

7 Human Factors in SHOT Error Incidents n=2857

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Key SHOT message

- To reduce the risk of attribution bias, incident investigators should analyse all evidence as impartially as possible. It may be advantageous for investigators to imagine themselves in the position of any key person being considered culpable for the adverse event and then consider what system and organisational factors could apply to the case
- The human factors questions from the SHOT database could be added to local incident documentation to encourage investigators to consider system and organisational factors when gathering data

Abbreviations used in this chapter

HF	Human factors	IT	Information technology
HFE	Human factors and ergonomics	NCABT	National Comparative Audit of Blood Transfusion
HFIT	Human factors investigation tool	RCA	Root cause analysis

Introduction

Human factors methodology has not always been applied rigorously to errors in healthcare, and there are concerns that some healthcare settings have a culture of blame and cover up rather than learning from errors. As part of a PhD research project (Watt 2020), SHOT has developed a human factors investigation tool (HFIT) for transfusion safety incidents, as detailed in the last three Annual SHOT Reports (Bolton-Maggs et al. 2017; 2018 and Narayan et al. 2019). HFIT results, including the 2019 analysis given below, indicate that safety investigators predominantly ascribe the root cause of an incident to errors by individuals, yet when respondents were asked what could be changed to avoid future errors 65.3% of responses proposed changes to organisational and systemic factors (Figure 7.1). This suggests that root cause analyses (RCA) still disproportionately blame individual members of staff for what are systems failures. SHOT has developed training resources to improve the value of RCA investigations and suggests that the HFIT questions could be added to local incident investigation documents, so human factors are considered while gathering information.

In the 2018 Annual SHOT Report (Narayan et al. 2019), one of the main recommendations was that all clinical and laboratory staff should be encouraged to become familiar with human factors and ergonomics (HFE) concepts and all healthcare organisations should consider employing a qualified HFE professional. An online survey was sent to all reporters to understand progress on implementing the 2018 key SHOT recommendations 6 months following their publication, which included questions relating to key recommendation 1 – moving away from a blame culture and towards a just and learning culture. It was encouraging that the majority of respondents perceived their organisation as never having had a blame culture and that the recommendations have influenced a positive change. The full results of the survey can be found on the SHOT website (<https://www.shotuk.org/resources/shot-surveys/>).

Attribution bias

Investigating incidents using a human factors approach is vital to understand what truly caused the incident, hence helping identify the appropriate corrective and preventative actions. It is also important to consider the human factors of incident investigations and how they can influence the quality and accuracy of investigations, and the ability for organisations to identify valid causal factors and remedial actions. To do this we will look at fundamental attribution error (Ross 1977).

Attribution bias is a type of cognitive bias and errors in cognition contribute to significant number of errors in healthcare. Essentially, cognitive biases are cognitive short cuts used to aid our decision-making. In social psychology, fundamental attribution error is a well-known bias that explains the way in which people tend to evaluate other people's behaviour. Fundamental attribution error suggests that people are likely to assume that the behaviour of another person is due to some internal trait of that person, for instance their personality, attitude or level of intelligence. This internal focus leads to a failure to recognise or underestimate external factors that have influenced behaviour. Interestingly, when a person is asked to reflect on their own behaviours, they often identify external factors that justify and explain their course of action. Fundamental attribution error is extremely relevant to incident investigations as it may negatively impact on an organisation's ability to learn; lead to flawed investigation conclusions; result in an incorrect use of 'just culture'; produce remedial actions that do not address underlying external causes; and waste valuable resources through poor allocation, for example investing time, money and resources into behavioural based safety programmes in a hope that this will result in 'good behaviour' while not adequately addressing the external driving factors that produce an undesired behavioural outcome.

From a cultural perspective fundamental attribution error may also have a negative impact on safety culture. If the workforce sees the organisation unfairly punishing individuals rather than dealing with broader external factors this could lead to a reduction in workforce engagement in safety programmes and so on.

Fundamental attribution error can be avoided by seeking to understand the behaviour in the context it occurs, staff training and increasing awareness of this error and other performance shaping factors. Performance shaping factors is a human factors term used to describe factors that increase the likelihood of human failure due to their influence on a person's behaviour. Raising the awareness of these factors with staff who conduct investigations and those responsible for agreeing remedial actions can ensure these factors are afforded the appropriate level of attention (O'Sullivan and Schofield 2018).

Analysis of the SHOT human factors investigation tool (HFIT)

Are HFIT scores disproportionately assigned to individual staff members?

