6 Human Factors in SHOT Error Incidents n=2760

Authors: Alison Watt and Paula Bolton-Maggs

Key SHOT messages

- Reporters are encouraged to familiarise themselves with human factors concepts, particularly by using the SHOT human factors tuition package https://www.shotuk.org/reporting/human-factors-tuition-package/, which includes a useful video link https://t.co/qTeUoPiUlq
- Staff investigating errors in the transfusion process are advised to examine systems failures, so they can identify contributory causes beyond failure by an individual

The importance of considering human and organisational factors when reporting transfusion incidents has been highlighted by SHOT, because over the past two decades it has been established that most incidents are caused by human errors in the transfusion process. In 2016 the International Organisation for Standardisation (ISO) published a standard related to human factors (ISO 27500) which sets out high-level human-centred principles for executive board members in organisations to endorse (see below).

In order to understand how transfusion errors can be affected by human factors, a bespoke human factors investigation tool (HFIT) (Gordon et al. 2005) was created and linked to the SHOT database (Dendrite) from January 2016. Human factors questions were added in all error categories to examine which of four human factors was estimated to be implicated in each incident and it is these reports which make up the total 2760 reviewed for this summary. The reporters were asked to rate the contribution of each of the following:

- Unsafe practice by individual staff member(s)
- Unsafe conditions associated with the local environment or workspace
- Unsafe conditions associated with organisational or management issues in your Trust/Health Board (e.g. staffing levels)
- Conditions associated with the government, Department of Health or high level regulatory issues. This is not to score whether the error was reportable as a regulatory failure but to assess the impact of decisions made by regulators or conditions imposed by them

Analysis of the first year's data from the HFIT indicated that reporters tended to attribute culpability mostly to individual staff members, 62.6% in 2016 (Bolton-Maggs et al. 2017) and scores were lower for any contribution of systems factors beyond the control of the individual. The pattern was similar in 2017, with 57.9% attributing culpability to individuals and 393/2760 (14.2%) scoring 10/10 for staff members and zero for all other factors.

Case 6.1: Total culpability attributed to individuals may fail to highlight system problems

A patient was issued and transfused platelets and red cells in separate incidents with only one group on record in the laboratory information management system (LIMS). In the morning a group and screen sample was processed and one unit of platelets was requested for the patient. The biomedical scientist (BMS) realised that there was no historic group on record for this patient and added the code to the report stating that if blood components were required, a second sample would be needed to confirm the patient's group. In the early hours of the following day another BMS received a request for one unit of red cells and one unit of platelets. Having seen that a sample had

been received and processed earlier the day before, and that the patient had already received a unit of platelets, the BMS crossmatched red cells and issued these with a second unit of platelets, both of which were transfused although the patient had not yet had a group-check sample tested.

Case 6.1 was scored as 10 (maximum score) for individual culpability with no scores for other human factors. However, it is unlikely that two qualified, trained and competent individuals would make related mistakes if the systems were well designed to prevent errors. Other factors mentioned included workload issues, both were lone working, and in particular, the second incident occurred in the middle of the night. In addition, the second error was compounded by an assumption that the required testing had been done earlier and the important comment highlighting that it had not been done was at the bottom of the report. The corrective actions include updating the standard operating procedure (SOP) and adding a flag to the LIMS. These actions suggest there were system problems that contributed to the errors.

Studies have shown that culpability by the individual is expected to be about 10% (Reason 1997; Karl 2012) so it is likely that the higher percentages reported to SHOT are due to a lack of awareness of system failure issues among incident reporters, who would not be expected to have an in-depth knowledge of human factors. Therefore, from January 2017 a self-learning package was made available showing examples of scoring human and organisational factors. This package was published on the SHOT website http://www.shotuk.org/reporting/human-factors-tuition-package/ and includes real case studies from the first year of reporting in 2016.

It would be unrealistic to expect reporters to read the self-learning package on each occasion they report errors to SHOT, so a question was asked about if and when they have read the package. This was designed to give an indication of whether the reporters have studied how to assess the implicated human factors before recording their scores and if so, how recently did they do this (Figure 6.1).

