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Can we enhance transfusion incident reporters' awareness of human and organisational factors?

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ABSTRACT

The importance of considering human and organisational factors when reporting transfusion incidents has been highlighted recently. The UK haemovigilance scheme, Serious Hazards of Transfusion (SHOT), has established over the past two decades that most incidents are caused by human errors in the transfusion process. To enhance the incident reporter's awareness of human and organisational factors, we implemented two interventions and evaluated the effects. First, we created and incorporated a bespoke human factors investigation tool (HFIT) which explicitly asks for the level of contribution of individual staff member(s), the local environment or workspace, organisational or management and government or regulation. Second, we created and incorporated a self-learning package linked to the UK national haemovigilance reporting database, showing both good and poor examples of human and organisational factors reporting with discussions about the merits of these different reports. Data from this tool have been analysed to investigate whether increased learning is possible. The main conclusion after one year's use of the HFIT, was that incident reporters tended to attribute culpability mostly to individuals (62.6%). It is possible this result is due to lack of system awareness amongst incident reporters. Six-month initial data analysis after the inclusion of the self-learning package shows that if the incident reporter has studied the self-learning package before scoring the level of contribution associated with an incident, there is a slightly lower tendency to attribute most responsibility to individuals.

KEYWORDS

Transfusion, healthcare, incidents

Introduction

Over the last few years, the importance of considering human factors when reporting transfusion incidents has been highlighted. As noted by the UK haemovigilance scheme, Serious Hazards of Transfusion (SHOT) in every Annual SHOT Report for the past two decades, most incidents are caused by human errors in the transfusion process (SHOT Reports, 1996-2016). Therefore, a recommendation was made in the 2013 Annual SHOT Report (Bolton-Maggs et al., 2014) that in line with human factors research it may be better to review the transfusion process to design out the errors.

To understand how transfusion errors can be affected by human factors, a data collection tool was needed to gather information, so a bespoke human factors investigation tool (HFIT) has been created (Gordon et al., 2005). The format of the HFIT was developed from evaluating existing human factors models (DeRosier et al., 2002; Rasmussen, 1983, 1997; Reason, 1990; Shappell and

Wiegmann, 1997; Leveson, 2004a,b; Hollnagel and Gottmann, 2004; Holden et al., 2013). The HFIT has been incorporated within the UK national haemovigilance reporting database and data from this tool have been analysed to investigate whether increased learning is possible with the use of a bespoke HFIT.

Methods

The research method used was to add human factors questions to all error categories of the transfusion errors reporting database to examine the extent to which four human factors were estimated to be implicated in each incident. The transfusion error categories included incorrect blood component transfused (IBCT) and avoidable, delayed or under-transfusion (ADU), which are the two most serious categories of transfusion incident and can lead to major harm or death. Other error categories were handling and storage errors (HSE) and errors with anti-D immunoglobulin (Anti-D Ig) administration, which can cause serious harm, but are unlikely to result in death. The final two error categories are potentially serious errors, but which fortuitously cause no patient harm: right blood right patient (RBRP), where an error was made, but the patient still received the correct transfusion and near miss (NM) incidents, where the error was discovered before the transfusion took place.

The questions asked were:

To what extent is the cause of this incident attributable to:

1. Unsafe practice by individual staff member(s)
2. Unsafe conditions associated with the local environment or workspace
3. Unsafe conditions associated with organisational or management issues in your Trust/Health Board (E.g. staffing levels)
4. Conditions associated with the government, Department of Health or high level regulatory issues (i.e. the error was caused by regulatory issues, not reportable as a regulatory failure)

Incident reporters were asked to score each question from zero, no contribution to ten, fully responsible, using radio buttons against each question. In addition, every question had a free text box to gather further details.

Please give any additional relevant information:

This enabled reporters to add any extra comments about the human factors related to the incident, leading to enhanced understanding of the system issues during analysis of the data.

Results

Data have been analysed from all applicable error reports completed in the calendar year 2016 (n=2677). These errors have separately been analysed from a transfusion and patient outcome perspective for the 2016 Annual SHOT Report (Bolton-Maggs et al., 2017) therefore this is a fully validated dataset.

There was considerable variability in the scores allocated to the four questions and the percentages of each score attributed to each of the four human factors is shown in Figure 1.

