

Human factors ergonomics in healthcare: How we are influencing change and improving safety

Sue Deakin



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I developed an interest in human factors ergonomics in 2011, when after eight years as a consultant orthopaedic surgeon, our team during a routine Wednesday afternoon operating list, somehow managed to operate on the wrong ankle in a patient with bilateral ankle instability and the anaesthetist managed to block the wrong leg.

Thankfully, it was not the only functioning kidney, eye, ear or lung – but what if it had been? This possibility affected the whole team from clinic to ward to theatre. As I write this article 13 years on, I still get palpitations!

I needed to understand what, why and how this could happen with an experienced and technically capable team. It became apparent that there were multiple contributory factors to this 'Never Event'.

The multiple contributory factors

1. Distractions in an overbooked clinic.
2. The patient could not decide which side to have operated on first and said she would make a decision on the day.
3. On the paper prescription for surgery at the time, there was no mandatory field for 'side of surgery' so no patient side appeared on the operating list.
4. An overworked nurse on the ward responsible for giving the patient her anti-embolism (TED) stocking put the stocking over the mark on the correct leg for surgery.
5. The registrar and anaesthetist did not recheck the mark in the anaesthetic room at sign-in.
6. The scrub nurse prepped the unmarked, incorrect leg, whilst we scrubbed to be more efficient.
7. The newly introduced WHO checklist was not designed, at that time, to ensure another check of the mark just prior to knife to skin at time out.
8. The scrub nurse not rechecking the consent form (which was accurate.)

It was a problem with teamwork, tasks, design of equipment/tools and culture.

In the aftermath of this Never Event, I explored and discovered a discipline called human factors ergonomics. Why had I not learnt about this earlier you might ask. I could not believe it myself. This episode and my learning from it, have now transformed my surgical practice. >>

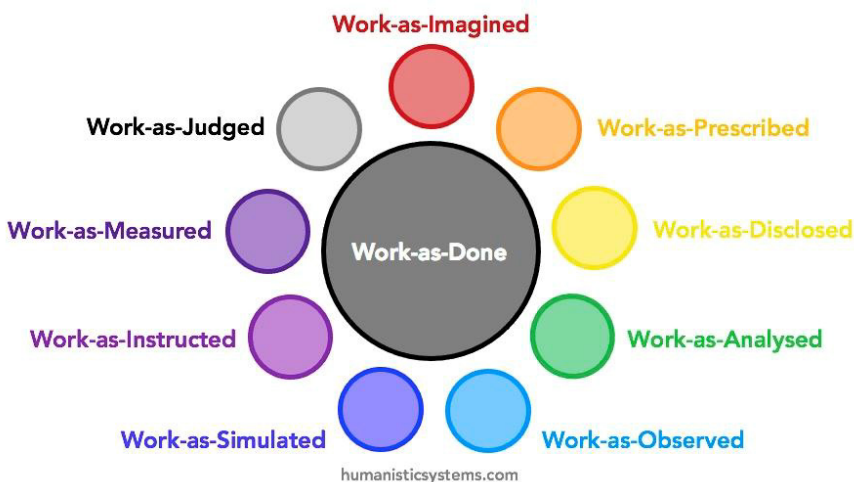


Figure 1: Proxies for Work as Done.

A just culture guide

Supporting consistent, constructive and fair evaluation of the actions of staff involved in patient safety incidents

This guide supports a conversation between managers about whether a staff member involved in a patient safety incident requires specific individual support or intervention to work safely. Action singling out an individual is rarely appropriate - most patient safety issues have deeper causes and require wider action.

The actions of staff involved in an incident should **not** automatically be examined using this *just culture guide*, but it can be useful if the investigation of an incident begins to suggest a concern about an individual action. The guide highlights important principles that need to be considered before formal management action is directed at an individual staff member.

An important part of a just culture is being able to explain the approach that will be taken if an incident occurs. A just culture guide can be used by all parties to explain how they will respond to incidents, as a reference point for organisational HR and incident reporting policies, and as a communication tool to help staff, patients and families understand how the appropriate response to a member of staff involved in an incident can and should differ according to the circumstances in which an error was made. As well as protecting staff from unfair targeting, using the guide helps protect patients by removing the tendency to treat wider patient safety issues as individual issues.

- Please note:**
- A **just culture guide** is not a replacement for an investigation of a patient safety incident. Only a full investigation can identify the underlying causes that need to be acted on to reduce the risk of future incidents.
 - A **just culture guide** can be used at any point of an investigation, but the guide may need to be revisited as more information becomes available.
 - A **just culture guide** does not replace HR advice and should be used in conjunction with organisational policy.
 - The **guide** can only be used to take one action (or failure to act) through the guide at a time. If multiple actions are involved in an incident they must be considered separately.

