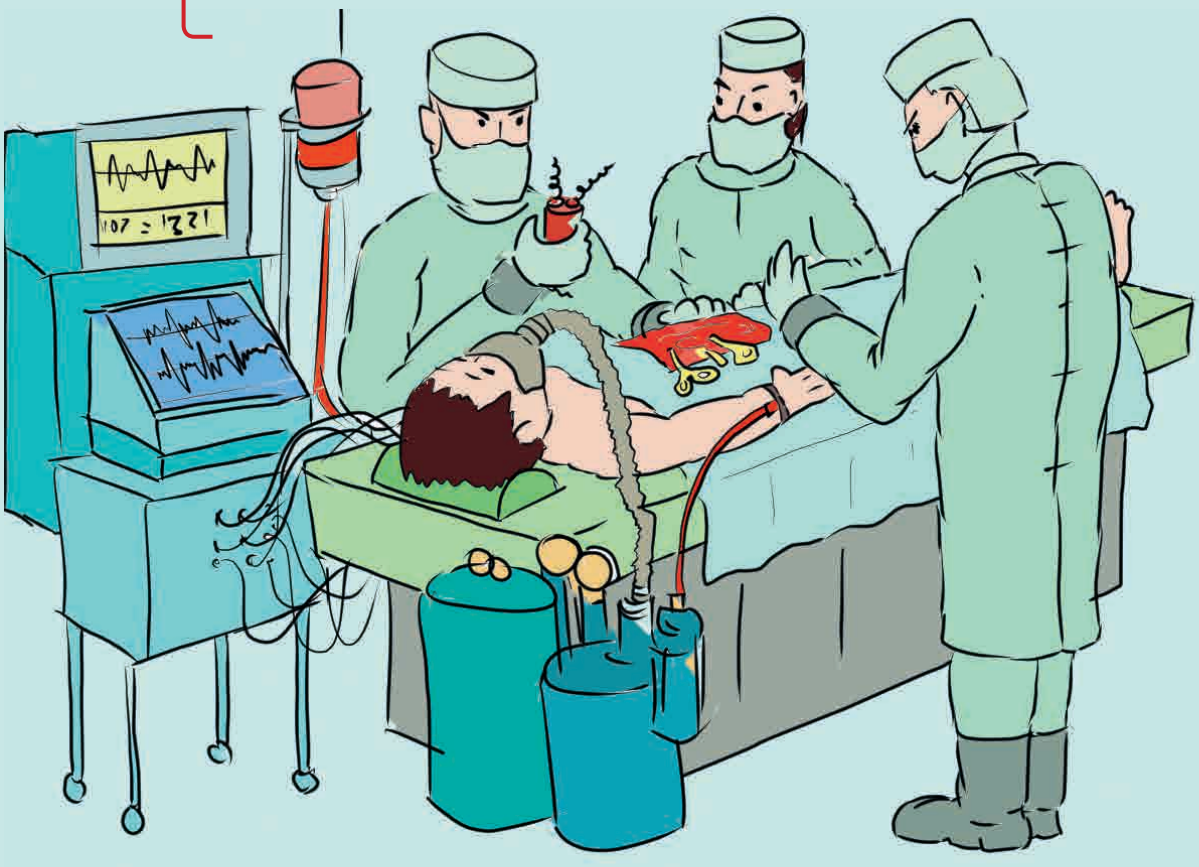
IMAGINING WORK-AS-DONE IN SIMULATION: LESSONS FROM HEALTHCARE

Simulation is common to both healthcare and aviation. Part of the aim is to explore and address the gap between work-as-imagined (by simulation participants and others) and work-as-done. In healthcare, simulation includes diverse teams and difficult situations, making psychological safety a priority. In this article, **Michael Moneypenny** outlines some useful lessons.

KEY POINTS

1. **Simulation aims to invoke work-as-done, but requires imagination. It allows us to facilitate participants' personal learning journeys from their own work-as-imagined to work-as-done.**
2. **For effective learning, it is necessary to create the conditions for psychological safety. What is said in the briefing is critical.**
3. **Simulation allows us to highlight problematic aspects of equipment, processes, systems and the environment.**



Are you sure this is the pacemaker and not buzzer form the last similations?

Simulation occupies a unique domain in the industries in which it is employed for learning and assessment. The aim in simulation delivery is not for 'the real' but for realism; not for making scenarios as real as possible but rather as realistic as necessary to invoke 'real-life' behaviour. Yet all simulation requires a suspension of disbelief and a degree of imagination by the participant, who must become immersed in the scenario they are faced with. In this twilight where the real, the realistic and the make-believe intertwine we can gain some insights into 'work-as-imagined' (WAI) and 'work-as-done' (WAD).

