

# Blood transfusion safety: patients at risk from human errors

The annual report from the UK independent confidential haemovigilance reporting scheme – SHOT – was published in July (Bolton-Maggs et al, 2013). This is the 16th year of reporting, and more than 97.8% of NHS organizations in the UK made reports. Hospitals are encouraged to report any adverse incident related to transfusion of blood components, including acute allergic transfusion reactions and other serious clinical outcomes, and also ‘near miss’ events. The cumulative data are shown in *Figure 1*.

## Risks of transfusion

Transfusion is very safe and deaths are fortunately rare. The risk of death from transfusion as estimated from SHOT data in 2012 is about 1 in 320 000 components issued, and for major morbidity about 1 in 21 000 components issued; the risk of transfusion-transmitted infection is much lower. Acute transfusion reactions and transfusion-associated circulatory overload carry the highest risk of morbidity and death (transfusion-associated circulatory overload contributed to six deaths in

2012). The cause of pulmonary complications may be difficult to determine and requires careful investigation.

There were two deaths in 2012 related to haemolysis, one triggered by intravenous immunoglobulin therapy. This is a reminder that this widely used therapy is not without danger. Allergic-type transfusion reactions are the most common adverse event (1 in 7700 components issued). These reactions are unpredictable and are one of the reasons for observing patients carefully during transfusion.

Each year mistakes resulting in wrong transfusions are the most common incidents overall (1 in 2800 components issued). The most dangerous of these, ABO-incompatible red cell transfusion, can result in death or major morbidity with renal failure. These are described by the Department of Health as ‘never events’, since they are caused by mistakes and should never happen. In 2012 there were 12 such events, fortunately with no deaths.

Many people believe that the greatest risk from transfusion is transmission of infection. Serious viral transmissions are

now very rare (ranging from 1 in 3.8 million components issued for hepatitis B, 1 in 28 million for hepatitis C, and 1 in 6.7 million for HIV) although there were three in 2012, reminding us that transfusions should not be given unless clearly indicated (and that indication recorded in the notes together with the beneficial outcome).

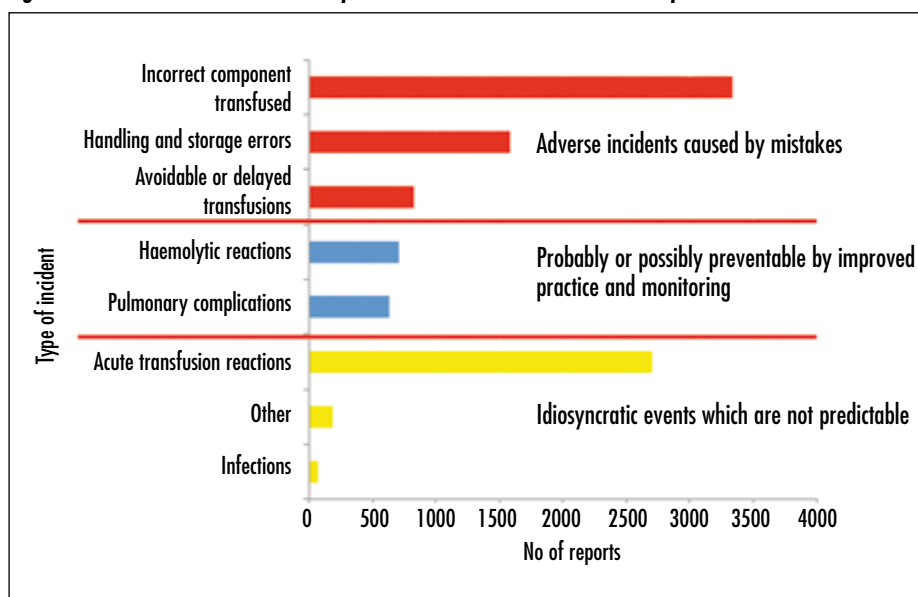
## The importance of checking

Transfusion is a multi-step process involving several different health-care professionals. These include doctors (decision to transfuse, prescription), nurses (blood samples, administration of components), laboratory scientists (sample testing and issue of components), health-care assistants and porters (transporting samples, collection of components from the transfusion laboratory). Each person must take responsibility for the safe completion of his/her own part in the process, and in particular correct identification of the patient.

