7 Human Factors and Ergonomics (HFE) in SHOT Error Incidents n=3322

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Key findings:

- An increase in cases investigated using HFE frameworks
- A more even spread of contributory factors shows broad consideration of the all the categories
- A decrease in attribution to situational factors, and a corresponding increase to organisational factors

Gaps identified:

- Organisational pressures played a role in the event in 16.8% of cases
- Gaps or issues with staff knowledge were reported in 28.4% of cases
- Mismatches between workload and staff provision occurred in 23.8% of cases
- Suboptimal system design resulted in unsafe workarounds

Good practice:

- HFE principles or frameworks/models to investigate events continue to be embedded
- Improved appreciation of system and organisational factors is evident due to a more even allocation of contributory factors
- Some cases included corrective and preventive action (CAPA) that showed organisational-wide learning

Next steps:

- Familiarisation with the updated Human Factors Investigation Tool (HFIT) questions for 2025
- Considering CAPA for action effectiveness utilising the hierarchy of intervention effectiveness
- Considering design HFE principles when implementing new systems

For all abbreviations and references used, please see the **Glossary** and **Reference list** at the end of the full Annual SHOT Report. Please see the supplementary information on the SHOT website (https://www.shotuk.org/shot-reports/annual-shot-report-2024/).

Definition:

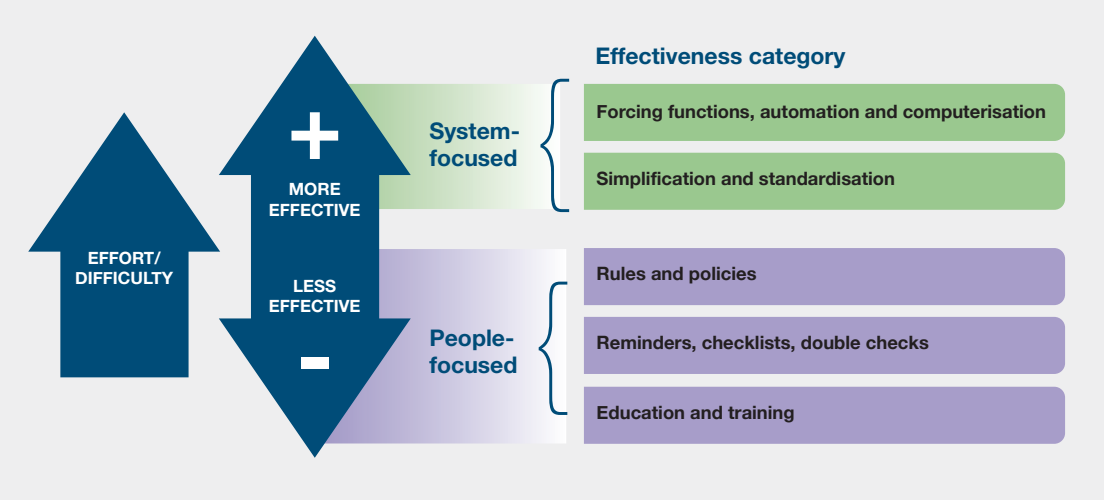
Human factors and ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system.

Introduction

The fundamental principles of HFE are related to how the design of equipment, work and workplaces will influence the performance or outcomes of an organisation relative to safety, efficiency and wellbeing (Sujan, et al., 2021). Workarounds refer to methods that people may develop to overcome challenges or limitations in a system, process, or equipment in the workplace. Dekker's analysis of workarounds (Dekker, 2011) suggests that they are often the result of design flaws or wider organisational issues rather than individual negligence. Using HFE principles when investigating errors has been recommended by SHOT for several years and is becoming increasingly embedded. Potential workarounds in the workplace may be prevented if HFE factors are also recognised and implemented early on during the design stage, particularly when new equipment or systems are introduced.

In healthcare, when planning corrective and preventive actions following incidents, a hierarchy of interventions help prioritise actions based on effectiveness and sustainability. This was initially discussed in relation to haemovigilance reports in the 2022 Annual SHOT Report (Narayan, et al., 2023). This hierarchy emphasises designing safer systems rather than relying solely on individual vigilance or training. For 2025 an additional section has been added to the HFIT asking reporters to describe up to three main actions following investigation of a safety event and rank their effectiveness. This may assist those undertaking after-event reviews to identify effective systems-based preventive actions to help prevent occurrence or recurrence. SHOT resources are available to help, and the SHOT team can advise on categorisations. The HFIT tuition package on the SHOT website provides information and guidance to help understand the causal and contributory factors and effective actions related to transfusion events being reported.

