Human factors in medicine: the art of common sense at work

We all make mistakes, mostly with little or no adverse impact or consequence. However, in medicine, and other high-risk organizations such as aviation, any error can be catastrophic. Direct comparison of other high-risk organizations with health care should not be made as they are diverse professions. However, medicine should embrace the concepts of learning from human factors as an effective mechanism in reducing errors, and human factors awareness should begin early in undergraduate training and continue throughout any medical career.

The scale of the problem

One in ten UK hospital admissions involve some form of error, and while most are minor, the risk of death from a major error is 1 in 300 (Young and O'Regan, 2010). There are estimated to be 4000+ deaths/year as a result of medical error, and never events continue to occur despite initiatives such as the World Health Organization checklist. The Swiss cheese model, where 'holes' align to cause error, is now well recognized (Reason, 1995). Doctors are often blamed for error, yet many incidents are a consequence of 'systems' errors – for example, overbooked clinics or staffing issues in operating theatres significantly increasing the likelihood of error. Human factors are increasingly recognized as contributing to medical error. Much of human factors awareness is simple common sense, but repeated occurrence of serious adverse events demonstrates a lack of appreciation of and progress in addressing many of these issues.

Dr Rachel S Oeppen, Consultant Radiologist, Department of Clinical Radiology, University Hospital Southampton, Southampton

Professor Peter A Brennan, Consultant Maxillofacial Surgeon and Honorary Professor of Surgery, Department of Oral and Maxillofacial Surgery, Queen Alexandra Hospital, Portsmouth PO6 3LY

Mr Ian Taggart, Senior First Officer, TUI Airways, Manchester

Professor Malcolm WR Reed, Professor of Surgical Oncology, Dean, Brighton and Sussex Medical School, Brighton

Correspondence to: Professor PA Brennan (Peter.brennan@porthosp.nhs.uk)

Optimizing our own performance

The oxygen mask briefing before every commercial flight is familiar to most people – please put your own mask on first before helping others. This is a fundamental human factors principle: to give our patients the best care and reduce the chance of error, we must also look after ourselves. Yet healthcare professionals often forget to take regular breaks, drink inadequate fluid or miss meals citing that they are 'too busy' caring for patients.

Many doctors experience prolonged periods without food and drink, exacerbated in some cases by omitting breakfast. With limited opportunity for catching up on nutrition and hydration during the working day, some will be underhydrated or inadequately fed to optimize their own energy, concentration and performance, thereby raising their risk of error.

Hydration and nutrition at work

Water accounts for over 60% of body mass and in health is regulated to within 0.66% of bodyweight (Cheuvront et al, 2004). Even small water deficits impede physical performance. Children's learning and academic performance is adversely affected when they do not eat breakfast. Regularly missing this important meal leads to a reduction in metabolic rate with fewer burned calories, lower energy and motivation (Adolphus et al, 2013). When assessed in full motion aircraft simulators, pilots' working memory, spatial awareness and flying accuracy is adversely affected when dehydrated (equivalent to a 1–3% loss of body mass; Lindseth et al, 2013). Worsening dehydration causes headache, sleepiness, impatience and apathy. How many colleagues come home with a headache because they have not drunk enough fluid during the day? Doctors may not have considered that poor hydration affects performance or thought about why their urine is so concentrated at the end of a busy shift.

Thirst cues usually present before the ill effects of low hydration, yet a study of junior doctors working in the intensive care unit found they were more likely to be oliguric than the patients they were caring for (Solomon et al, 2010). Individual fluid requirements vary considerably, with a minimum intake of 2 litres per day recommended for healthy adults. Clinical teams could agree to take regular fluid breaks when planning long ward rounds or all-day operating lists and trusts should provide readily available sources of drinking water.

Omitting lunch should be discouraged as performance is impaired while overall hunger is increased, resulting in eating more at the next meal. Eating fast food or processed food is also linked to poorer performance (Florence et al, 2008), but doctors working under pressure frequently resort to eating a sugar fix (such as a chocolate bar) while rushing to the next task. In addition to not satisfying hunger, this raises insulin levels and can paradoxically reduce performance. The authors recommend eating before the start of the working day and eating healthily while at work, ensuring meals are not missed because clinicians are too busy to take a short break (Brennan et al, 2019).

Tiredness

Tiredness is a significant cause of accidents in routine activities such as driving as well as at work. Many high-risk organizations have guidelines for taking regular breaks. Most people would stop every few hours when driving but can doctors say that they do the same when they come to work? The value of a short break (10–15 minutes) every 2–3 hours while working is immense – it enhances performance, team morale and aids subsequent concentration and completion of clinical tasks in a more effective manner. The time 'lost' by taking a short break is usually

© 2019 MA Healthcare Ltd

more than made up as a result. Shift rotas can completely change doctors' circadian rhythms, especially when going from a day to a night rota or vice versa. Provision of rest facilities by employers is important both during and following shifts – for instance where a worker has to drive home after a night shift (McKenna and Wilkes, 2018).