Realising personal performance gaps: Life-threatening asthma

One of the most powerful rationales for using simulation is that it allows us to facilitate participants' personal learning journeys from their own WAI to WAD. Asthma is increasing in prevalence and most attacks are easily treated with an inhaler. However some attacks worsen into life-threatening asthma, which will lead to death if not diagnosed and managed quickly and effectively. Most final year medical students are able to explain the investigations, the management options, and the need for early intensive care input. The students may rate themselves fairly high in terms of confidence in dealing with this imaginary scenario. Place those same students into an immersive simulation, with a 'patient' (mannequin) whose saturations are falling and who is unable to complete sentences, and the results are very different. The call for help is often late or never carried out as the student is too busy dealing with the problem at hand and cannot project into the future. Important investigations are omitted while inessential ones become a focus of attention. Within a safe learning environment this experience is a lightbulb moment for the student: they appreciate the disconnect between the theory and the application, between the seemingly straightforward WAI and the messy WAD.

Psychological safety and briefing the participants

In healthcare simulation our first concern is the psychological safety of the participants. Participants are often under stress because they are unsure of how well they will perform (WAD) and how well this will correspond to the image they have of themselves (WAI). A presentation slide on the Scottish Centre for Simulation and Clinical Human Factors faculty development course states: "Prioritise your relationship with the learners above the content of the course". Creating a safe learning environment serves a number of functions. The safe learning environment means that people will engage with the simulated scenario, performing as they would 'in real life', rather than focusing on the elements which are not realistic. During the post-scenario debrief, the safe learning environment fosters additional engagement; people will discuss their own mistakes, be open to critique from others and be willing to critique others' performance. The safe learning environment also creates the conditions that are a prerequisite for personal change: a lowering of defense mechanisms, the acceptance of personal fallibility and the belief in the possibility of improvement. Lastly, the safe learning environment helps to convince participants of the benefits of simulation as a learning technique and encourages repeated engagement. The 'difficult' quiet group of learners is often a result of a lack of perceived safety.

Psychological safety is created. It does not emerge naturally when a group of professionals get together, or are 'forced' to attend, for a learning experience. Psychological safety is established in a number of ways, which include:

- how participants are welcomed
- the environment in which the learning is to take the place
- the confidentiality of performance, and
- the briefing at the start of the day.

The briefing provides an opportunity to prepare participants for the unexpected, while at the same time instilling hope.

A typical briefing might include something along the lines of the following:

> *You may be wondering if you are going to make a mistake today in front of your colleagues.*
>
> *Let me put your mind at ease.*
>
> *You are going to make not just one mistake, but a number of mistakes today.*
>
> *None of us, including me, perform as well as we imagine we will when placed under stress. This results in gaps in performance.*
>
> *I have been involved in incidents in clinical practice which have led to patient harm and, a couple of times, contributed to a patient's death. Although I cannot be certain, I am convinced that for a number of those mistakes, had I made them in a simulated environment, I would not have made them with patients.*
>
> *So today is an opportunity for all of us to make mistakes in a safe environment and to dissect those mistakes, so that we can learn from them and not repeat them in real life.*

The briefing relaxes participants. They now know that their own WAI and WAD will be divergent, but that these gaps will be explored to improve their own performance.

Medical devices

As in aviation and ATC specifically, healthcare workers are surrounded by complicated devices. These devices can cause harm if used improperly. Simulation uses real equipment when this is essential for immersion. This means that the stressful simulated scenario (WAD) can expose weaknesses in the design of medical devices, which may be difficult for the manufacturers to predict (WAI).

For anaesthetists, the primary piece of equipment is the anaesthetic machine. Anaesthesia is one of the safest medical specialties and this is reflected in the safety mechanisms built into the modern anaesthetic machine. One safeguard is the hypoxic guard, which prevents the delivery of fatal 100% nitrous oxide. Another safeguard is the pin-index system, which prevents the potentially fatal swapping of gas cylinders. However, design weaknesses still exist. For example a well-known anaesthetic machine manufacturer

