

# 8 Human Factors in SHOT Error Incidents n=2623

Author: Alison Watt and Emma Milser

## Recommendations

- Staff involved in investigating incidents should be fully trained in techniques for effective investigations, including an understanding of human factors methods
- Investigations should identify, and include improvement actions, for all the contributory factors involved
- The nine key principles outlined in the white paper titled 'Learning from Adverse Events' published by the Chartered Institute of Ergonomics and Human Factors (CIEHF, 2020) should be applied to investigating transfusion incidents in order to help with understanding a human factors perspective. A link to the paper is in the chapter resources section

**Action: Hospital risk departments, hospital transfusion committees, hospital transfusion teams**

## Abbreviations used in this chapter

<b>BMS</b>	Biomedical scientist	<b>IT</b>	Information technology
<b>CIEHF</b>	Chartered Institute of Ergonomics and Human Factors	<b>RCA</b>	Root cause analysis
<b>HF</b>	Human factors	<b>SEIPS</b>	Systems Engineering Initiative for Patient Safety
<b>HFIT</b>	Human factors investigation tool	<b>WEG</b>	Working Expert Group
<b>LIMS</b>	Laboratory information management system	<b>YCFF</b>	Yorkshire Contributory Factors Framework

## Introduction

There were 2623 error cases reported in 2020, which is 234 fewer than in 2019 (n=2857). This is consistent with an overall reduction in adverse incident reports made to SHOT in 2020 and the reasons for this are discussed in Chapter 5, COVID-19 and Haemovigilance.

This chapter represents the final year's analysis of the original HF question set that formed the SHOT HFIT between 2016 and 2020 (Watt 2020). From January 2021 the HFIT questions were restructured because the overriding outcome from the five years of this study showed a disproportionate emphasis on the culpability of individual staff members (Figure 8.1). Therefore, the questions have been expanded to request more detail about the system and organisational elements of error incidents. The scoring has also been refined to a five-Likert scale (Likert 1932) so causation can be estimated using the guidance: 0 – None, 1 – Barely, 2 – A little, 3 – Some, 4 – A lot, 5 – Fully.

The new HFIT questions are based on the YCFF (Lawton et al. 2012) and further information about this framework can be found on their website (Improvement Academy 2021). To assist reporters when answering the new HFIT questions, a revised tuition package is available on the SHOT website along with two new HF videos created by SHOT, with other additional HF resources: a recording from the SHOT HF webinar held in 2020 and an interview with the author of the SHOT HF chapter. Links to all these resources can be found in the resources section later in the chapter.

## Analysis of the SHOT HFIT (2016-2020)

### Distribution of scores for HFIT

Over the 5 years of this study the distribution of scores given to the four human factors has not changed substantially, as shown in Figure 8.1. The initial impact of the self-learning material seemed to be that slightly less responsibility was assigned to staff members, but although that early reduction has been maintained, the decrease has not continued. In 2020 over half of all scores were still assigned to staff members with no major difference of scoring between those that have or have not used the learning material. Therefore, the HFIT questions have been changed from January 2021 to encourage reporters to examine error incidents in more depth.