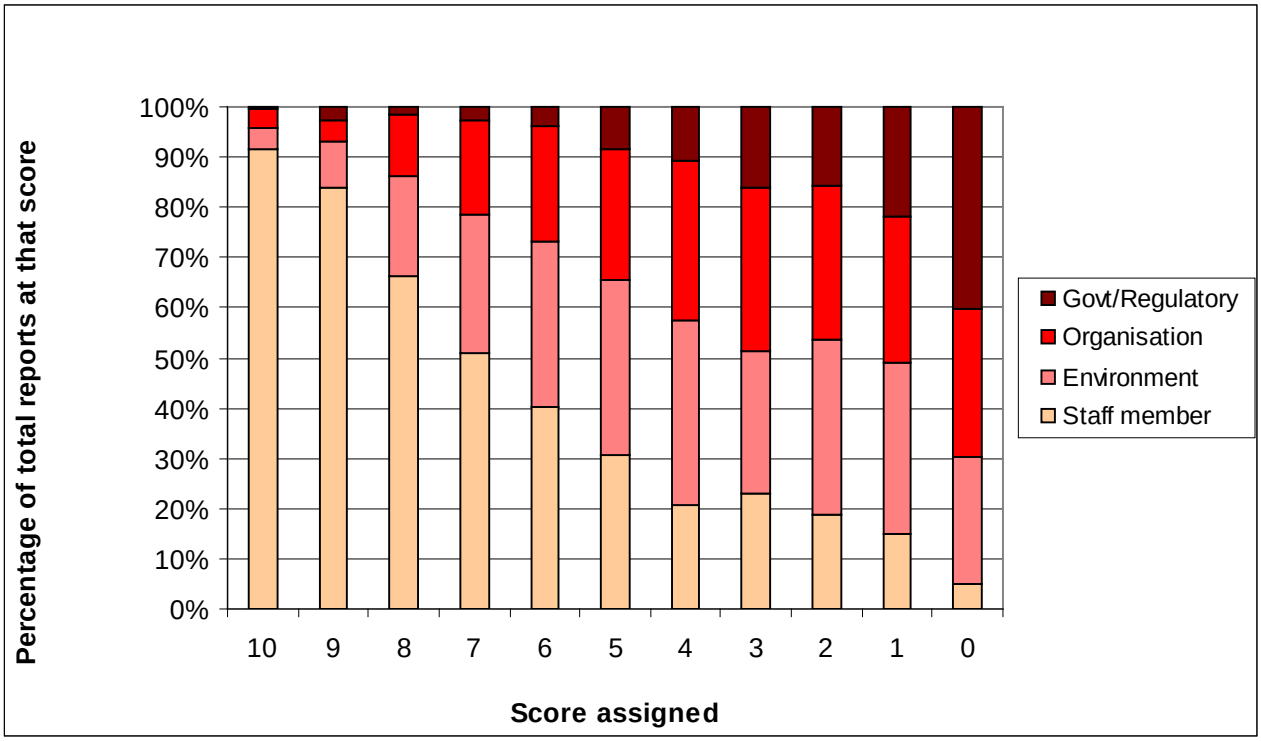


Figure 1: Estimation of different human factors contribution to errors, score out of 10

Incident reporters seem to consider the cause of errors as predominantly attributable to unsafe practice by individual staff member(s). At the simplest level, a total of the scores attributed to each of the human factors (Table 1) shows 62.6% of the cause was attributed to staff members, with the percentages diminishing for system problems and human factors beyond the control of the individual.

Table 1: Total scores (0-10) for each of the human factors

	Staff member	**Environment**	**Organisation**	**Govt/regulatory**
Total sum of scores assigned to each	16,891	5,087	3,862	1,141
Percentage of the total assigned to each	62.6%	18.9%	14.3%	4.2%

The conclusions from the first year of the HFIT study indicated the incident reporters may not be considering system problems in detail and the scores given may not always reflect the reality if there is too much focus on individual error. These data were reviewed by taking a selection of cases to assess whether the details of the incident as reported match the scores allocated. As an example, Case 1 was scored as 10 for unsafe practice by the individual, with no scores for any contribution of other system factors.