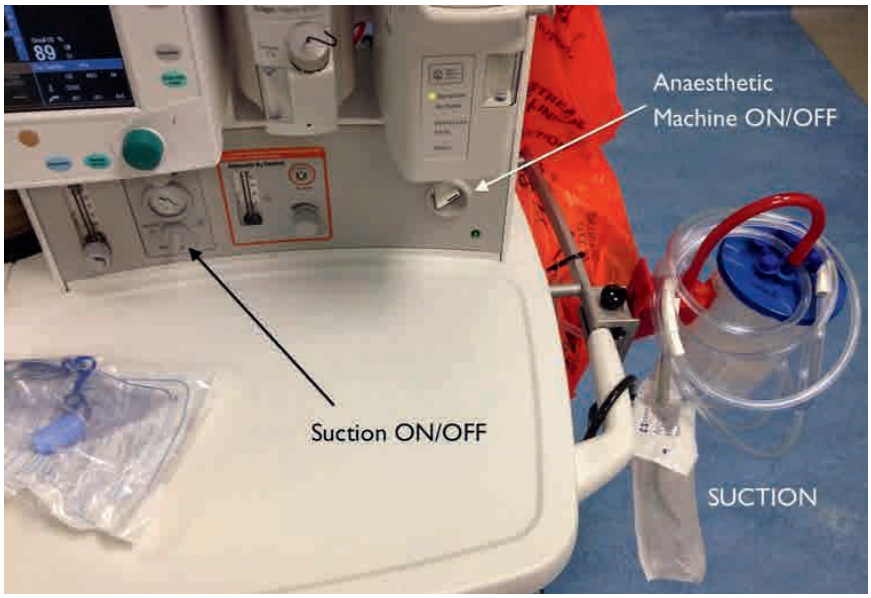


Figure 1: Anaesthetic machine.

had placed the on/off switch on the front, right-hand side of the machine. In everyday use, this anaesthetic machine is switched on in the morning and then not switched off again until the end of the operating day. Many machine set-ups also have the airway suction canister, tubing and stylet (a slender probe) attached to the right-hand side of the machine. The on/off switch for the suction is located on the front of the machine, in the middle. During everyday operations, the suction is used to clear a patient's airway of secretions before removing the endotracheal tube that is delivering gases and protecting the airway. In a crisis, the suction might be used to clear an airway that was not protected and had been soiled with stomach contents.

Over the course of several years, during simulated crises, we had observed participants switch off the anaesthetic machine when they had wanted to switch on the suction. This means that not only did the anaesthetist still not have the means to clear the airway but they also now also had an anaesthetic machine that required some minutes to restart. After discussions with anaesthetists it was discovered that the same mistake had been known to occur in real life. The machine manufacturer has since installed a lid on top of the on/off switch as a barrier to inadvertent use. (However, given that the switch is only used twice a day the better solution would be to place it out of immediate reach on the back of the machine).

A multitude of similar weaknesses are hidden within other medical devices, waiting for the right conditions to reveal their harmful consequences. Immersive simulation allows us to observe situations and behaviours in a single day, which the average anaesthetist may not see in many years of practice. Unfortunately, medical device manufacturers are failing to use immersive simulation to identify the gap between their WAI and the actual WAD.

Testing of systems and processes

Healthcare has a complex system of regulatory bodies, providers, training organisations and interest groups. This means that systems and processes are varied. For example, in most of the UK (Scotland has made some advances in standardisation) the only ubiquitous piece of paperwork is the death certificate. Everything else – anaesthetic charts, drug charts, fluid charts, admission records, operating notes, observation records, etc. – vary from hospital to hospital. Hospital processes vary similarly. Every hospital has a major haemorrhage protocol. This is put into action if a patient is at risk of dying due to blood loss, and results in different people being informed and different procedures being triggered in each hospital. The protocols are often wordy documents – rarely accessed and quickly forgotten – and the major haemorrhage protocol requires coordination between people who rarely work together. This means that those who write the protocols (usually a committee of interested parties) are only able to invoke WAI in the creation process. When the major haemorrhage protocol is activated in real life, the people involved make the system work despite its limitations. Without dedicated observers, lessons are not learnt for future activations. It was only when the major haemorrhage protocol was tested repeatedly at the point of care, using the actual staff in their own work environment, and when WAD replaced WAI, that major flaws in the process were identified and rectified.

Final thoughts

The concepts of WAI and WAD help illustrate how simulation can be used effectively for learning. They help to point our own performance gaps and help to maximise learning by creating a psychologically safe learning environment. Drawing on these concepts, simulation can be used proactively to improve patient safety through device design and process testing. Concepts fulfil their purpose when they are useful in everyday practice and deepen our understanding of the complex systems in which we work. By these measures, work-as-imagined and work-as-done are valuable additions to our vocabulary.

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