition to creating a non-prejudicial environment for all to voice concerns in an open and transparent way.⁷ All staff should be able to highlight safety issues and the organisation has an obligation to address concerns. A difference between pilots and surgeons is that in the event of an error, pilots may have the same fate as their passengers. Surgeons are not usually harmed by an error (at least not physically) though the psychological effects of significant patient harm or death can be devastating.⁸

What about those personal factors?

Tiredness, fatigue, poor nutritional status, dehydration, stress and anger, multi-tasking, poor communication, not being able to challenge hierarchy and losing one's situational awareness can all lead to error.

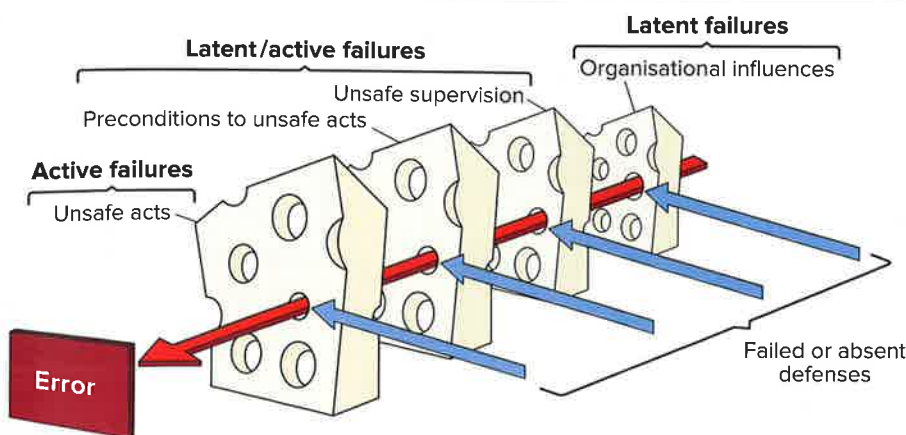


Figure 1. The Swiss cheese model of error showing both latent and active failures. By following basic HF principles, we are far more likely to prevent active failures.



Figure 2. The simple pneumonic HALT= stop that help us remember some of the factors leading to error.

Tiredness

HROs have strict guidelines for regular breaks as tiredness represents a significant cause of accidents. Tiredness affects operating skills, decision-making, performing mental tasks and situational awareness. The value of a short break (10–15 minutes) every 2–3 hours while operating is immense, as well as enhancing performance and morale. Time away from a stressful operating list can also lead to a fresh outlook. Remember too that your own cognitive capacity will be lower than 'the boss' especially when trying to learn new operations or perform under pressure. You need that regular break!

Nutrition and Hydration

Three often overlooked main components affecting physical performance are hydration, nutrition and recovery. Body mass, exercise, ambient temperature and diet all affect our hydration status. Most of us need more than 2L/day of fluid. Reduced cognitive function and performance can occur with even small levels of dehydration.⁹

Optimised energy, reduced fatigue, increased metabolism and lowered fat storage can be achieved by small regular meals, ideally every few hours. Processed foods, and refined sugars should ideally be avoided. How many of us miss lunch and then have a chocolate bar instead?

Emotional factors at work

Positive and negative emotions can resurface during times of increased workload or high-risk situations, such as surgery. These 'sentinel' events can trigger the start of a threat and error chain leading to an "incident". Most of us can recall having an angry outburst which we later regret, and given the right circumstances, these can lead to major error.¹⁰ The HALT pneumonic is easy to remember (Figure 2).

Effective communication

When you want to ensure a message is understood, ask for it to be repeated back. In this way ambiguity can be resolved. And don't use pronouns (e.g. that, this, the, it) when giving vital information. Use 'we are going to do the left side today'. Don't say, 'we are going to do the right side.' but 'we are going to do the correct side today, which is the patient's right.' A further simple step to flatten the hierarchy gradient is for the team leader to ask, "which side are we doing today...?" Pilots are taught to ask open questions rather than steer towards an answer. Asking "What do you think?" to a colleague can often reveal an amazing amount of information.

Challenging hierarchy

Steep hierarchy gradients still exist in some teams, leading to trainees feeling unable to challenge consultants about decisions leading to potentially catastrophic errors. There should be a slight gradient between trainee and boss as there is on the flight deck (Figure 3).

The team brief is a great way for team leaders to actively encourage anyone to challenge or speak up, without fear of retribution if they have any concerns whatsoever. The first response to a "challenge" should be "thank-you" from the team leader followed by an open question of "please explain the issue you see here..." While there are no black box flight recorders in theatre, just imagine if there was: behaviour would almost certainly be different. Other ways to reduce hierarchy are to use first names, debriefing sessions over a coffee discussing what went well, and what went not so well. The power of saying thank you to the team cannot be highlighted enough. Think about when you were last appreciated and how that was achieved.

Situational awareness (SA)

Our own awareness and perception can change over time, sometimes suddenly. SA can be simply summarised as 'what has happened, what IS happening now, and what might happen in future.'

SA is an important skill for us all to acquire, and improving it through training and workload management, together with team awareness reduces its impact in medical errors. Aviation has found that when the crew and in particular the Captain lose their SA it's often the start of

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Figure 3. A gentle hierarchical gradient on a Boeing 787 flight deck on approach to Boston, USA.

the 'incident.' Simply put, the level of SA of the team is the lowest level of any individual member; i.e. high "shared SA" is the goal. Tunnel vision, losing track of time, losing perception or relying on wrong information to confirm what we think is correct (reinforcement bias) are all areas to think about. Within any task there are usually predictable key critical moments. These threats should be identified within the team brief; to identify any threats followed by discussion on "how" to manage them including, if required, allocation of critical duties to named individuals. The best way to improve SA is to ask everyone to look out for each other during the team brief/WHO checklist. We often ask the scrub nurse to let us know when 2–3 hours have passed so we can all take a break. Time can fly and it is easy to lose track of ourselves when concentrating. Remember SA is dynamic and degrades. As with pilots we should plan ahead and discuss issues at times of low workload.

"As with pilots we should plan ahead and discuss issues at times of low workload."

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