

Beyond technical skills: the next essential steps to safety

Martin Bromiley, pilot and director of the Clinical Human Factors Group

The NHS is starting to see the value of addressing “human factors” to improve safety. Martin Bromiley challenges healthcare professionals to speed up this process.

I am an airline pilot whose late wife died as a result of errors during an attempted operation. Since Elaine’s death I have been trying to understand the current health system and how it could be improved for the benefit of patients and clinicians.

Modern aviation practice

Before we get into the detail of what happened to Elaine I’d like to give you some insight into four key attributes of aviation. The first is that safety is our priority. I’m often told, “in theory it should be in the NHS, but we have a lot of competing priorities, such as targets and budgets”. Pilots also have competing priorities, for example, “targets” on reducing the carriage of fuel and punctuality. This is fine until there is a conflict between the target and safety. At this stage there is no conflict and safety is always the priority. This is something common across safety critical industries¹.

The second thing is that it is now normal for all major incidents and accidents to be investigated by external experts, whose only brief is to learn what happened and disseminate that learning. The focus is not on what to do with those involved, the focus is on everyone else – what we can all learn from what happened because it could have been us. The issue of blame is something that can be left for the judicial system or airline disciplinary process once the investigation is complete. UK airlines have a policy of immunity from disciplinary action in the event of inadvertent human error freely reported – a policy that puts learning about safety first.

Third, from the mid 1940s onwards aviation started to understand that there were enormous benefits from designing around the human. However, by the 1970s it became obvious that safety improvements from design and technology were no longer reducing accident rates and a giant leap could only be made if we could understand the 75% of accidents caused by “human factors”.

So the fourth thing to understand is that now all pilots, air traffic controllers, cabin crew and engineers have as part of their basic and recurrent training a requirement to understand human factors. We have been re-skilled, to understand threats to safety, ways to avoid, trap and mitigate error, the skills involved in teamwork, and communication and leadership in a safety critical industry. If you’re wondering how we are convinced of the need to do this, spend a few hours in a simulator and you will realise we all need a team to support us!

Elaine’s story

In Elaine’s story, it’s important to stress that all the clinical staff, as far as it’s possible to know, were well trained and technically competent and had the technical knowledge to cope with the

emergency that occurred. At the inquest they talked about what they should have done, and none could understand why they hadn’t acted in the way they believed they should have done.

Although I had no suspicions about Elaine’s care, I expected and was granted an independent review of Elaine’s care conducted by Professor Michael Harmer, MD FRCA. A full, anonymised copy of the report and inquest verdict is available².

Elaine was booked in for endoscopic sinus surgery and a septoplasty to correct a recurring problem. A thorough pre-op assessment was carried out and there were no significant concerns. Present were Dr A, a consultant anaesthetist with 16 years’ experience, regarded as “diligent” and “careful” by his colleagues, and a senior operating department practitioner (ODP).

Anaesthesia was induced at 08.35, but it was not possible to insert the flexible laryngeal mask due to increased tone in the jaw muscles. Another 50 mg of propofol was administered and further attempts made using other sizes of mask. After 2 minutes Elaine had turned blue and her oxygen saturation had fallen to 75% (anything below 90% could be considered critical). By 4 minutes the oxygen saturation had dropped to 40%. Attempts to ventilate the lungs with 100% oxygen using a facemask and oral airway proved extremely difficult.

Between 6 to 8 minutes Dr A had started to attempt tracheal intubation and had given 100 mg of suxamethonium (a paralysing drug to allow insertion of the tracheal tube). He was joined by Dr B, another consultant anaesthetist. The senior ODP had called for help and an ODP with six months in post and two experienced recovery nurses arrived in theatre (the “theatre staff”). Mr E, an ENT surgeon with 30 years’ experience, also entered the room.

At the inquest we discovered that one of the nurses went out to phone the intensive care unit (ICU) as she was shocked at Elaine’s vital signs and colour. On return she announced: “A bed is available in intensive care”, but in her own words the consultants looked at her as if to say “What’s wrong? You’re over-reacting.” She went back to the phone and cancelled the bed. Meanwhile the senior ODP asked her colleague to fetch the tracheotomy kit. On her return her colleague announced to the consultants that: “The tracheotomy set is available”, but felt ignored. At the inquest, two of the theatre staff present stated that they had known exactly what needed to happen. Professor Harmer’s verbal statement to the coroner was that he felt they “didn’t know how to broach the subject”.

Guidelines covering a scenario of “can’t intubate, can’t ventilate” suggest at this point that some form of surgical access would be a likely course of action. At this stage Elaine had been at 40% oxygenation or less for 6 minutes.

However, the consultants appear to have become “fixated” on intubation, using a variety of techniques and pieces of equipment to the exclusion of other options. By the time a further 15 minutes had passed they finally managed to insert an intubating laryngeal mask which rapidly improved the oxygen saturation to 90%.