Figure 7.1: HFIT questions for reporters to rank main actions against their effectiveness category



Neutral language

In their work on human factors, Shorrock & Williams (2016) allude to the 'language of blame' in the context of organisational culture and investigation of patient safety events. The impact of language on staff safety, described by Usrey (2024), likens the language used to that found in a criminal investigation. This can influence how individuals perceive safety, accountability, and organisational culture. This is because the term 'investigation' may evoke images of blame and punishment, rather than an opportunity for learning and improvement. The recommendation that healthcare organisations should introduce and promote a restorative just culture, with buy-in from leadership at all levels was made in this chapter in the 2023 Annual SHOT Report (Narayan, et al., 2024). Choice of language may also negatively affect patients' perceptions and experiences, potentially making them feel they are somehow to blame for poor outcomes (Cox & Fritz,

2022). For 2025, the language used in the updated HFIT questions has undergone subtle changes to reflect the shifting focus from a retributive to a restorative approach when examining contributory factors in patient safety events.

Table 7.1: Neutral language alternatives

Example	Alternative
Investigation	Learning review
The patient failed chemotherapy	Chemotherapy did not work for the patient
Pump user error by nurse	Pump allowed incorrect programming

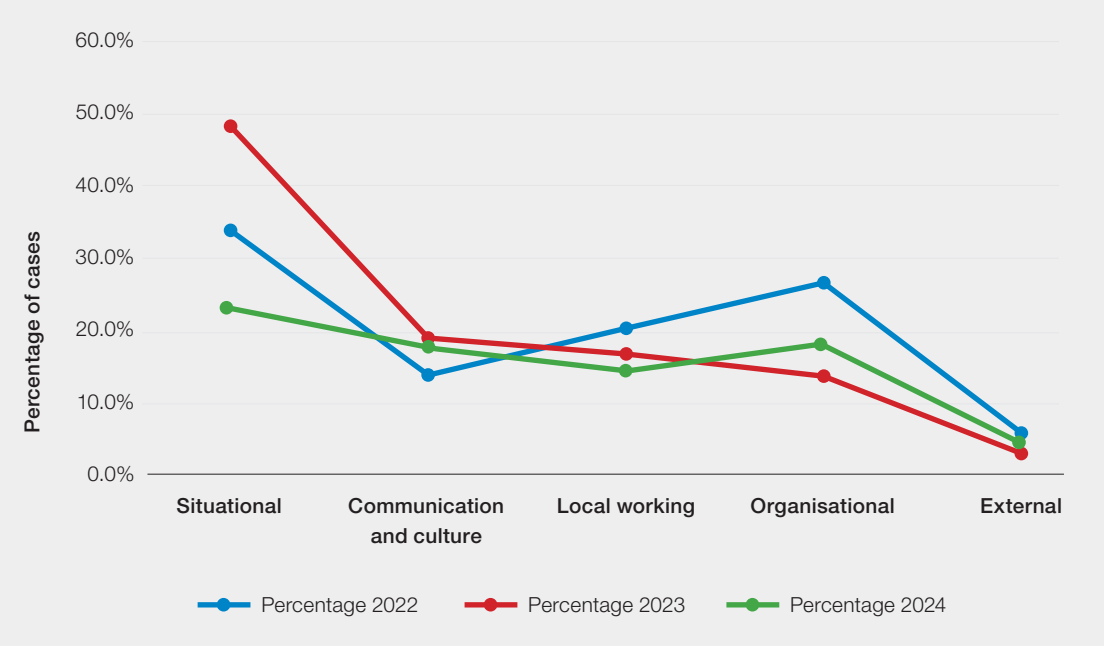
Staff fatigue

In promoting a restorative just culture, the detrimental effects of staff fatigue should be recognised as these can lead to errors and accidents, ill-health and injury, and reduced productivity (HSE, n.d) The challenge of addressing fatigue in healthcare is addressed in a new white paper 'Fatigue risk management for health and social care' from the Chartered Institute of Ergonomics and Human Factors (CIEHF, 2024). Staff fatigue can have potentially serious consequences and the paper sets out practical tips to approach the issue. Pertinent to this, the problem of ‘corridor care’ has gained media attention recently and a coalition letter from the Royal College of Nursing (RCN), British Medical Journal (BMJ) and multiple other organisations to the Health Secretary was published in January 2025 (RCN, 2025). The letter outlines concern for patient safety and staff wellbeing, highlighting that the issue causes moral distress and ultimately, moral injury. In the supplementary section for this chapter, some case studies where ‘corridor care’ was cited as being a contributory factor in errors are described.

