3 Headline Data: Deaths, Major Morbidity and ABO-Incompatible Transfusions

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Key SHOT messages

- Errors account for 85.5% of all reported incidents (Figure 3.1)
- At each step in the transfusion process, do not assume that errors have not been made in previous steps; verify each step, particularly patient identification
- An increasing proportion of blood components are given to older medical patients with comorbidities. Physicians need to understand and manage risks of transfusion and to know about alternative treatment approaches for anaemia
- Resource allocation is critical: inadequate staffing, lack of training and poor supervision are all likely to be associated with an increased risk of error
- Emergency transfusion saves lives. Do not delay. Do not let the patient bleed to death or die from anaemia
- A culture of accountability (as distinct from blame) is integral to prevention of mistakes. Root cause analyses of all adverse incidents should be thorough and must identify attributable system-related and human factors so that appropriate actions can be instituted

Deaths where transfusion was implicated n=21

Major morbidity n=112

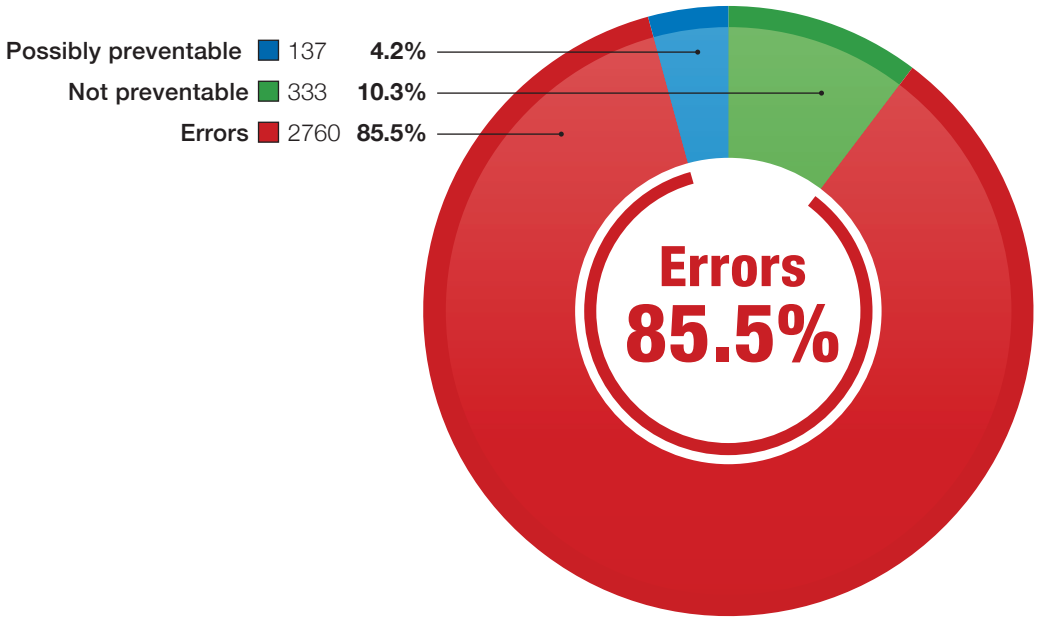