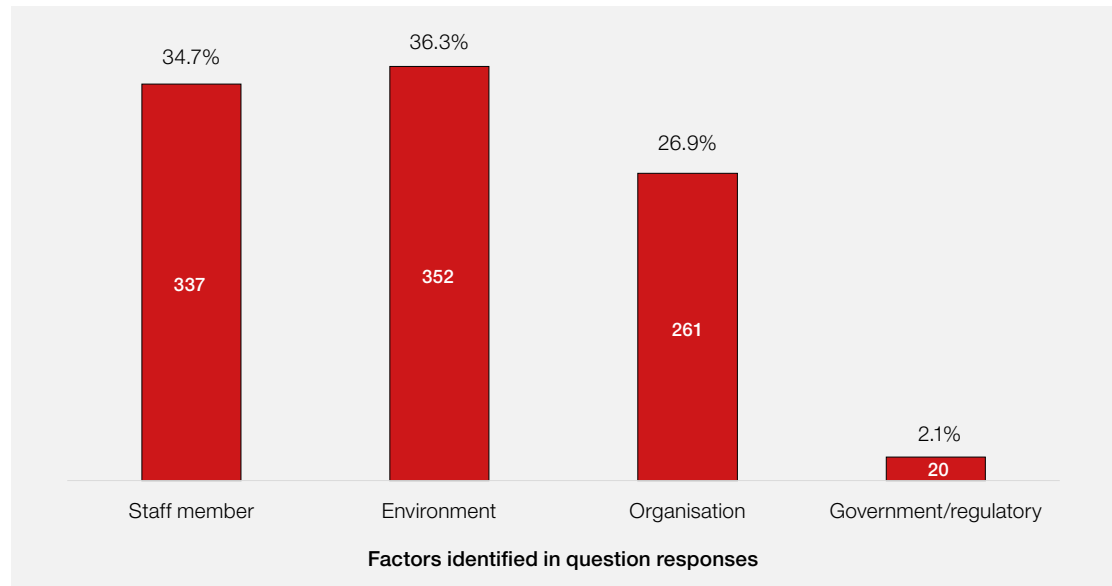
In 2019 689/2857 (24.1%) reports had a score of 10/10 for the contribution of the individual staff member(s). This is a questionably high percentage of maximum scores given to staff (Karl and Karl 2012), which means opportunities to consider system and organisational factors could be missed. In 201/689 (29.2%) cases where a maximum 10 score was assigned to the individual staff member(s) an answer was also given to a question about changing one thing to make this incident less likely to recur and 115/201 (57.2%) responses indicated a change could be made to organisational and system factors, i.e. less than half, (86/201, 42.8%) identified a staff-related item as the primary change required, despite scoring maximum for staff culpability (Case 7.1). Figure 7.1 shows an analysis of all the cases that had answers to the question 'If you could change one thing to make this incident less likely to happen again, what would it be?', 970/2857 (34.0%).

Case 7.1: Overemphasis on staff culpability when there were obvious system failures

Four separate samples were collected from one patient, by four different staff members and all were labelled with an incorrect hospital number rather than the patient's actual number from their wristband. This was classified as poor practice and the incident was given a score of 10/10 for unsafe practice by individual staff member(s) with no scores assigned to the system and organisational factors. However, the incident report identified the root cause was mismatched data between two different information technology (IT) systems. A suggestion for the primary change to make this

incident less likely to happen again was for IT systems that link up in real time to reduce multiple patient identities. The report concluded that since the introduction of new organisation-wide patient administration system there were no further incidents of this type. This indicates the scoring should have reflected the system and organisational problems more than the staff-related failings.

Figure 7.1:
Factors identified
for one change
likely to reduce
recurrence of
the incident (970
responses)