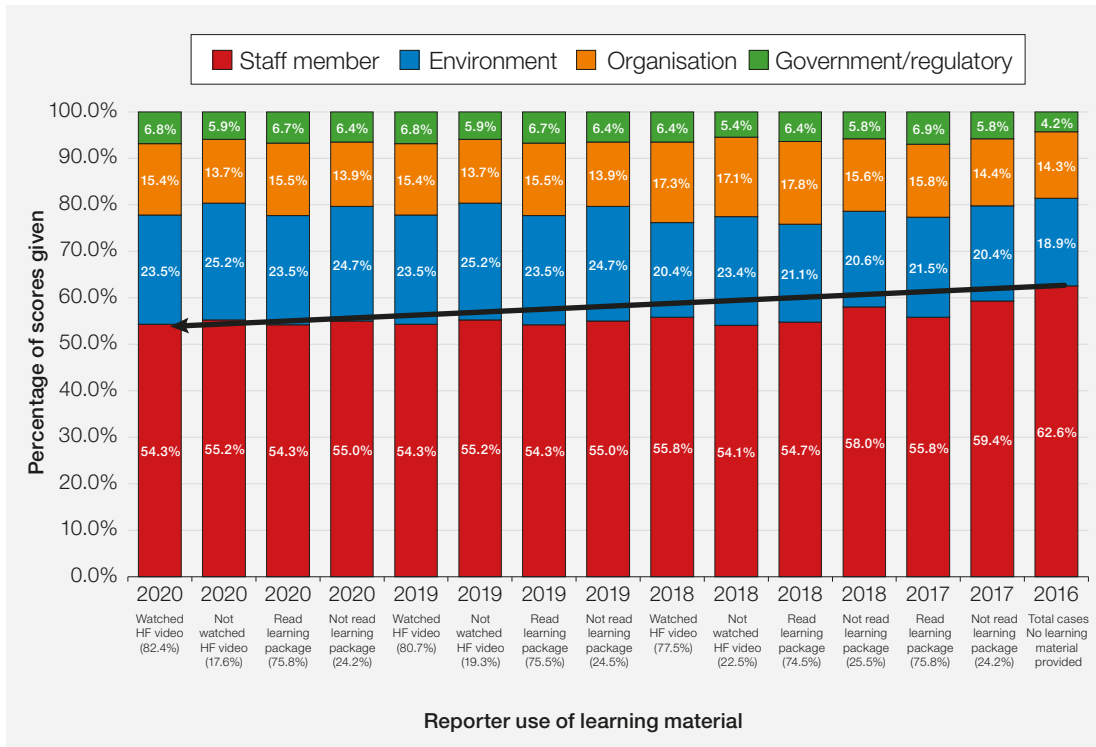


Figure 8.1: Evaluation of uptake of self-learning opportunity and comparative percentages of scores for human and organisational factors

### Learning points

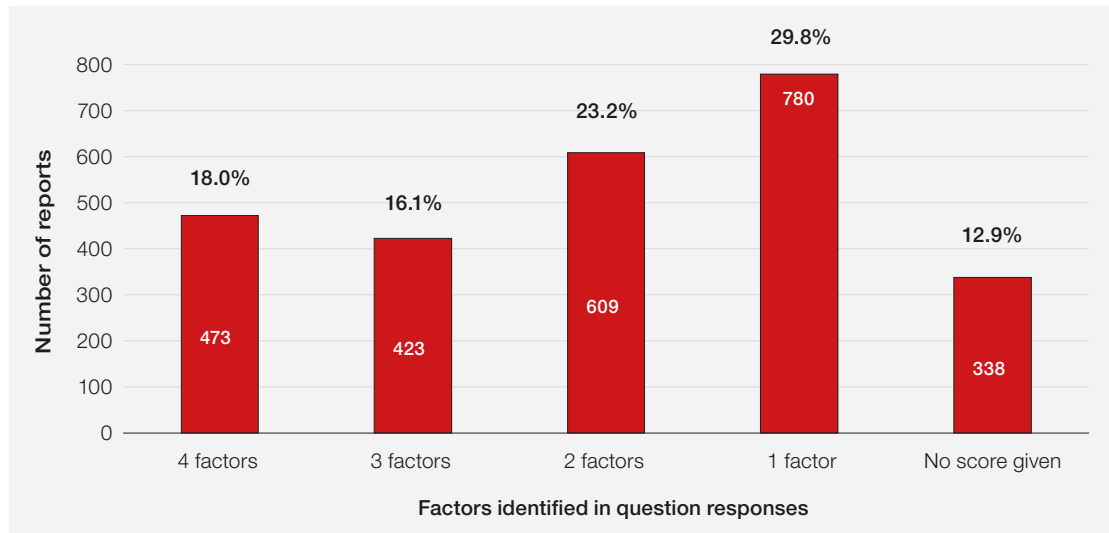
- A better understanding of the rationale and scoring of the HFIT questions is essential so that appropriate responses are recorded to help drive local improvements. While self-learning material is available and useful, it is acknowledged that access to local human factors experts and incorporation of human factors driven incident investigation frameworks is important to sustain changes in practice
- Responses to the HFIT questions show a slight preference for videos as a learning tool; SHOT has produced two videos specifically on human factors