Figure 3.1: Errors account for the majority of reports: 2760/3230

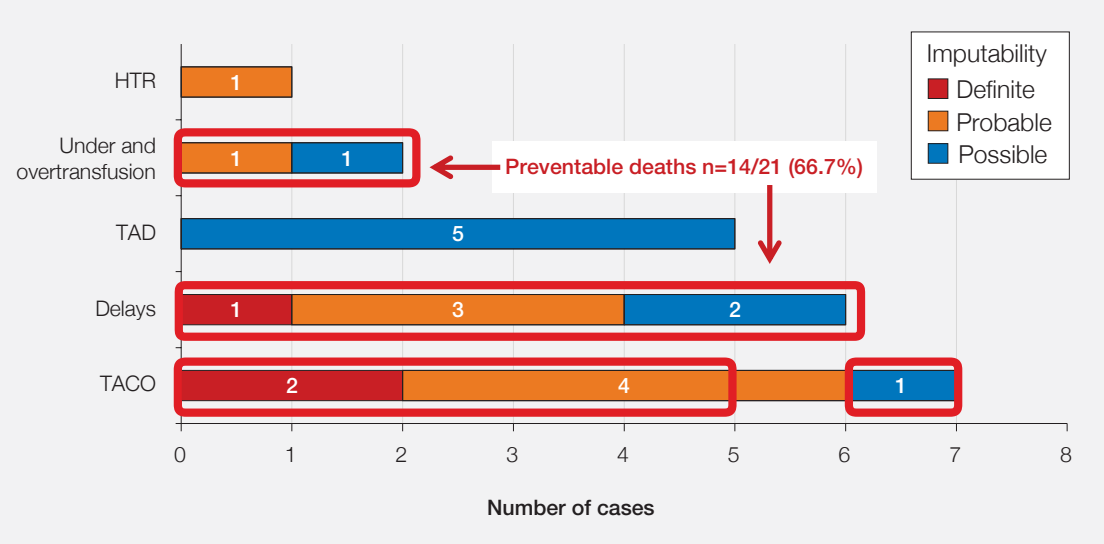


Figure 3.2: Deaths related to transfusion (with imputability) reported in 2017 n=21

HTR=haemolytic transfusion reaction; TAD=transfusion-associated dyspnoea; TACO=transfusion-associated circulatory overload

Most of the deaths attributable to transfusion are associated with delays and TACO. Review of cumulative data shows that pulmonary complications are the leading cause of transfusion-related death, but it is worrying that nearly a quarter were related to delays. In this period (2010-2017) there were two deaths from ABO-incompatible transfusion.

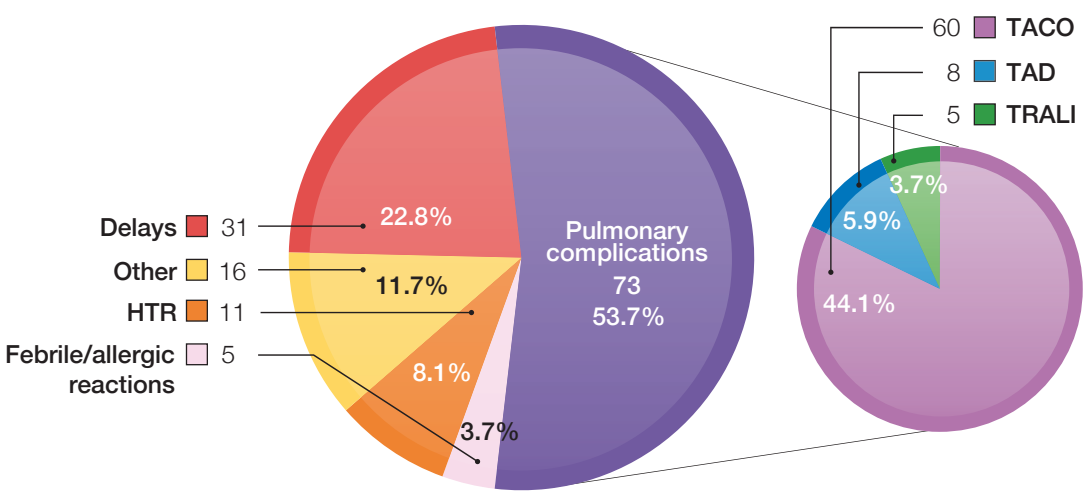


Figure 3.3: Transfusion-related deaths 2010 to 2017 n=136

HTR=Haemolytic transfusion reactions; TACO=Transfusion-associated circulatory overload; TRALI=Transfusion-related acute lung injury; TAD=Transfusion-associated dyspnoea

'Other' includes 1 each for transfusion-transmitted infection, post-transfusion purpura, transfusion-associated graft-versus-host disease and anti-D related; there were 5 in the avoidable, over or undertransfusion category and 7 deaths related to other unclassified reactions