However, the medics were concerned about security of the airway and made further attempts to improve it. Thirty five minutes after starting the procedure, they appeared to decide to abandon the operation and allow Elaine to wake up.

Once Dr A was satisfied that Elaine was breathing satisfactorily with the oral airway in place, she was transferred to the recovery room. It is clear now that the recovery nurses were far from happy with Elaine’s condition. Eventually at 11.00 Elaine was transferred to the ICU. She died 13 days later having never regained consciousness.

Human factors and healthcare

It became apparent at the inquest that the medics hadn’t shared the same awareness, what we term “situational awareness”, of what was happening and what needed to happen. There was a dispute about who people felt was in charge at different points. Decision making appears to have become fixated on one option which in this case was not suitable. The theatre staff, however, could see what was happening and what needed to happen, but seemed unable to make themselves heard.

All these factors are what we call “human factors” or failings in “non-technical skills” and as I’ve already made clear they directly cause 75% of aviation accidents. Human factors is really a pseudo-discipline covering many areas³. It encompasses all those factors that can influence people and their behaviour. In a work context, human factors are the environmental, organisational and job factors, and

individual characteristics which influence behaviour at work.

In aviation we followed the path of detailed, independent investigation to understand the problem, then we tried to design out human error, then finally we’ve tried to train the humans to avoid, trap or mitigate error by their behaviour and the development of systems or procedures and ways of working that either reduce the probability of error or help us to catch it. Along the way though we had to understand that for all of us, error is normal. The clinicians involved in Elaine’s care weren’t incompetent, weak or poor performers – they were good people trying to do their best, but also prone to human error.

What’s happening now?

Over the last four years I’ve tried to understand how “safety” fits into the NHS and the role of human factors. To begin with I really struggled, but slowly I came across some pockets of excellence. I found researchers and NHS organisations that had a grasp of the problem, but also a small number of clinicians who were passionate about improving safety and could see the importance of human factors. And the good news is there is now a steady ground-swell of understanding.

The box lists just a few examples of the positive signs I see. But it’s not all good news. There are still a tremendous number of people in the healthcare sector unaware of the enormous influence that human factors has on performance.

The majority of work done about human factors in health care is over focused on acute care. The lessons of human factors are equally if not more applicable to the challenging environments of primary and community care (with care often provided by solo staff), mental health (with vulnerable patients), and ambulance work (with rapidly changing and unknown situations).

I’ve tried to bring together leading organisations, clinicians, policy makers and academics into one impartial, independent body which aims to promote the benefits of the human factors to healthcare. That group is the Clinical Human Factors Group (CHFG): see www.chfg.org.

What of the future?

I firmly believe that healthcare needs to embrace human factors if it is to see a quantum improvement in safety and efficiency, and is to improve the well being of those who work in the vast system that is health care. More independence in investigation and a focus on learning, not the individuals involved, will create more learning for the whole system. The designers and purchasers of equipment will start to recognise that good ergonomics comes before style and industry branding. Under- and postgraduate training for all health staff will start to include non-technical skills, not because it’s nice, but because it’s essential. I don’t think this is a wish list, these things will happen. Whether it takes five years or 50 years depends on you.

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STEPS FORWARD FOR HUMAN FACTORS

- The English Patient Safety First campaign has launched a guide on human factors developed by the Clinical Human Factors Group. See www.patientsafetyfirst.nhs.uk
- The Royal College of Surgeons of Edinburgh in conjunction with the NHS Institute is seeking to include the training and examination of human factors in postgraduate curricula.
- Exams in human factors for clinicians at undergraduate level have already started at the University of Aberdeen. See www.abdn.ac.uk/iprc
- The Royal College of Nursing is planning a series of regional patient safety seminars focusing on culture, communication and reporting.
- Work at the Imperial Centre for Patient Safety and Service Quality in London has recently included a project on “mental rehearsal” for clinicians. www.cpssq.org
- The Quality Reliability, Safety and Teamwork Unit at the John Radcliffe Hospital in Oxford has done detailed research on “team/crew resource management” training in healthcare. www.surgery.ox.ac.uk/surgery/research/qrstu
- The National Patient Safety Agency has a web-based programme called “Foresight Training” aiming to develop good non technical skills in nursing staff. www.npsa.nhs.uk/nrls/improvingpatientsafety/humanfactors/foresight
- The NHS Institute are running a series of trials developing “team resource management skills” in three trusts, see www.institute.nhs.uk under the Productive Operating Theatre.

References

1. Flin R, O’Connor P, Crichton M (2008), *Safety at the sharp end: a guide to non-technical skills*. Ashgate: Aldershot.
2. Harmer M (2005), *Independent review on the care given to Mrs Elaine Bromiley on 29 March 2005*, and Bromiley M (2005 and 2007), *Coroner’s inquest verdict, [and] corrected timeline*. See www.chfg.org/resources/07_qrt04/Anonymous_Report_Verdict_and_Corrected_Timeline_Oct_07.pdf
3. Dekker S (2005), *Ten Questions About Human Error*. CRC Press: USA.