Analysis of the SHOT HFIT

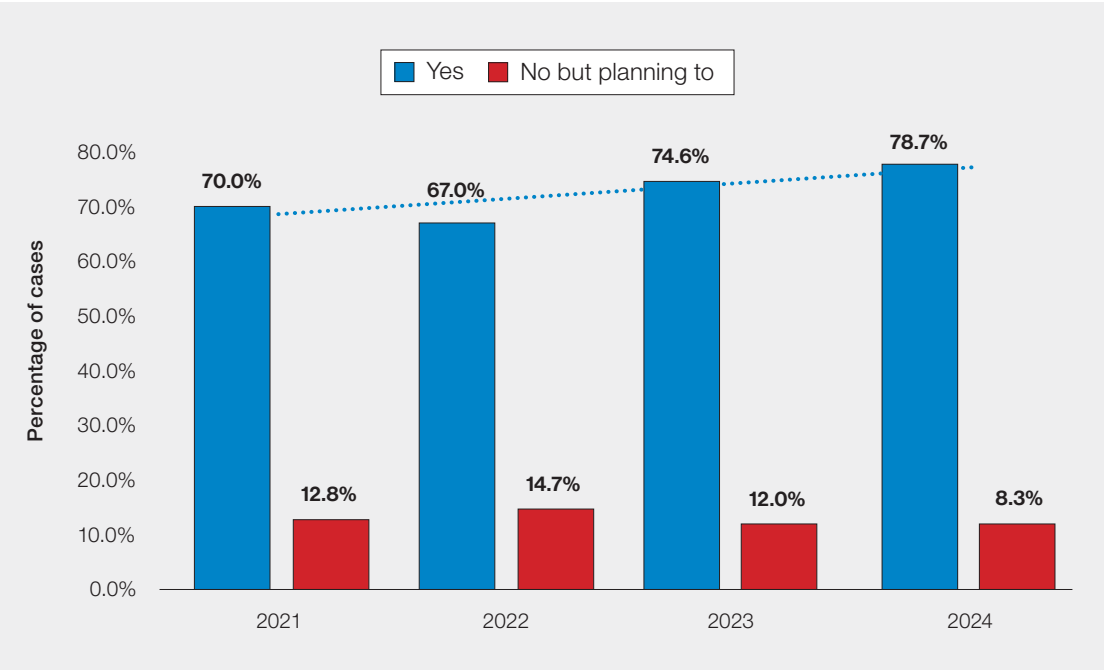
A total of 3322 error cases were included in 2024, representing an increase in the error cases reported in 2023 (n=3184). Throughout SHOT’s historical analysis of HFE, there has been evidence of an over-emphasis on blaming individuals, but analysis of the last 3 years’ data shows an improved appreciation of system and organisational factors. Figure 7.2 shows consideration across the breadth of factors, with a marked decrease of 24.6% attributed to situational factors and an increase of 3.2% attributed to organisational factors. Within the organisational factors category, where responses were provided, 558/3322 (16.8%) reported that organisational pressures played a role in the event, and 944/3322 (28.4%) shared that there were gaps or issues with staff knowledge. For local working conditions around the time of the event 792/3322 (23.8%) stated that there was a mismatch between workload and staff provision. In comparison to 2023 there was a more even allocation of contributory factors demonstrating consideration of the all the categories.

Figure 7.2: A comparison of HFIT categories assigned by SHOT reporters in 2022, 2023 and 2024



The 2021 Annual SHOT Report recommendation that 'a tried and tested human factors-based framework' should be applied to investigations remains pertinent (Narayan, et al., 2022). In 2024, 2615/3322 (78.7%) cases specified that HFE principles or a framework/model was used to investigate incidents and a further 276/3322 (8.3%) indicated they were planning to in the future. Figure 7.3 shows that this is an encouraging uptake compared to recent years and that more cases are being investigated using a formal framework to consider human factors.