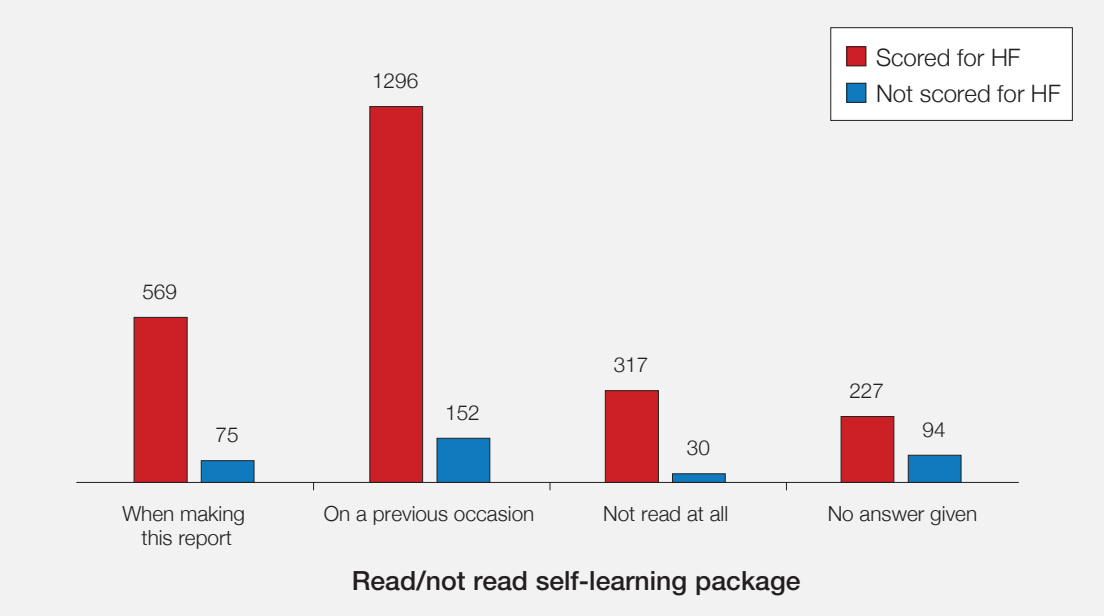


Figure 6.1: Evaluation of uptake of self-learning opportunity and whether reporters are encouraged to add scores to assess the human factors

HF=human factors

Figure 6.1 shows that 644/2760 (23.3%) reports were made by individuals who had read the self-learning package on this occasion and 1448/2760 (52.5%) by reporters who had read the package when reporting a previous error. There were 2092 reports made by individuals who had read the package either when making this report or on a previous occasion and of these, 1865/2092 (89.1%) included a score for human factors. In comparison 668/2760 (24.2%) indicated that the reporter had not read the self-learning package, either by a direct 'no' response to the question, or by not giving an answer, and of these 544/668 (81.4%) included a score for human factors. It is a little more likely that those who have read the self-learning package will then proceed to complete the questions about contributory human factors.

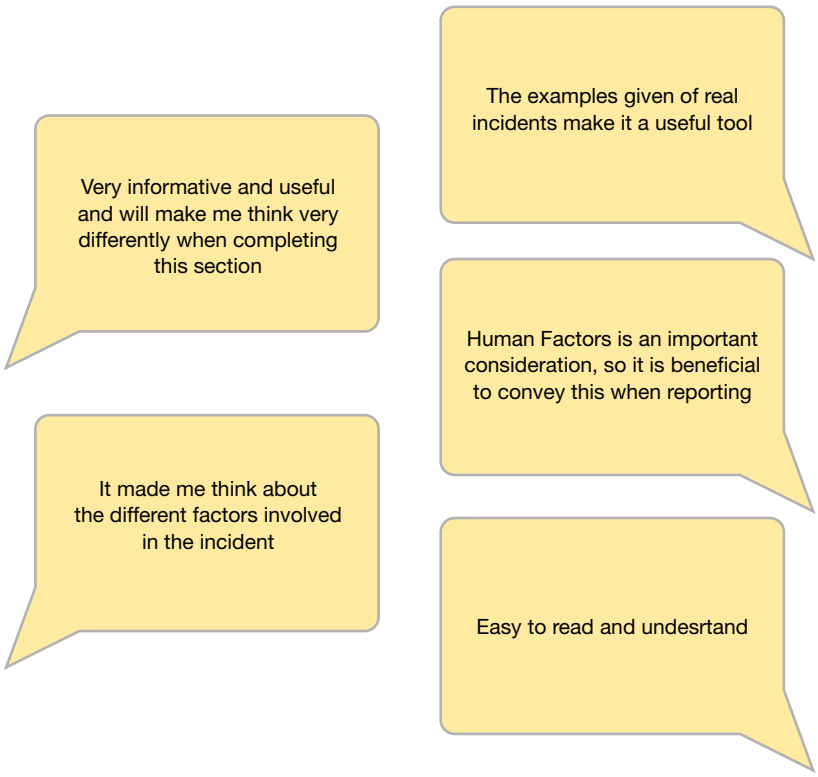
Case 6.2: Failure to assign scores for human factors may reduce learning opportunities