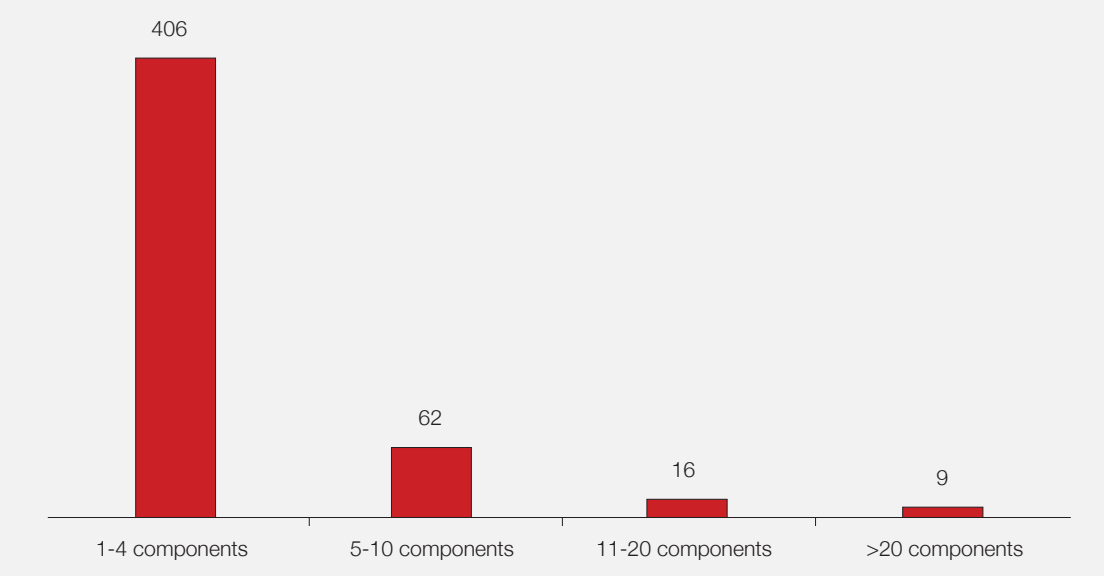
Errors without harm to patients n=1559 (near miss and right blood right patient reports).

Other errors with actual or potential harm n=1201 (handling and storage errors, avoidable and delayed transfusions, anti-D immunoglobulin errors and incorrect blood component transfused); Figure 2.4 in Chapter 2, Participation in UK Haemovigilance Reporting.

Missed irradiation of cellular components where indicated

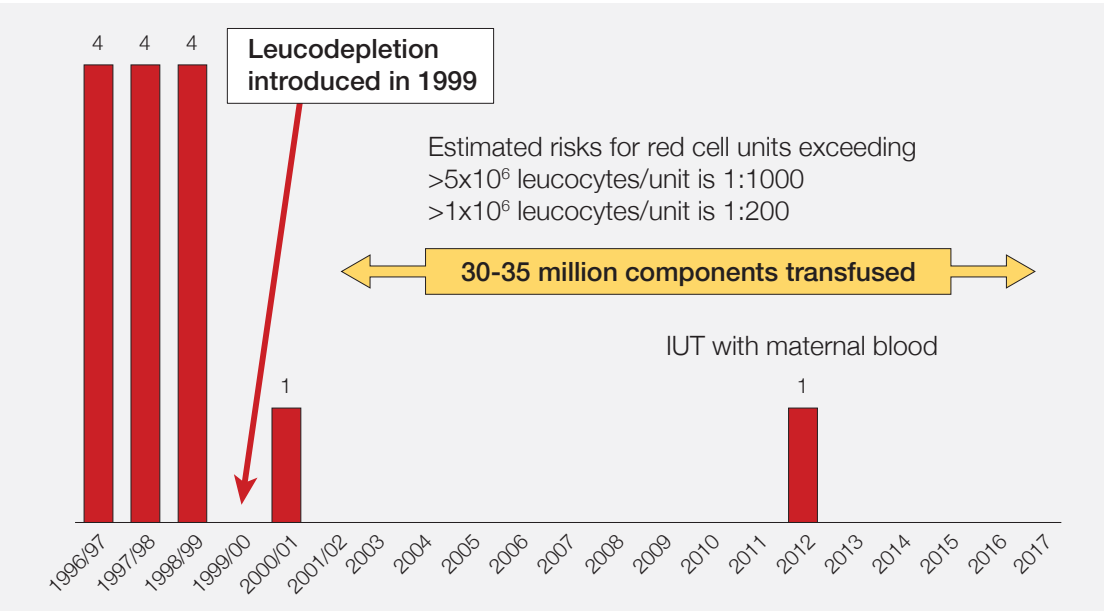
Irradiation of cellular components was missed in 87 patients in 2017. In 77 (88.5%) cases the error was made in clinical areas and 10 in the laboratory. The cumulative number of reports of patients known to have missed irradiation is now 1397 since 1999. Patients were exposed to one or more components. Detailed analysis of 554 reports 2010-2016 established that the range of non-irradiated components transfused was 1 to 486 (a patient with Hodgkin lymphoma). The number of components was not reported for 61 cases (Elliot et al. 2018).