### Variability in HFIT scoring

In 2020, as in previous years, there is considerable variability in whether scores are assigned to all four factors (Figure 8.2) and nearly a third are only given a score for one factor (780/2623, 29.8%) Of these, the vast majority are allocated a single score for the culpability of staff members (745/780, 95.5%).

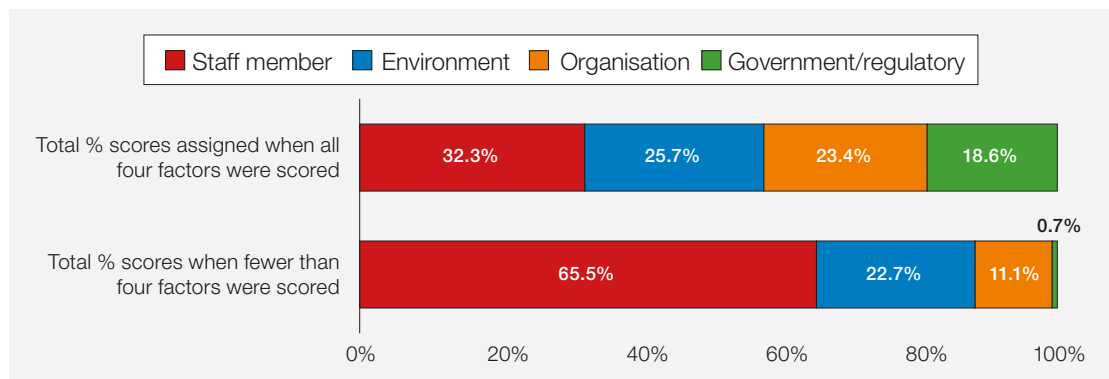


**Figure 8.2:**  
Assessment of whether multiple contributory factors were assigned HF scores (2020)



There is a more equitable spread of percentage scores between the different factors when comparing cases where all four factors have been scored (473/2623, 18%) against cases where fewer than four factors were assigned a score (2150/2623, 82%) (Figure 8.3). From these percentages, the blame assigned to staff members was twice as high when fewer than four factors were scored (65.5%), as when all four factors were given a score (32.3%).

**Figure 8.3:**  
Comparison of percentages when the incident was scored for all four of the human and system factors or for fewer than four factors (2020)



Case 8.1 demonstrates that scoring 10/10 for the single factor of staff culpability could mean further learning from an incident is reduced. This case shows there were system and organisational problems, but the emphasis on staff issues implies opportunities to resolve other problems may have been overlooked. In addition, scoring like this may make staff colleagues feel that their organisation does not have a just culture (Dekker 2012).

**Case 8.1: COVID-19-related organisational problems, but the report identifies only staff issues**

*An emergency patient was admitted straight to theatre during the night. Red blood cell units were removed from the recovery room refrigerator by order of the anaesthetist and kept near the patient in theatre for the duration of the surgery. No temperature-controlled storage box was requested from the laboratory. Due to the units being out of temperature-controlled storage for over 4 hours, and their close-proximity to a suspected COVID-19 positive patient they were wasted.*

This near miss case was scored 10/10 for the extent to which the cause was attributable to unsafe practice by individual staff member(s) and no scores were assigned to other factors. The main suggested change was staff-related, i.e. all staff to acknowledge that they have received and understood new information before proceeding with their duty. However, further information revealed this was the first COVID-19 patient in theatre and the operation was during a night shift, so there was reduced staffing and a lack of senior staff to contact for advice. The theatre policy was unclear at this time regarding COVID-19 ‘hot’ areas and staff did not want to go from a ‘hot’ area to a ‘cold’ area for blood if needed.