Case 1: Total cause of incident attributed to individual

Patient A had a pre-transfusion sample taken by a nurse in a side room of the ward. The nurse was also coordinating the ward beds and labelled the sample away from the bedside, while dealing with

a query from another member of staff about Patient B. The nurse labelled the sample and request form with Patient B's details instead of Patient A. Patient B had a historical blood group result, so the ABO mismatch was detected by laboratory testing. The nurse then realised her error and repeated the sampling of Patient A. There was a slight delay in ordering blood for Patient A, but no major harm was caused in this instance, although an incident like this has the potential to result in an ABO incompatible blood transfusion.

The following observations can be made from the information provided in this case:

1. The local environment or workspace was not ideal, because the nurse was working in a side room, whilst also being responsible for coordination of all ward beds. This observation suggests that a score should have been given for local environment or workspace
2. The member of staff involved in the critical task of taking pre-transfusion samples should not be disturbed by another staff member
3. A patient's request form should be written in advance of taking a sample, so the details can be cross-checked during the sampling process, but on this occasion, it can be surmised the form was not completed in advance of sampling, because the error report states 'The nurse labelled the sample and request form with Patient B's details instead of Patient A'

These latter factors could have been caused by a lack of appropriate policies, which is an organisational factor. Alternatively, staff may have failed to comply with policies, because of an excessive workload, also an organisational factor. If the excessive workload was caused by poor staffing levels, that could be because of government level factors affecting the health service. The 2017 Care Quality Commission (CQC) report (CQC, 2017) states 'The scale of the challenge that hospitals are now facing is unprecedented'. Therefore, in this case it might be more accurate to have an even spread of scores across all four of the human factors identified for this study instead of the sole score of 10/10, placing sole responsibility onto the individual. Reviewing a selection of case studies enabled the creation of the self-learning package.

To help incident reporters have a better understanding of system problems, a self-learning package has been developed and it was made available from January 2017, so that a full year's data can be compared to the 2016 data at the end of the calendar year. This package includes real case studies from adverse events reported in 2016 and examines how best to categorise and score the human factors aspects of these cases. The tuition package is published on the SHOT website at www.shotuk.org/reporting/human-factors-tuition-package/ and reporters are directed to read this when completing a transfusion error report.

Interim results 01 January to 30 June 2017, following the publication of a self-learning package (n=1375 reports)

Individuals who report transfusion errors to SHOT will usually report on numerous occasions, so it would be unrealistic to expect them to read the self-learning package on each occasion. By examining the answers to the question of if (and if so, when) they have read the self-learning package, an indication is given whether they have studied how to assess the implicated human factors before inputting the scores and if so, how recently did they read it (Figure 2).