Situational awareness

In simple terms situational awareness means 'what has happened, what is happening now, and what might happen in future'. Situational awareness and perception changes constantly and sometimes suddenly. Good situational awareness can be developed and improved over time. Tunnel vision, losing track of time or relying on wrong information to confirm what we think is correct (reinforcement bias) are all areas leading to loss of situational awareness.

It is good to ask team members to look out for each other – loss of situational awareness can often be recognized before any serious harm occurs. The authors recommend asking the 'what if?' question at the start of clinical sessions so that all possible complications are considered. The mnemonic HALT reminding doctors to stop if Hungry, Angry, Late or Tired is useful to help regain situational awareness. It is also worth reminding senior colleagues that less experienced doctors reach cognitive saturation more quickly, particularly when learning new or complex medical procedures.

Communication and challenging hierarchy

Safe and effective communication between team members is essential to patient safety and to ensure information is understood and acted upon by the recipient(s). This is one reason why the use of pronouns (this, that, they, he, she, it) is discouraged when confirming vital information and formal names or sides are preferred. The authors also advise repeating back what has been said to make sure information is heard and understood.

A steep hierarchy still exists in medicine, with some feeling unable to question colleagues about potentially wrong decisions. There should always be a gentle gradient between trainee and consultant. Team briefs are a good opportunity to actively encourage anyone to speak up or challenge without fear if they have any patient concerns. Trainees should also be given opportunities to lead briefing and debriefing sessions. The first response to any 'challenge' should be 'thank you' from the team leader (which immediately diffuses any anxiety) followed by an open response such as 'Let's stop. Why do you think that?' The Care Quality Commission (2018) report stated that adopting a just culture across medicine will reduce many preventable errors.

Other ways to reduce hierarchy are to use first names and to hold informal debriefing sessions, perhaps over a cup of coffee. The power of saying 'thank you' to others cannot be emphasized enough. Kind words of appreciation encourage more junior colleagues to feel empowered to raise concerns, in contrast to intimidating hierarchies that discourage raising the alarm. **BJHM**

Adolphus K, Lawton CL, Dye L. The effects of breakfast on behaviour and academic performance in children and adolescents. Front Hum Neurosci. 2013 Aug 8;7:425. https://doi.org/10.3389/fnhum.2013.00425

Brennan PA, Oeppen R, Knighton J, Davidson M. Looking after ourselves at work: the importance of being hydrated and fed. BMJ. 2019 Feb 06;364:l528. https://doi.org/10.1136/bmj.l528

Care Quality Commission. 2018. Opening the door to change. (accessed 20 June 2019) https://www.cqc.org.uk/sites/default/files/20181224_openingthedoor_report.pdf

Cheuvront SN, Carter R 3rd, Montain SJ, Sawka MN. Daily body mass variability and stability in active men undergoing exercise-heat stress. Int J Sport Nutr Exerc Metab. 2004 Oct;14(5):532–540. https://doi.org/10.1123/ijsnem.14.5.532

Florence MD, Asbridge M, Veugelers PJ. Diet quality and academic performance. J Sch Health. 2008 Apr;78(4):209–215, quiz 239–241. https://doi.org/10.1111/j.1746-1561.2008.00288.x

Lindseth PD, Lindseth GN, Petros TV, Jensen WC, Caspers J. Effects of hydration on cognitive function of pilots. Mil Med. 2013 Jul;178(7):792–798. https://doi.org/10.7205/MILMED-D-13-00013

McKenna H, Wilkes M. Optimising sleep for night shifts. BMJ. 2018;360:j5637. https://doi.org/10.1136/bmj.j5637

Reason J. A systems approach to organizational error. Ergonomics. 1995 Aug;38(8):1708–1721. https://doi.org/10.1080/00140139508925221

Solomon AW, Kirwan CJ, Alexander NDE, Nimako K, Jurukov A, Forth RJ, Rahman TM; Prospective Analysis of Renal Compensation for Hypohydration in Exhausted Doctors (PARCHED) Investigators. Urine output on an intensive care unit: case-control study. BMJ. 2010 Dec 14;341 dec14 1:c6761. https://doi.org/10.1136/bmj.c6761

Young RS, O'Regan DJ. Cardiac surgical theatre traffic: time for traffic calming measures? Interact Cardiovasc Thorac Surg. 2010 Apr;10(4):526–529. https://doi.org/10.1510/icvts.2009.227116

KEY POINTS

- We all make mistakes.
- Human error is often multifactorial.
- Look after yourself and your colleagues to care for patients better.
- Hierarchy forms a barrier to communication.
- Good communication improves patient safety.
- HALT if Hungry, Angry, Late or Tired.

Correspondence

BRITISH JOURNAL OF HOSPITAL MEDICINE

If you would like to comment on any of the articles in *British Journal of Hospital Medicine*, please write in no more than 250 words to:

Professor Rob Miller, Editor-in-Chief, BJHM
c/o Rebecca Linssen, MA Healthcare
St Jude's Church, Dulwich Road, London SE24 0PB

Email: rebecca.linssen@markallengroup.com

© 2019 MA Healthcare Ltd