A unit of red cells was transfused the day after the validity had expired for the sample used for crossmatch. No scores were assigned for contributory human factors and the reporter did not answer whether they had read the self-learning package, but important additional information implied system-related problems. This patient was transfusion-dependent and needed transfusing two or three times a week so samples used for crossmatching must be less than 72 hours old at transfusion. Units are crossmatched by the Blood Service (BS) due to antibody complexity and this can add delay between sampling and transfusion. To facilitate traceability, units issued via the LIMS have a default de-reservation period of 48 hours, so the date automatically prints on the compatibility label as two days later. When de-reservation is required after one day, because the sample validity would expire by then, the BMS must manually amend the label and annotate with the correct date. In this case, the BMS did not annotate the label with the correct de-reservation date and the unit was not de-reserved.

Corrective actions show there were system problems. These actions were listed as follows:

- A sample collection/testing schedule is to be created for all transfusion-dependent patients who require crossmatching by the BS
- Risk-assessment to determine whether 96 hours is more manageable for the patient's quality of life compared to the possibility of forming new antibodies
- Problems with sample validity and changing of de-reservation dates on compatibility labels have been lodged with the provider to consider amendments to the LIMS

Analysing system problems like these identified in Case 6.2 could improve patient safety, and use of the SHOT HFIT questions could improve that analysis. The aim of adding the self-learning package was to encourage more accurate analysis of human and organisational factors contributing to errors. A comparison of reporters' estimation of different human factors contribution to errors in both 2016 and 2017 shows a small increase in the contribution rated for organisational or environmental factors among those who had read the self-learning package (data not shown). This is a selection of comments made about the self-learning package, which were very positive:



Commentary

It has been noted in several areas of SHOT reporting that the root cause analyses are not satisfactory and that the systems problems are not being recognised nor addressed. This has been noted by the MHRA and is one of the triggers for increasing the inspections in 2018 (Chapter 24, Medicines and Healthcare Products Regulatory Agency (MHRA)). If reporters start attributing incidents more to organisational factors, more could be learnt from those adverse events and this would give healthcare organisations the opportunity to resolve some of the underlying problems that are leading to errors.

This could have cost implications for the UK National Health Service (NHS), but there are also costs associated with continuing to experience serious, but preventable, incidents. These costs can be human as well as financial, such as serious harm or death caused to patients and the second victim costs related to adverse effects on staff who are being assigned sole blame for an error. Detrimental consequences for staff include losing their job, or suffering legal challenges and such outcomes for staff are likely to have a negative effect on healthcare organisations, with no improvement in patient safety.

Incorporation of a self-learning package into the process for reporting may encourage reporters to consider factors beyond the culpability of an individual. Further work will be needed to continue this improvement, so a revised self-learning package was published on the SHOT website from 01 January 2018. This has been enhanced with a link to a simple video giving more information about human factors. It is anticipated that reporting of human factors and system problems involved in transfusion incidents will improve over time as the messages about accurate examination of these aspects are disseminated. This in turn should lead to improved systems and a resultant higher level of patient safety.

ISO 27500

Other resources are available to assist learning and application of human factors, for example the ISO standard for human factors applicable to organisations (ISO 27500). Advice about application of behavioural psychology using the 'Choices framework of behavioural drivers' can be found at: https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/putting-behavioral-psychology-to-work-to-improve-the-customer-experience.

Lee Alford (invited by the Chair of a Pharma sub-group of the Chartered Institute of Ergonomics and Human Factors to lead a small working group to develop and raise awareness of the standard across the pharma sector) writes: In March 2016 the British Standards Institution (BSI) published BS ISO 27500: The human-centred organisation. Aimed at corporate board members, the standard explains the values and beliefs that make an organisation human-centred, the significant business and operational benefits that arise, and the policies they need to put in place to achieve this. The standard offers health and safety professionals the opportunities to raise the profile of wellbeing in their organisations. As a starting point a sub-group of the Chartered Institute of Ergonomics and Human Factors (CIEHF) has produced a survey to help organisations across the pharma and healthcare sectors to self-assess themselves against the seven principles and ways of application described in the standard. The survey is available at www.surveymonkey.co.uk/r/CF9QJRD.