Figure 7.3: Percentage of cases investigated using HFE principles or framework 2021-2024



Of those using a HFE framework, 2531/2615 (96.8%) provided data about the type that was used. The most common response 1039/2531 (41.1%) used the SHOT HFIT questions, which were adapted from the evidence-based Yorkshire Contributory Factors Framework (YCFF) (Improvement Academy, 2022) and 123/2531 (4.9%) used the YCCF framework, making it the sixth most commonly used. The Patient Safety Incident Response Framework (PSIRF) was introduced in England in 2022 to replace the

National Health Service England (NHSE) Serious Incident Framework. In 2023, 102/2227 (4.6%) used this framework and for 2024 this has risen to 457/2531 (18.1%). An increasing number of organisations in England have implemented the framework, now making PSIRF the second most commonly used investigation method. It remains important that SHOT-reportable events are fully investigated and in the case of Medicines and Healthcare products Regulatory Agency (MHRA)-reportable incidents, the Blood Safety and Quality Regulations (BSQR) require an investigation of factors leading to the incident and appropriate CAPA (Department of Health, 2005). The third and fourth most commonly used frameworks were in-house HFE and root cause analysis (RCA) tools. Organisations are discouraged from using RCA methods as they imply that a single root cause can be found and tend to favour a temporal narrative rather than a wider systems view (Peerally, et al., 2016).

Case 7.1: Workarounds by nursing staff during administration of platelets

A patient on the intensive care unit (ICU) received an adult therapeutic dose of platelets following a cardiac procedure. An incorrect identification (ID) band, not attached to the intended patient, and not at the patient's side, was scanned by the nurse administering the platelets. The electronic-tracking system alerted that an incorrect patient ID band had been scanned. When the error was realised, the correct patient received the transfusion.

The ICU had a very limited number of handheld scanning devices and so relied on additional scanners attached to workstations on wheels, which did not reach the ID bands attached to patients. As a workaround staff had begun printing spare ID bands which were not attached to patients, and it was common practice to have multiple ID bands at the computer desk.

The case demonstrates the workarounds that can arise when the design of equipment and processes do not consider HFE factors, meaning that staff cannot properly use a system which is intended to enhance patient safety. In the section of the HFIT that asks if one thing could be changed to make this incident less likely to happen again, the response was that adequate handheld scanning devices should be made available to all staff. The CAPA following the event included involvement of the hospital transfusion committee and nursing working group, and an organisational-wide review of hardware and infrastructure to support safe use of electronic systems. Therefore, from a single event much wider learning, and preventive action would take place beyond the department where the event originated. Once implemented the corrective actions identified represent higher ranked interventions on the hierarchy of intervention effectiveness (Figure 7.1), compared to potential human-based interventions. By ensuring adequate hardware and infrastructure, more effective 'automation and computerisation' and 'forcing function' interventions that are system-focused may prevent workarounds and optimise use of the electronic system.

Learning point

- Considering HFE factors during initial system design may help to avoid workarounds at a later stage. Workarounds have the potential to lead to unintended patient harm

Conclusion

From January 2025, SHOT has updated the HFIT to include an opportunity to record up to three main actions taken following the investigation of an event. Reporters can use this section to consider their CAPA for action effectiveness utilising the hierarchy of intervention effectiveness (Figure 7.1). Reporters are encouraged to become familiar with the updated HFIT questions and HFIT tuition package for 2025.

It is anticipated that reporting actions in the revised HFIT will provide useful data about problems known to occur with actions outside the immediate control of staff involved, e.g., the need for a new electronic system. These would usually be at the more effective level on the hierarchy (Figure 7.1) but can be difficult to implement. It can be important to record what may be seen as aspirational actions and if necessary, add to the organisation's risk register for long term monitoring. This year (2024) a mismatch between workload and staff provision was seen in almost a quarter of cases, which indicates that actions to improve staffing levels were needed. Such actions are often not included in the improvement plan

because they cannot be resolved locally and require very high-level input. However, patient harm events will continue if these issues remain unresolved.

SHOT is promoting a restorative just culture, so staff issues like fatigue, wellbeing and burnout all require consideration. The use of no blame and neutral language is encouraged, and SHOT is endeavouring to refer to reported cases as 'events' which has fewer negative connotations than the word 'incident'.

Finally, SHOT has been highlighting the importance of considering HFE in design principles when implementing new systems or purchasing equipment. Further information on this can be found in the SHOT Human Factors and Ergonomics (HFE) Meet the Experts Webinar.

Recommended resources

SHOT Human Factors Tuition Package
https://www.shotuk.org/resources/human-factors-investigation-tool-hfit/

SHOT Human Factors and Ergonomics (HFE) module
https://www.shotuk.org/resources/e-learning/

SHOT Human Factors and Ergonomics (HFE) Meet the Experts Webinar
https://www.shotuk.org/resources/human-factors-and-ergonomics-hfe-webinar/

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