Start here - Q1. deliberate harm test

1a. Was there any intention to cause harm?



Yes

Recommendation: Follow organisational guidance for appropriate management action. This could involve: contact relevant regulatory bodies, suspension of staff, and referral to police and disciplinary processes. Wider investigation is still needed to understand how and why patients were not protected from the actions of the individual.

END HERE

No go to next question - Q2. health test

2a. Are there indications of substance abuse?



Yes

Recommendation: Follow organisational substance abuse at work guidance. Wider investigation is still needed to understand if substance abuse could have been recognised and addressed earlier.

END HERE

2b. Are there indications of physical ill health?



Yes

Recommendation: Follow organisational guidance for health issues affecting work, which is likely to include occupational health referral. Wider investigation is still needed to understand if health issues could have been recognised and addressed earlier.

END HERE

2c. Are there indications of mental ill health?

if No to all go to next question - Q3. foresight test

3a. Are there agreed protocols/accepted practice in place that apply to the action/omission in question?

3b. Were the protocols/accepted practice workable and in routine use?

3c. Did the individual knowingly depart from these protocols?



If No to any

Recommendation: Action singling out the individual is unlikely to be appropriate; the patient safety incident investigation should indicate the wider actions needed to improve safety for future patients. These actions may include, but not be limited to, the individual.

END HERE

if Yes to all go to next question - Q4. substitution test

4a. Are there indications that other individuals from the same peer group, with comparable experience and qualifications, would behave in the same way in similar circumstances?

4b. Was the individual missed out when relevant training was provided to their peer group?

4c. Did more senior members of the team fail to provide supervision that normally should be provided?



If Yes to any

Recommendation: Action singling out the individual is unlikely to be appropriate; the patient safety incident investigation should indicate the wider actions needed to improve safety for future patients. These actions may include, but not be limited to, the individual.

END HERE

if No to all go to next question - Q5. mitigating circumstances

5a. Were there any significant mitigating circumstances?



Yes

Recommendation: Action directed at the individual may not be appropriate; follow organisational guidance, which is likely to include senior HR advice on what degree of mitigation applies. The patient safety incident investigation should indicate the wider actions needed to improve safety for future patients.

END HERE

if No

Recommendation: Follow organisational guidance for appropriate management action. This could involve individual training, performance management, competency assessments, changes to role or increased supervision, and may require relevant regulatory bodies to be contacted, staff suspension and disciplinary processes. The patient safety incident investigation should indicate the wider actions needed to improve safety for future patients.

END HERE

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Based on the work of Professor James Reason and the National Patient Safety Agency's Incident Decision Tree

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Figure 2: NHS 'A just culture guide'.

“The scientific discipline concerned with the understanding of interactions amongst humans and other elements of the system, and applies theory, principles, data and methods to DESIGN in order to optimise human wellbeing and performance and overall system performance”.

(Chartered institute of Ergonomics and human factors definition).

What is human factors ergonomics?

Put simply, it is ‘Making it easier to do things well or right, or harder to do things less well or wrong’.

Two recognised definitions of human factors/ergonomics are:

“Enhancing clinical performance through an **understanding** of the effects of teamwork, tasks, equipment, workspace, culture and organisation on human behaviour and abilities and application of that knowledge in clinical settings”. (NHS Quality board definition).

“The scientific discipline concerned with the **understanding** of interactions amongst humans and other elements of the system, and applies theory, principles, data and methods to DESIGN in order to optimise human wellbeing and performance and overall system performance”. (Chartered institute of Ergonomics and human factors definition).

What did I do?

I produced a trust wide business case for a human factors approach to patient safety and quality of care in my role as the divisional director of surgery.

I read copiously, spoke to human factors experts, consulted the Clinical Human Factors group advice on our website on “How to’ Guide to Human Factors” – Volume 1 and 2 (<https://chfg.org/how-to-guide-to-human-factors-volume-1>). The Clinical Human Factors group is a charity founded in 2007 by Martin Bromiley after the loss of his late wife during a routine operation.

I set up and facilitated training of a human factors faculty of interested clinicians of all types to deliver free, multidisciplinary, one-day Human Factors workshops, mainly focussing on team resource management skills. We now include faculty from the patient safety team.

We have trained over 900 people from all specialties in various roles, including porters, receptionists, clinicians, managers and leaders and we continue to do so.

I was aware that no matter how useful the skills picked up during these courses were, we needed a more systems thinking approach to make it easier for staff to do the right thing.

