Laboratory-related Transfusion Errors
Information Technology is not the Complete Solution

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Introduction
Blood and blood component transfusion is currently very safe but fifteen years of haemovigilance reporting to the SHOT scheme demonstrates that errors related to laboratory practice continue to contribute to adverse events, despite the introduction of integrated IT systems implemented specifically to reduce such errors. Errors originating in the laboratory may result in ABO incompatible transfusions with catastrophic outcomes.

Aims
To determine the level of IT errors originating in the laboratory caused by human intervention.

Method
A retrospective analysis was performed of laboratory-related SHOT reports between 1996 and 2011 and of IT system-related SHOT reports between 2006 and 2011 as these have only been identified and analysed in detail for the past six years.

Table 1. Subgroup analysis of Laboratory and IT-related reports

<table>
<thead>
<tr>
<th>Year</th>
<th>Lab-related reports</th>
<th>Lab-related IT reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>320</td>
<td>28</td>
</tr>
<tr>
<td>2007</td>
<td>121</td>
<td>25</td>
</tr>
<tr>
<td>2008</td>
<td>200</td>
<td>44</td>
</tr>
<tr>
<td>2009</td>
<td>230</td>
<td>61</td>
</tr>
<tr>
<td>2010</td>
<td>205</td>
<td>56</td>
</tr>
<tr>
<td>2011</td>
<td>217</td>
<td>74</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1293</td>
<td>288</td>
</tr>
</tbody>
</table>

Results
Fifteen years of data showed that overall two thirds (6242/9925) of all SHOT reports are adverse events caused by error with 2666/6242 (43%) originating in the laboratory. A subgroup analysis of laboratory errors reported between 2006-2011 (Table 1) shows that 288/1293 (22%) are IT-related and 185/288 (64%) of these are caused by human intervention (Figure 1).

These include:
- failure to identify/consult historical records 39/288
- warning flag ignored or erroneously overridden 66/288
- failure to utilise or update warning flags/logic rules 50/288
- inappropriate release of components by electronic issue 30/288

Figure 1. Lab-related IT errors caused by human intervention

![Illustration of laboratory IT pop up warning flag](image)

Of the laboratory-related errors 1745 (66%) resulted in the transfusion of an incorrect blood component, 404 (15%) were transfusions where handling and storage errors rendered the component less safe and 517 (19%) were errors related to the issue of anti-D immunoglobulin to women of childbearing potential.

Conclusion
Analysis of SHOT laboratory and IT-related data indicates that all manual interventions are prone to human error and IT systems cannot eradicate or address these. The use of automation together with integrated IT systems adds additional levels of safety if the software is configured and used appropriately, but this subgroup analysis demonstrates that errors related to IT remain a problem. Failure of warning flags and/or logic rules is the most common category, and for half of the cases identified in 2011, their use would, if implemented, have prevented errors. Further, the data indicate that manual interventions within automated systems remain prone to human error.

SHOT recommendations include a continuing need for transfusion laboratory staff to have appropriate serological knowledge and understanding of specific transfusion requirements to underpin safety provided by automation and IT.