The guidance regarding handling and storage of blood components for COVID-19-related cases was not clear at the time, or had not been well communicated, as exemplified by staff not asking for a temperature-controlled blood storage box. The main contributory factors were environmental due to enforced COVID-19 adaptations and organisational due to poor communication of the changes. Reduced staffing at night could be due to Government-level funding factors, which may affect the staffing complement. The scoring could have been much more evenly spread between system factors, presenting better opportunities for learning. From the information supplied, it appears the level of staff culpability was minimal and it was not clear why it warranted a score of 10/10. While acknowledging that SHOT may not have the full details of events in this case, it is likely that over-scoring staff culpability could contribute to staff demoralisation if people perceive they are being blamed unfairly.

**Evaluation of one change to make incident less likely to recur**

Useful information is elicited from responses to the question ‘If you could change one thing to make this incident less likely to happen again, what would it be?’. Figure 8.4 shows a categorisation of the main suggestions made in 2020 and indicates mostly changes to the local environment (357/970, 36.8%) or organisation-wide modifications (419/970, 43.2%), despite the overall tendency to score staff members as being most culpable (Figure 8.5).

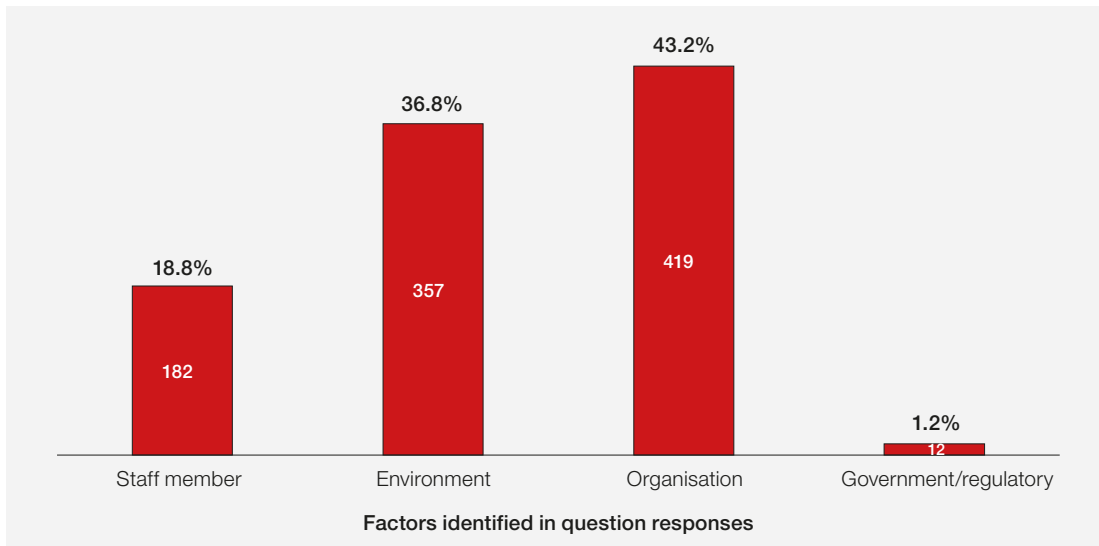


Figure 8.4: Factors identified for one change likely to reduce recurrence of the incident (n=970 responses) (2020)

A comparison was made of the factors identified as possible improvements as shown in Figure 8.4 against the actual HFIT scores assigned in these same cases (n=970). The outcome is shown in Figure 8.5 and demonstrates again that despite high scores attributed to staff, the preferred resolutions are system and organisational rather than staff related.