I wrote a business case and a job description for a fulltime human factors practitioner trained via the Chartered institute of Ergonomics and Human factors to get involved in using human factors science in enabling improvement of safety, efficiency and wellbeing.

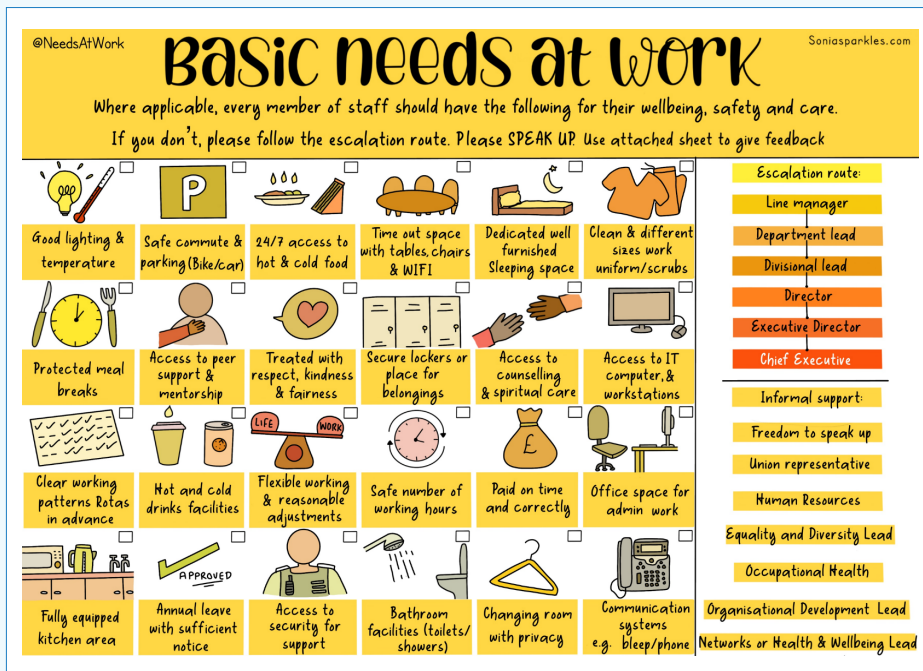


Figure 3: Basic needs at work framework.

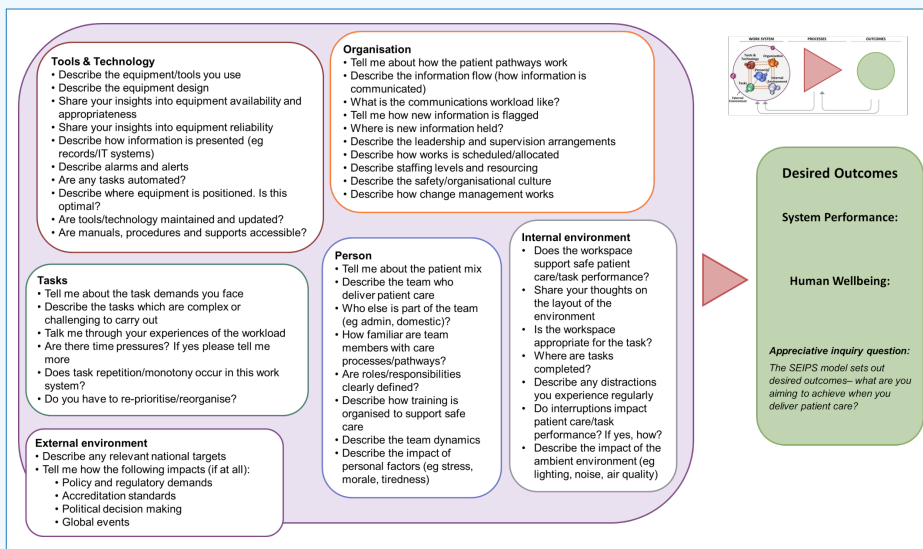


Figure 4: System Engineering Initiative for Patient Safety (SEIPS) explorer questions NHS England. SEIPS is a framework for understanding outcomes within complex socio-technical systems. It describes how a work system (or socio-technical system, left) can influence processes (work done, middle), which in turn shapes outcomes (right). The SEIPS framework acknowledges that work systems and processes constantly adapt.

The role is not part of the management hierarchy. Their job is to help make it easier for us to do our work by casting a human factors ergonomics lens on WORK AS DONE. Not work as imagined /described/ prescribed by others far removed from the frontline (see Figure 1).