Each year about a third of all reports to SHOT are about near miss events. These are errors which, if undetected, could result in determination of a wrong blood group or transfusion of a wrong component, but which were recognized before the transfusion took place. Most errors occur because patients are not correctly identified at the time of blood sampling and/or the tubes are labelled away from the patient. Later the final check at the patient’s side when the component is connected for transfusion may not be correctly performed, or neglected entirely.

Many incidents result from multiple errors which could have been detected by the final bedside check. Investigation of near miss events consistently shows that half are sample errors and 90% of these are wrong blood samples (i.e. where the name on the tube is not the name of the patient whose blood is in the tube). Worryingly, doctors are the most common staff group responsible for this (44%), while phlebot-

**Figure 1. Cumulative data for SHOT reports 1996–2012. Total number of reports 11 570.**



omists are rarely responsible (5%), perhaps because they are working in a more controlled setting and doing a single task. SHOT recommends that the same labelling standards should apply to all pathology samples (four identifiers which are first name, family name, date of birth and unique patient number, with zero tolerance for anything less).

## Improving the safety of blood transfusion

The intrinsic safety of blood components has been improved at source, as demonstrated by evidence from SHOT. A reduction in bacterial contamination followed the introduction of diversion of the first few ml of a donation, together with improved skin cleaning techniques for the donor's arm. A reduction in transfusion-related acute lung injury has followed the exclusion of female donors for fresh frozen plasma. However, the rate of events resulting from errors has changed little over the 16 years of reporting. These human factors are not confined to transfusion but are also evident in medication and other medical mistakes. The introduction of a surgical checklist has reduced morbidity and mortality from surgery (Haynes et al, 2009), and SHOT recommends use of a transfusion checklist to remind all those involved to complete the necessary identity checks at all points of the transfusion process.

The appropriateness of every transfusion must be questioned. An audit of blood transfusion in medical patients has identified that up to 25% of transfusions may not be indicated (National Comparative Audit Programme, 2012). Patients were transfused for possible reversible anaemia (e.g. iron deficiency) or above a defined haemoglobin threshold. Transfusion for gastrointestinal haemorrhage has recently been reviewed and better survival and outcome noted with a more restrictive transfusion policy (Villanueva et al, 2013).

In the last few years SHOT has received an increasing number of reports of transfusion-associated circulatory overload. Some of these transfusions were not necessary, others were based on wrong haemoglobin results (for example where the blood count sample was taken from the drip arm) and many were given over too short a time (e.g.

2 hours) in elderly patients. This is a reminder that all patients must be properly assessed before every transfusion, and this is the responsibility of the prescriber. This assessment should identify if the patient has any additional specific requirements, such as the need for irradiated components (e.g. where there is immune deficiency induced by some specific types of chemotherapy). This is commonly missed, putting the patient at risk of transfusion-associated graft *vs* host disease, a lethal complication.

## The importance of communication

SHOT incidents have arisen from poor communication, exacerbated by increasing fragmentation of medical care. Robust communication is essential at handover of patients at shift changes, and when patients are transferred between different wards. Junior doctors may be asked to prescribe transfusions at night for patients who they have not seen before and therefore who are not adequately assessed because of pressure on their time.

As has been emphasized by both Francis (2013) (we need a 'relentless focus on patient safety') and Berwick (2013), patient safety is everybody's business. 'A promise to learn and a commitment to act' apply in all areas of medicine, and certainly in transfusion practice.

## Conclusions

The SHOT recommendations remind all staff involved in transfusion of the importance of correct and positive identification of the patient at every step, careful and accurate labelling of all pathology samples, and the importance of good communica-

tion between different wards and departments, and between hospitals where patients are transferred, to ensure that the patient receives the appropriate component at the right time for a clearly recorded indication. **BJHM**

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## KEY POINTS

- Transfusion of blood and its components should be used only when necessary and appropriate, taking the patient's needs fully into account.
- Patients are at more risk of damage from errors in the transfusion process than from other untoward reactions.
- Correct identification of the patient is essential at every step of the process.
- Good communication between doctors and the transfusion laboratory, and between different departments is essential to ensure specific requirements are met.
- Transmission of viruses by transfusion is very rare.