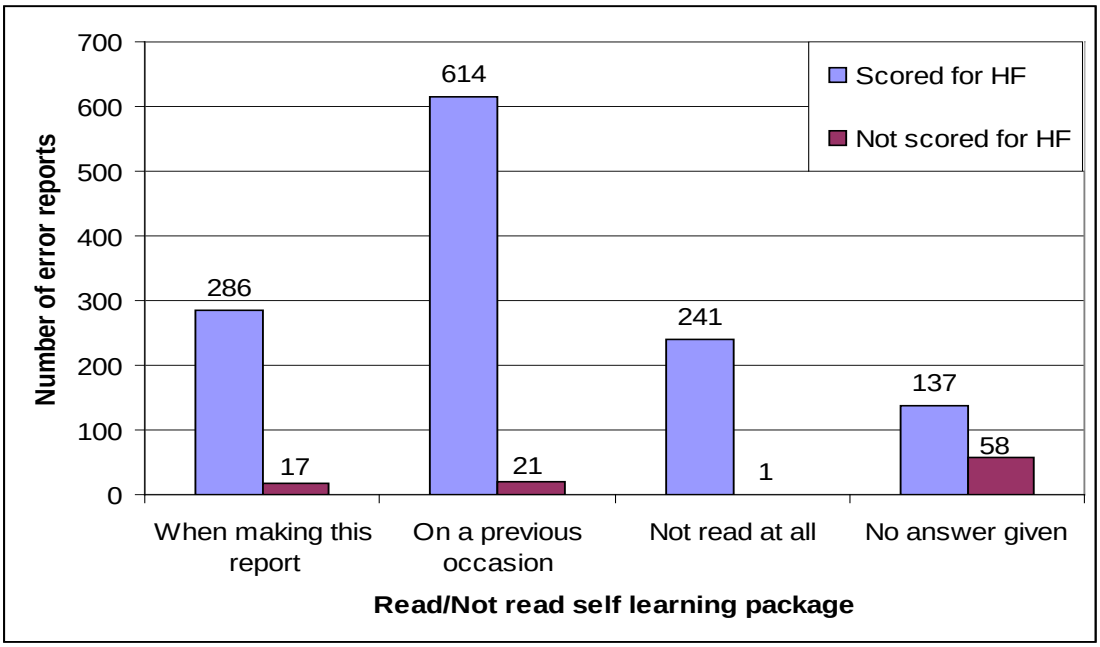


Figure 2: Evaluation of uptake of self-learning opportunity

Figure 2 shows that a total of 938/1375 (68.2%) reports were made by individuals who had read the self-learning package either on this occasion or when reporting a previous error. Of these, 900/937 (96.1%) included a score for human factors. In comparison 437/135 (31.8%) 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 378/437 (86.5%) included a score for human factors.

Figure 1 showed the percentage estimation of different human factors contribution to errors, scored out of 10. These data were from the complete calendar year, 2016. Figure 3 shows a similar summary of the reporters' estimation of different human factors contribution to errors but compares the first six months of reports in both 2016 and 2017, i.e. 01 January to 30 June inclusive in each year. This gives an interim comparison until there is a full year's data at the end of 2017.

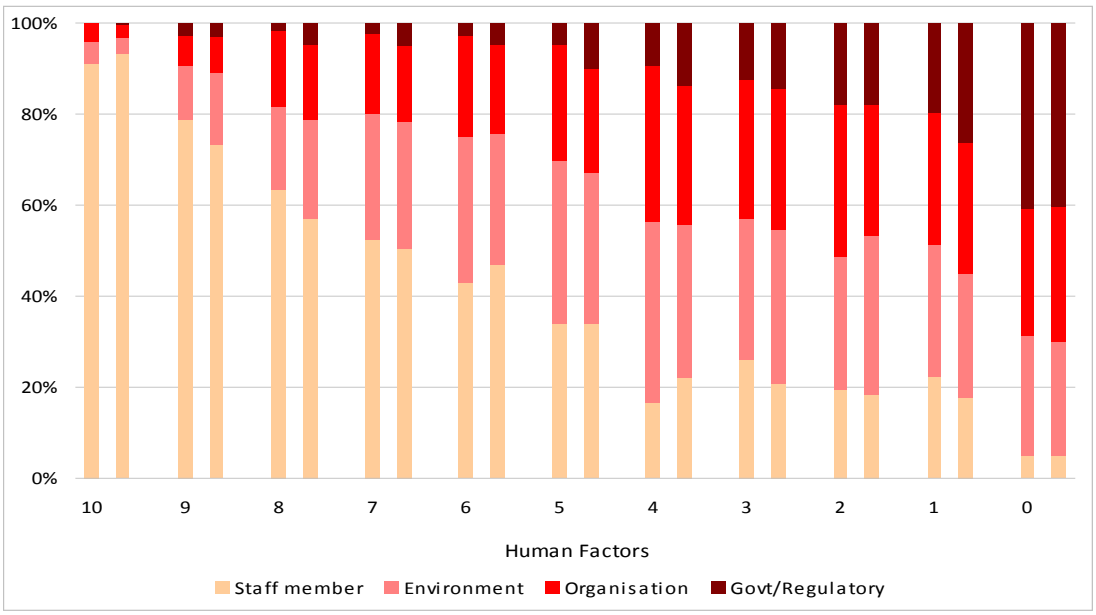


Figure 3: Comparison of percentage of scores out of 10 given to four human factors Jan-June 2016 (left column) and Jan-June 2017 (right column)

From these results it isn't feasible to estimate whether there has been a significant change in reporting patterns since the changes made at the end of the first year's data collection. However, a slightly clearer picture can be seen by comparing the total scores given by those who had read the self-learning package and those who had not read it before completing their incident report (Figure 4).