Figure 3.4: Number of components received by individual patients who were exposed to non-irradiated components 2010 to 2016 n=493



There have been no cases of transfusion-associated graft-versus-host disease reported since 2001 in patients who received leucodepleted red cells. Irradiation of cellular components for susceptible patients was introduced several decades ago and guidelines were published in 1996, and revised in 2010 (BSH Treleaven et al. 2010). The case reported in 2012 was caused by an intrauterine transfusion (IUT) with maternal blood (not leucodepleted, not irradiated and human leucocyte antigen (HLA)-related). None of the 13 cases reported up to 2001 occurred in patients with conditions where irradiation was recommended in the guidelines: 6 occurred in patients with B-cell diseases; 3 after cardiac surgery; 2 had no recognised risk factors. Two others were subsequently found to have immune deficiency. At least 4/13 were documented to have shared HLA haplotypes with their red cell donors and two received red cells less than 7 days old.

Figure 3.5: Cases of transfusion-associated graft-versus-host disease reported to SHOT since 1996



IUT=intrauterine transfusion.

Summary data and risks associated with transfusion

Data collected in 2017 are shown in Figure 3.6. Near miss reporting continues to teach valuable lessons and contributed to 1359 (42.1%) of the total 3230 reports.

Cumulative data for 21 years are shown in Figure 3.7.