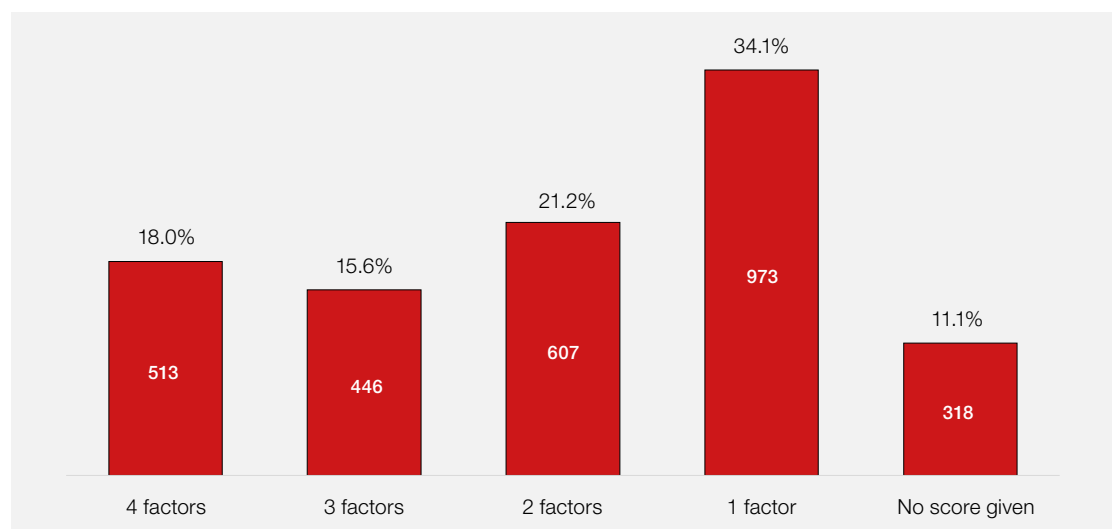
The HFIT study has demonstrated that blame is disproportionately attributed to people, rather than to system and organisational failings and this may be caused by various forms of cognitive bias (Tversky and Kahneman 1974) where something appears to be obvious after the event. Reporters should be aware of these biases and strive for impartiality when scoring the HFIT questions.

The introduction of the HFIT within the reports submitted to SHOT paved the way for incorporating human factors principles when reviewing these transfusion incidents. Improvement is an iterative process and the HFIT model will be reviewed and refined with the help of HFE experts to enable a better understanding of the submitted reports and help guide effective improvements in healthcare systems.

Assessment of variability in HFIT scoring

An analysis was made of how and whether incident reporters assigned scores to multiple contributing factors in 2019. The results are shown in Figure 7.2. Over a third of incidents (973/2857, 34.1%) were scored for a single contributory factor and the vast majority of these, 933/973 (95.9%) were given a score only for the individual staff member(s).

Figure 7.2:
Assessment of
whether multiple
contributory factors
were assigned HF
scores



Conversely, 513/2857 (18.0%) incidents were given a score for all four contributory factors and in these cases the percentage totals scored for the four factors were more evenly spread, as shown in Table 7.1, which compares these scores to the totals for all incidents. As an example, the percentage score for individual staff member(s) was 33.0% when all four factors had been scored, compared to an overall percentage of 56.6% assigned to individual staff member(s) for all cases.

	Staff member	Environment	Organisation	Government/ regulatory	Totals
Total sum of scores assigned when all four factors were scored	3,186 (33.0%)	2,461 (25.5%)	2,261 (23.5%)	1,736 (18.0%)	9,644 (100%)
Total sum of all scores	17,467 (56.6%)	6,836 (22.1%)	4,682 (15.2%)	1,896 (6.1%)	30,881 (100%)

Table 7.1:
Comparison of totals when the incident was scored for all four of the human and system factors with total sums of all scores

Over the 4 years of this study there has not been a major change in the distribution of scores given to the four human factors, as shown in Figure 7.3, although the trend across the 3 years is to assign slightly less responsibility to the staff members, especially if the educational material has been used.