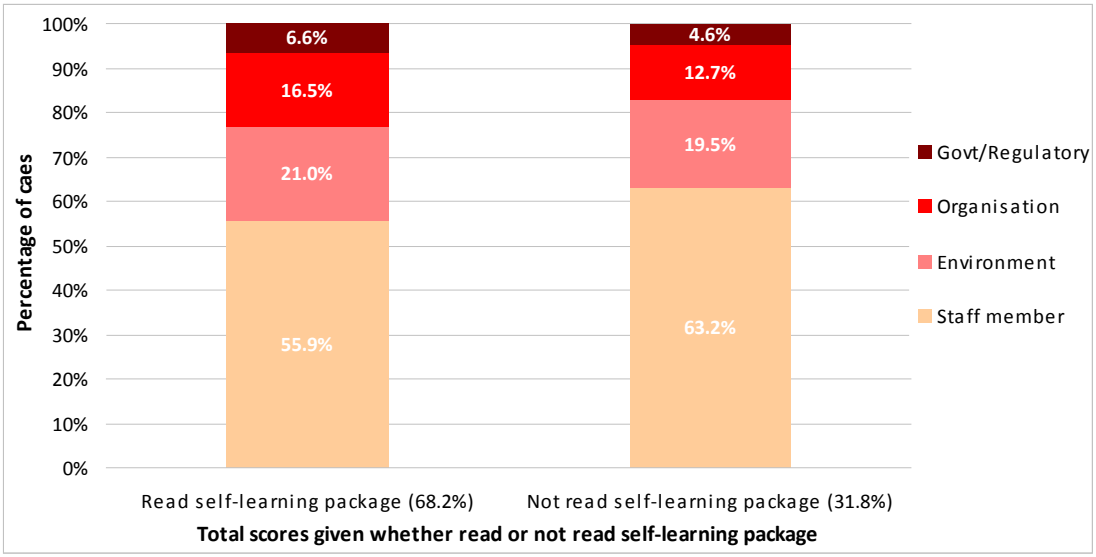


Figure 4: Scores given by those who had read or not read the self-learning package

Figure 4 shows there was slightly less of a tendency to put the responsibility for errors onto individual staff members if the self-learning package was read (55.9%) compared to those who had not read the package (63.2%), which indicates there is potential to influence their reporting with further education on system awareness.

Discussion

This analysis showed that the HFIT is a practical method of elucidating which human factors are considered most likely to be the cause of blood transfusion errors. After the first year of data collection in 2016 it was obvious that higher scores have been attributed to staff members as a cause of error than to the other potential human factors. Studies using James Reason's decision tree for determining the culpability of unsafe acts (Reason, 1997) has shown that 90% of quality lapses are defined as blameless (Karl and Karl, 2012). If culpability by the individual is usually about 10%, then there may have been an overestimation of the liability of individuals (62.6%) in the answers to the HFIT questions and an underestimate of the impact of environmental, organisational or high-level government or regulatory factors.

If incident reporters start attributing incidents more to organisational factors, it would enhance the overall learning from those adverse events, and give healthcare organisations the opportunity to resolve some of the underlying problems that lead to errors. That could have a cost implication 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. Such outcomes for staff are likely to have a negative effect on healthcare organisations, with no improvement in patient safety.

We may need a more sophisticated taxonomy to enable a better understanding of which organisational factors need to be addressed. The current HFIT does not examine organisational problems in detail, but an analysis of some comments associated with the HFIT answers given in 2016 showed staffing problems and a high workload were the most commonly mentioned organisational factors (Bolton-Maggs et al., 2017). Lessons could be learnt from recent work published on an incident reporting and learning system known as UPLOADS (Understanding and Preventing Led Outdoor Accidents Data System). This is based on Rasmussen's risk management framework and Accimap model and is being used to analyse the data, from a systems perspective, on incidents (including near miss incidents) resulting in injuries, illnesses, equipment, environmental damage and psychological impacts associated with led outdoor activities (Salmon et al., 2017).

Early analysis of transfusion incident data from the first half of 2017 has shown that the incorporation of a self-learning package into the process for reporting may be encouraging reporters to consider factors beyond the culpability of an individual. Further work will be needed to continue this improvement, such as continued training and education of incident reporters, and this should include regularly updating and redistributing the self-learning package. There are limitations as to how effectively incident reporters can be educated and trained to complete the HFIT more accurately, because they are employed independently within each healthcare establishment in the UK. However, SHOT staff provide a continuous education programme for these incident reporters, so 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.

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