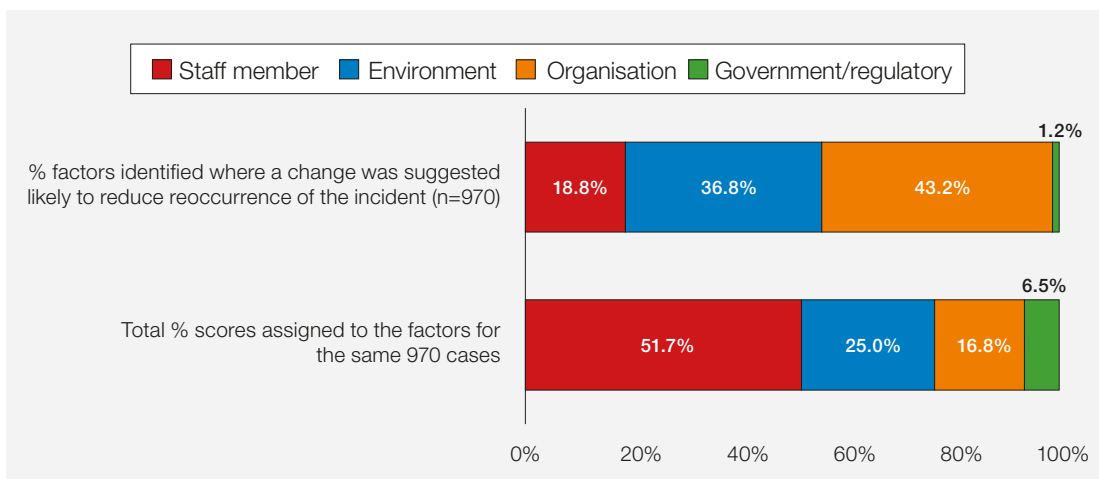


Figure 8.5: Percentages of the types of factors identified where a change was suggested (n=970) compared to percentages of HFIT scores in the same cases (2020)

Case 8.2 shows that there was inferred involvement of environmental and organisational issues in the incident which resulted in two appropriate system changes. However, no HFIT scores were given for these factors, with maximum scoring allocated for staff only.

**Case 8.2: Near miss scored 10/10 for staff only, but interim change made to environment and major organisational improvement planned**

*A patient required a transfusion of irradiated platelets. During the pre-administration check of the unit of platelets in the clinical area, it was noted that the identification label containing the patient details stated that the component was irradiated. Despite this the clinical staff detected that the irradiation blue-dot indicator sticker (RadTag®) was missing from the unit. They alerted the laboratory staff; the unit was returned to the laboratory and it was confirmed that non-irradiated platelets had been issued. An incorrect transfusion that did not meet the patient's special requirements was prevented by diligent checking.*

The BMS issuing the component had not checked for an irradiation sticker and an HFIT score of 10/10 was assigned to the staff member, with no scores for any other factors. However, it was identified that an organisational change of an upgrade to the LIMS was required, because at the time of this incident the LIMS did not have a function to stop non-irradiated components from being issued to patients known to require irradiated components. Whilst awaiting the IT change to be installed, an environmental change was implemented with a yellow tag being introduced and attached to all non-irradiated platelet units to ensure that they stood out to staff when issuing components. By scoring the HFIT for these system changes that were identified for the corrective and preventative actions, a more equitable spread of scores across different factors may have resulted.

## Conclusion

The HFIT has been revised and it is anticipated that the new format will inspire incident investigators to focus less on individual failures and more on examining underlying system failures. In the supplementary information to this chapter SHOT HF experts have included a case study which has been reworked using the updated HFIT. The same case has also been analysed using the SEIPS framework, a conceptual model that depicts how work systems affect patient safety and help drive improvements (Holden, 2020).

The key message is to highlight system and organisational problems and implement appropriate interventions to reduce risk of error recurrence.

Incident investigation should always include consideration of the impact of human factors. There may not necessarily be a single root cause, many incidents are multifactorial. Identification of all factors contributing to the error will enable robust interventions to be implemented for each of the factors highlighted. Local investigators should have appropriate training in the investigation process, which should include the importance of human factors. A white paper published by the Chartered Institute of Ergonomics and Human Factors (CIEHF 2020) aimed to help organisations understand a human factors approach to investigating and learning from adverse events. The paper discusses how organisations learn, or fail to learn, from adverse events and provides nine key principles, with practical guidance, which organisations can apply to capture the human contribution to adverse events. It is recommended that these principles are applied to the investigation of adverse events in transfusion.