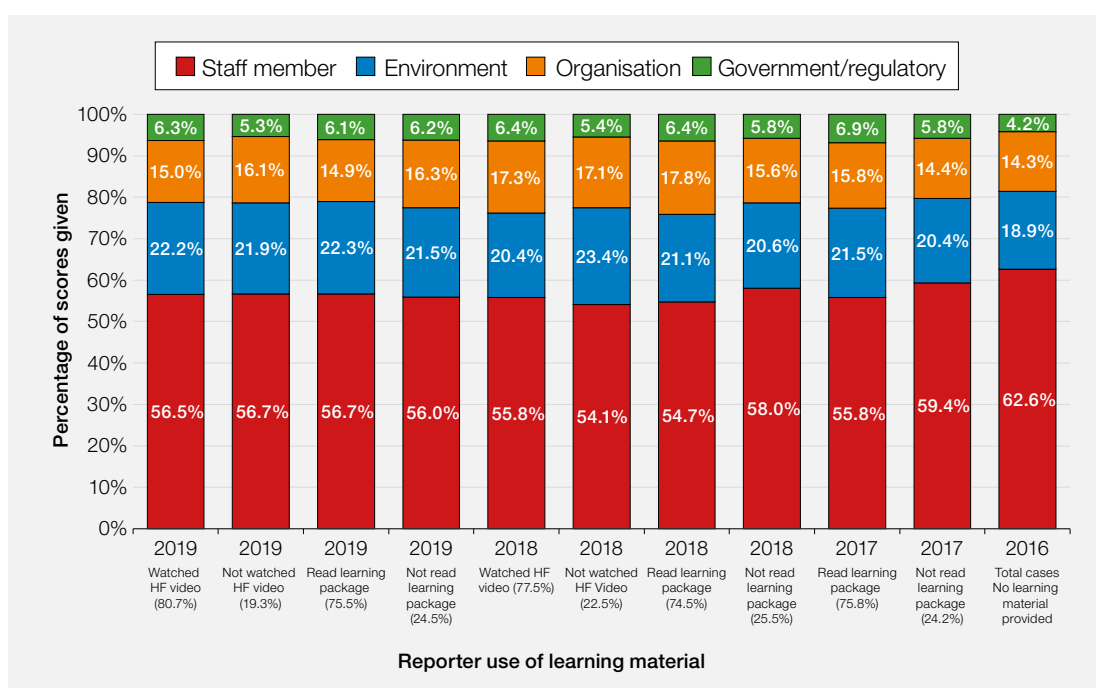


Figure 7.3:
Evaluation of uptake of self-learning opportunity and comparative percentages of scores for human and organisational factors

Educational material associated with the HFIT

A major limitation of the HFIT is the reliance on many individuals throughout the UK to assign scores, so as part of the PhD research some self-learning material was produced to assist reporters with this task. In 57/2857 (2.0%) cases in 2019, the reporter selected that they were unable to access a video via their organisation's IT system, which was a substantial reduction from the 2018 data 102/2905 (3.5%) and may have made a contribution to the higher rate of uptake of viewing the video, which was 80.7% in 2019 compared to 77.5% in 2018. Overall, the video was viewed more often than the human factors self-learning tuition package was read in both 2019 (80.7%/75.5%) and 2018 (77.5%/74.5%). This suggests a video may be the preferred form of learning. Videos are the simplest way to express complicated ideas in a memorable way and people can recall information easily when they receive it from stories featured in videos especially animated ones. Learning methods must be engaging and immersive and information delivered in the visual form is easily understood and recalled. A second video was trialled (Systems Thinking 2017) as part of the PhD study to identify the Health Education England animation that is currently linked from the SHOT database (HEE 2017). There are other videos available online that may suit different local needs. Video-based education materials should be explored further and developed, with the aim of providing a package to be incorporated into reporting organisations' training for investigation of incidents.

Vein to vein audit

The National Comparative Audit of Blood Transfusion (NCABT) (NHSBT 2020) has launched a continuous voluntary audit of the complete transfusion process, known as the Vein to Vein audit, which includes two HF-related questions to be asked at each step:

- Q1. Please give a short outline of the biggest or most recent difficulty that you have faced when carrying out this procedure and what did you do about the issue?
- Q2. How supportive was your manager/department for how you solved the issue?

Early data from these questions have been published (Watt et al. 2019) and expanded considerably in the PhD thesis (Watt 2020). Excellent learning opportunities have been developed, so that results from these simple HF audit questions can be used to analyse the potential for resilience of each hospital's transfusion process.

Recommendation

- Participation in the Vein to Vein audit is strongly encouraged and in particular hospital staff should use the human factors (HF)-related questions when carrying out local audits and feed back their results to the National Comparative Audit of Blood Transfusion (NCABT)

Action: Hospital transfusion teams and the NCABT

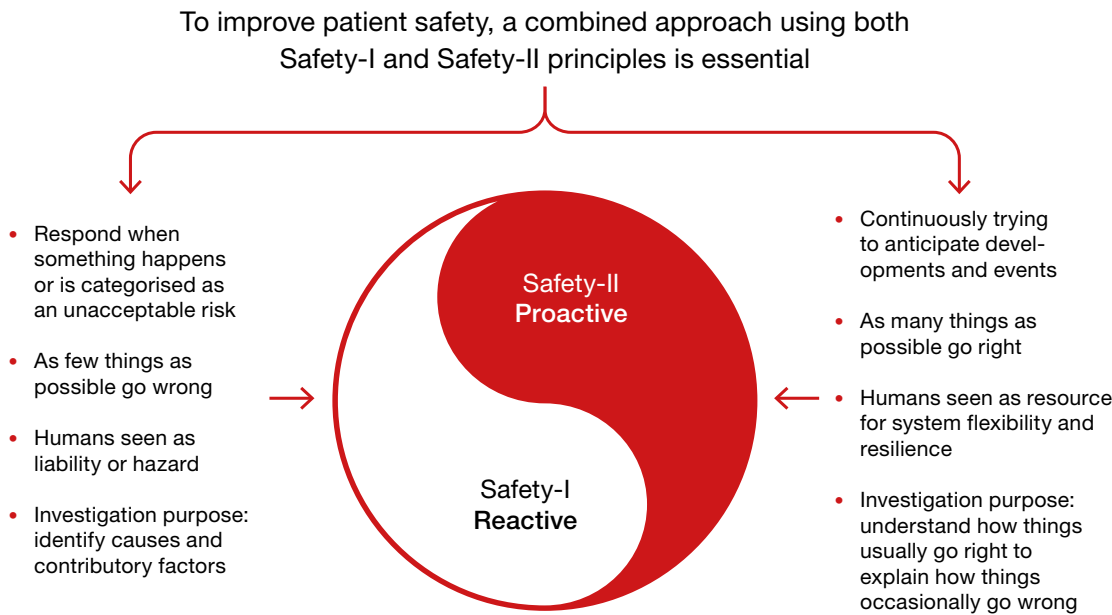
Trusts/Health Boards can register for National Comparative Audits and contact the audit team if interested in participating in the Vein to Vein audit (<http://www.nhsbtaudits.co.uk/>).