Examples of how we can apply the lens of human factors ergonomics to our work

Culture and looking after staff

At West Suffolk NHS Foundation Trust, we are involved in connecting with our HR team and organisational culture team casting a human factors lens on ways of supporting our staff.

We encourage them to think about how the NHS 'A just culture guide' ensures system factors are taken into account (see Figure 2). We encourage them to address work hygiene issues such as being paid on time, badges and logins are all in place to relieve unnecessary additional stress from colleagues' shoulders. We asked them to look at practical ways of enabling psychological safety so that staff can raise concerns, suggestions and feel able to bring their whole selves to work.

We encouraged the implementation of 24/7 access to hot nutritious food for all staff. Our junior doctors now have this provided in the doctors' mess. We are working to make this available to all staff.

We pushed for and achieved calm rooms during the COVID-19 pandemic so that staff could find a quiet non-clinical space to recover /rest from work pressures.

We are hoping to introduce the basic needs at work framework (Figure 3).

Patient safety improvement

At West Suffolk, we facilitated the training of patient safety investigators to use a human factors tool, System Engineering Initiative for Patient Safety (SEIPS), to consider systems factors in their safety investigations, see Figure 4. SEIPS is a tool now used in the newly implemented Patient Safety Investigation Response Framework (PSIRF). It ensures consideration of all the below in a patient safety investigation or after action review and it is now being incorporated into debriefing huddles, now known as swarm huddles immediately after an event.

SEIPS is a framework for understanding outcomes within complex socio-technical systems. It describes how a work system (or socio-technical system, left) can influence processes (work done, middle), which in turn shapes outcomes (right). The SEIPS framework acknowledges that work systems and processes constantly adapt. (Figure 4)

Our human factors practitioner (the HFP) is now a valuable link between our patient

safety team and the improvement teams in our trust. Many trusts have a gap between insight gleaned from patient safety incidents and implementation of the recommendations.

The HFP is working with our theatre leads to introduce National Safety Standards for Invasive Procedures (NatSSIPs 2.0), (Figure 5), to not only look at the steps and how we should do our implant checks, but to ensure implants are stored and labelled in a way to make it easier for us to get it right.

Proactive work on the environment we work in

We have ensured a human factors ergonomist perspective is considered in the design of our proposed new hospital due to be built by 2030. They used their knowledge to translate what our co-production teams were suggesting to the architects.

For instance, the workflow in the path labs is easier and more efficient if the equipment is placed in a way that makes it easier in terms of 'traffic flow' to get tasks done.

Ensuring that we do not have 'mirrored' theatres as this makes it harder for anaesthetists. For example, it is not universally appreciated that all anaesthetic machines are now designed to only work on one side of the patient. This example highlights how seemingly inconspicuous changes in design can significantly affect system efficiency and safety.

Procurement of equipment tools and IT

Within our Trust, we are ensuring there is collaboration with our procurement team to ensure that the equipment we buy has had human factors usability assessment declared and ideally tested in situ by those using it, for example, syringe drivers, operating tables, instruments should have been assessed to ensure they suit all types of user.

We are influencing our IT team to reconsider the electronic discharge summary template ergonomics to make it easier for discharge summaries to be completed with greater accuracy and efficiency. Negotiations are being led and influenced by feedback from those on the 'ground', namely the doctors doing the work, not those managing the system.

Observing and using human factors tools to analyse the challenges of doing drug rounds using a scan for safety drug administration system. Looking at drug storage, ordering, drug locker access, IT issues, scanning failure rates etc.

Service redesign

We are doing proactive work with the surgical operational team in the way we move an element of our elective orthopaedic work to an elective orthopaedic hub in our ICS. Using the SEIPS tool to ensure all aspects are considered with the input of staff.

Proactive work with the virtual ward leads continues to encourage optimisation of the system for both patients and staff alike.

Why should you as an orthoped take an interest in human factors ergonomics?

It will improve your own and your team's wellbeing. It will improve your ability to provide safe quality effective care to your patients.

How can you be involved/learn more?

If you have a human factors ergonomics team in your trust, ask them to help – it is what they are there to do. If you have not asked, ask yourself why not? There are always points to learn.

Attend or become faculty on Non-Technical Skills for Surgeons (NOTSS) courses or Multidisciplinary Team Resource management courses.

Join the Clinical Human Factors Group – free membership lots of resources and advice on the website www.chfg.org.

Visit the Chartered Institute of Ergonomics & Human Factors website at <https://ergonomics.org.uk> for courses from PGCert, MSc or PhD. ■



Figure 5: National Safety Standards for Invasive Procedures (NatSSIPs 2.0).