### Key SHOT messages

- The new questions in the human factors investigation tool (HFIT) are available in the human factors tuition package section of the SHOT website <https://www.shotuk.org/reporting/human-factors-tuition-package/>. Changes to questions are made in January each year, so reporters are strongly encouraged to download the HFIT dataset every year and use these questions as a structure for local investigations of error incidents
- Human Factors (HF) should be incorporated into local incident investigations. Where system and organisational problems are identified, these can be translated into local improvements. Such system changes can reduce the likelihood of a similar incident recurring

## Recommended resources

### SHOT Human Factors Tuition Package

<https://www.shotuk.org/reporting/human-factors-tuition-package/>

### SHOT Human Factors videos

<https://www.shotuk.org/resources/current-resources/videos/>

### SHOT Bites No. 1a, 1b and 12 that cover investigating incidents and cognitive bias

<https://www.shotuk.org/resources/current-resources/shot-bites/>

### SHOTcast Human Factors

<https://www.shotuk.org/resources/current-resources/shot-casts/>

### CIEHF Learning from adverse events

<https://www.ergonomics.org.uk/CIEHFLearningfromAdverseEvents>

### SHOT Human Factors webinar

<https://www.youtube.com/watch?v=ie0UK9R5IbM>

### Yorkshire Contributory Factors Framework

<https://improvementacademy.org/tools-and-resources/the-yorkshire-contributory-factors-framework.html>

### Supplementary material ABOi case worked through using HFIT and SEIPS

<https://www.shotuk.org/shot-reports/report-summary-and-supplement-2020/>



## References

Card AJ (2017) The problem with '5 whys'. *BMJ Qual Saf*, **26**(8), pp.671-677.

CIEHF (2020) Chartered Institute of Ergonomics and Human Factors (CIEHF) White Paper on Learning from Adverse Events <https://www.ergonomics.org.uk/CIEHFLearningfromAdverseEvents> [accessed 15 March 2021].

Dekker S. (2012) *Just Culture: Balancing safety and accountability*. Ashgate Publishing, Ltd.

Holden RJ, Carayon P. SEIPS 101 and seven simple SEIPS tools. *BMJ Qual Saf* 2021;0:1–10. doi:10.1136/bmjqs-2020-012538 <https://qualitysafety.bmj.com/content/qhc/early/2021/05/25/bmjqs-2020-012538.full.pdf> [accessed 28 June 2021]

Improvement Academy (2021) Yorkshire Contributory Factors Framework <https://improvementacademy.org/tools-and-resources/the-yorkshire-contributory-factors-framework.html> [accessed 15 March 2021].

Isherwood, P, and Waterson, P. (2021). To Err Is System; a Comparison of Methodologies for the Investigation of Adverse Outcomes in Healthcare. *Journal of Patient Safety and Risk Management* 26, no. 2: pp.64–73.

Lawton R, McEachan RR, Giles SJ et al. (2012) Development of an evidence-based framework of factors contributing to patient safety incidents in hospital settings: a systematic review. *BMJ Qual Saf*, **21**(5), pp.369-380.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, **22**, 140, pp.5-55.

Peerally MF, Carr S, Waring J et al. (2017) The problem with root cause analysis. *BMJ Qual Saf*, **26**(5), pp.417-422.

Watt AJ (2020) The application of human factors to the blood transfusion process. PhD thesis available at [https://repository.lboro.ac.uk/articles/The\\_application\\_of\\_human\\_factors\\_to\\_the\\_blood\\_transfusion\\_process/12489734](https://repository.lboro.ac.uk/articles/The_application_of_human_factors_to_the_blood_transfusion_process/12489734) [accessed 15 March 2021].