Conclusion

The enduring inclination of reporters to score individual error higher than other contributory factors is an example of fundamental attribution error (Ross 1977). This can be defined as a tendency to overestimate the importance of personal or disposition factors (i.e. people-related difficulties) relative to environmental influences and therefore to underestimate the influence of situational factors when explaining the behaviour of others. The theory postulates that we tend to explain someone's behaviour by attributing a cause. However, the tendency is to place undue emphasis on the internal characteristics of other people, e.g. their character or intention (Case 7.1), while overemphasising external factors, e.g. system and organisational problems, in relation to one's own behaviour. This particularly happens when the behaviour is negative. Therefore, incident investigators may benefit from trying to put themselves in the shoes of the individual staff member(s) that they perceive to be most culpable in the incident and then from that stance review the external system factors again in more detail.



Figure 7.4:
Overview of
Safety-I and
Safety-II



References

- Bolton-Maggs PHB (Ed), Poles D, et al. (2017) on behalf of the Serious Hazards of Transfusion (SHOT) Steering Group. The 2016 Annual SHOT Report. <https://www.shotuk.org/shot-reports/> [accessed 08 June 2020].
- Bolton-Maggs PHB (Ed), Poles D, et al. (2018) on behalf of the Serious Hazards of Transfusion (SHOT) Steering Group. The 2017 Annual SHOT Report. <https://www.shotuk.org/shot-reports/> [accessed 08 June 2020].
- HEE (2017) Health Education England, Human Factors: A Quick Guide. Animated video produced by Health Education England (HEE) and Medisense Medical Education, and endorsed by the Chartered Institute of Ergonomics and Human Factors (CIEHF). <https://t.co/qTeUoPiUlq> [accessed 08 June 2020].
- Karl R and Karl MC. (2012) Adverse events: root causes and latent factors. *Surg Clin N Am* 2012;**92(1)**:89-100.
- Narayan S (Ed), Poles D, et al. (2019) on behalf of the Serious Hazards of Transfusion (SHOT) Steering Group. The 2018 Annual SHOT Report. <https://www.shotuk.org/shot-reports/> [accessed 08 June 2020].
- NHSBT (2020) National Comparative Audit of Blood Transfusion. <https://hospital.blood.co.uk/audits/national-comparative-audit/> [accessed 08 June 2020].
- O'Sullivan ED and Schofield SJ. (2018) Cognitive bias in clinical medicine. *J R Coll Physicians Edinb* 2018;**48(3)**: 225-232. https://www.rcpe.ac.uk/sites/default/files/jrcpe_48_3_osullivan.pdf [accessed 08 June 2020].
- Ross, L. (1977) The intuitive psychologist and his shortcomings: Distortions in the attribution process. *Advances in experimental social psychology* 1977;**10**:173-220.
- Systems Thinking (2017) A New Direction in Healthcare Incident Investigation. Animated video produced by Systems Thinking Lab from Loughborough Design School in partnership with Leicester Improvement Innovation and Patient Safety (LIIPS), University of Leicester and Cogni+ive (a company specialising in whiteboard animation techniques) and supported by the Health Foundation. <https://www.youtube.com/watch?v=5oYV3Dqe0A8&t=5s> [accessed 08 June 2020].
- Tversky A and Kahneman D. (1974) Judgment under uncertainty: Heuristics and biases. *Science* 1974;**185(4157)**: 1124-1131.
- Watt A, Jun GT and Waterson P. (2019) Resilience in the blood transfusion process: everyday and long-term adaptations to 'normal' work. *Safety Science* 2019;**120**:498-506.
- 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 [accessed 26 June 2020].