Root cause analysis (RCA)

Author: Nina Vinall

When an incident or near miss occurs, it is easier and indeed quicker to come to the solution that it is a 'human error' as it is staff who are the ones who care for people in the NHS, yet staff do not come into work to purposefully cause harm.

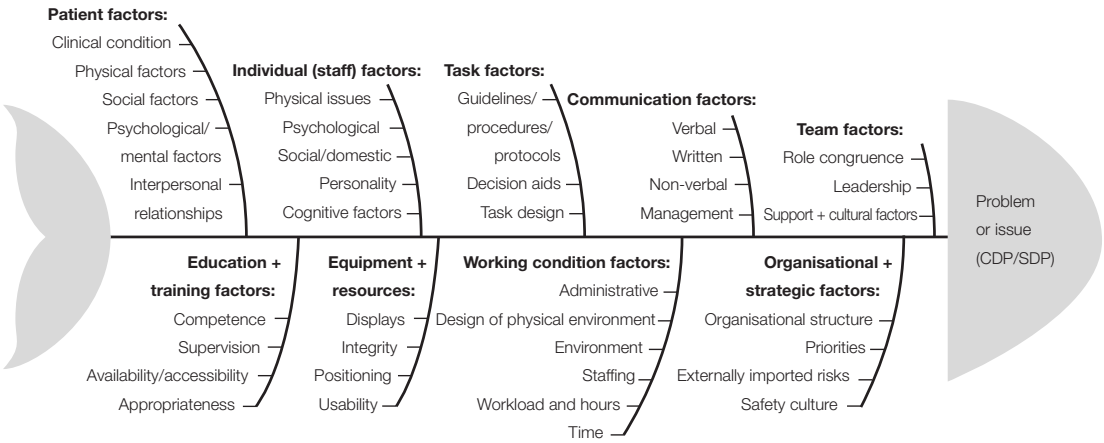
So how do we find out what has gone wrong and learn from it? For organisations, teams and staff to fully understand why an incident happened and what is to blame, we must first understand the root cause(s), that is, the equipment, task, policy/protocol, the organisational situation to name a few, to truly get to the factors involved in the incident.

The National Patient Safety Agency (NPSA) website still provides a wealth of tools to support this

way of investigating incidents and serious incidents. These enable the investigator to remove all subjectivity from the investigation process and allow objectivity only. This leads to truly understanding the reasons or 'root causes' of an incident. In identifying the root causes and realising that there are more factors involved that led to the incident, the organisation can then learn to look at their processes and policy which will inevitably reduce the risk of such an incident occurring again. This will also improve reporting of incidents or near misses, acting on the outcomes and lead overall to safer patient care. The items to support investigating using this method can be found at http://www.nrls.npsa.nhs.uk/resources/collections/root-cause-analysis/.

On this site you will find access to a presentation from NPSA's RCA investigations (2011) and other tools such as the fishbone template (as seen below). Once familiar with these tools investigators become more confident in the outcomes and the organisation becomes more open to understanding there are other factors at play.

Figure 6.2: Fishbone template for analysis of root causes



CDP=care delivery problem; SDP=service delivery problem

While root cause analysis has been part of health care and patient safety for several years, its successful application to identify and implement sustainable actions has been variable. There is a danger that health care professionals are starting to become complacent about the use of RCA and its techniques to the extent that RCA are being conducted in a more superficial manner. The fact that many RCA are conducted in and across Trusts for similar adverse events indicate that the RCA reports either did not yield sustainable solutions or were not comprehensive enough to deal with the problems and have long-lasting impact. We need to be conducting more credible RCA with tangible action plans which need to be measured to assess if they were effective in mitigating the risk. Only then will RCAs drive improvement in the process of reviewing events that cause or may cause serious harm, and in developing and implementing sustainable and measurable actions that prevent future harm to both patients and the workforce.

SHOT data have consistently shown that errors contribute to >80% of the events reported. To ensure safer transfusion practices and a consistent reduction in these errors, safe behaviours need to be identified, promoted and reinforced; safety processes that target the root cause of most incidents are vital. One such approach is a behaviour-based safety approach. This promotes interventions that are people-focused and often incorporate one-to-one or group observations of employees performing routine work tasks, setting goals carefully and giving timely feedback on safety-related behaviour, coaching and mentoring. These initiatives will have a proactive focus, encouraging individuals and their work groups to consider the potential for incident involvement and to assess their own behaviour as safe or unsafe always, no matter what. This will enhance performance and drive towards a safer culture thus promoting transfusion safety.

References

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