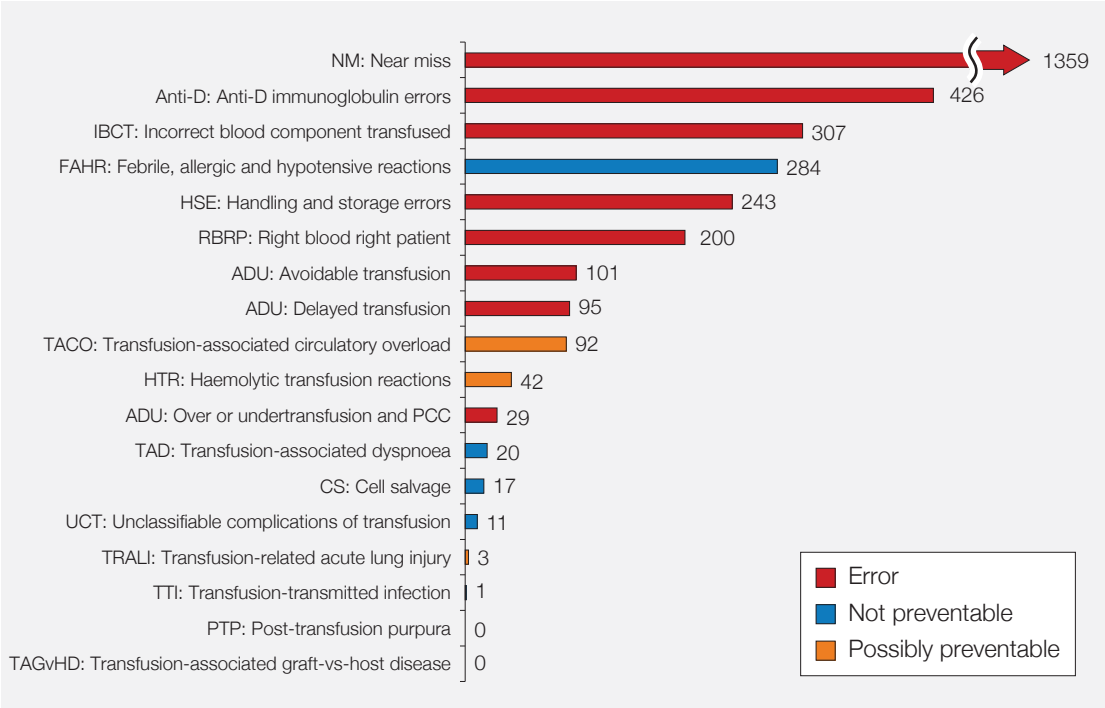


Figure 3.6: Summary data for 2017 all categories n=3230 (ranked by number)

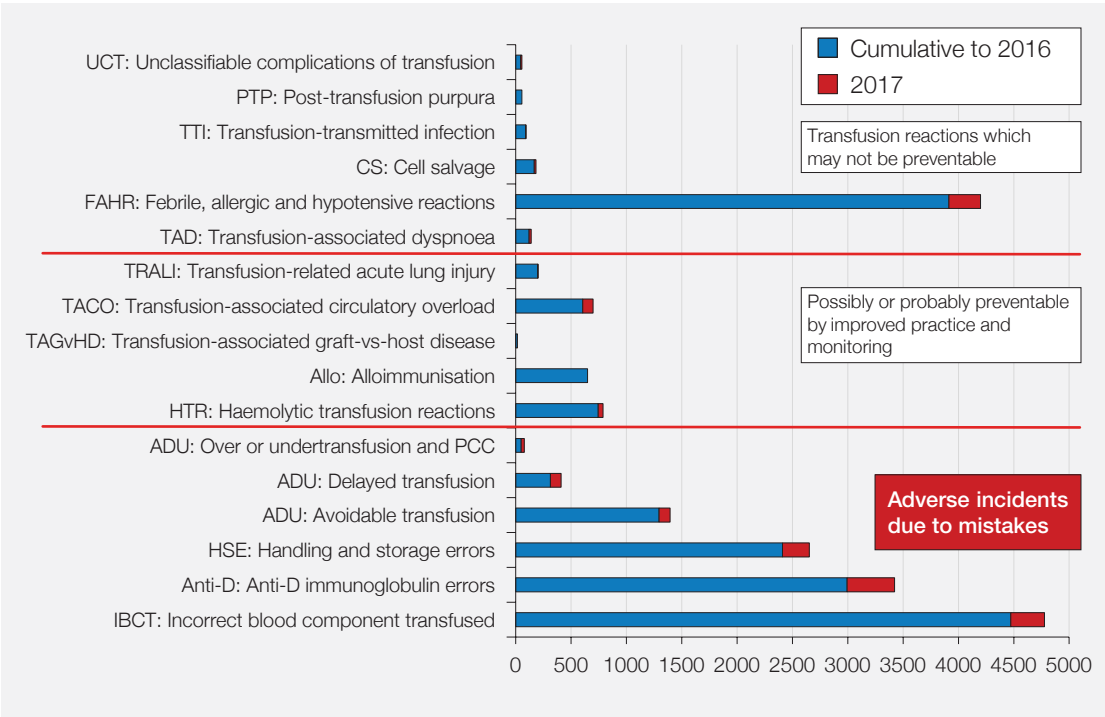


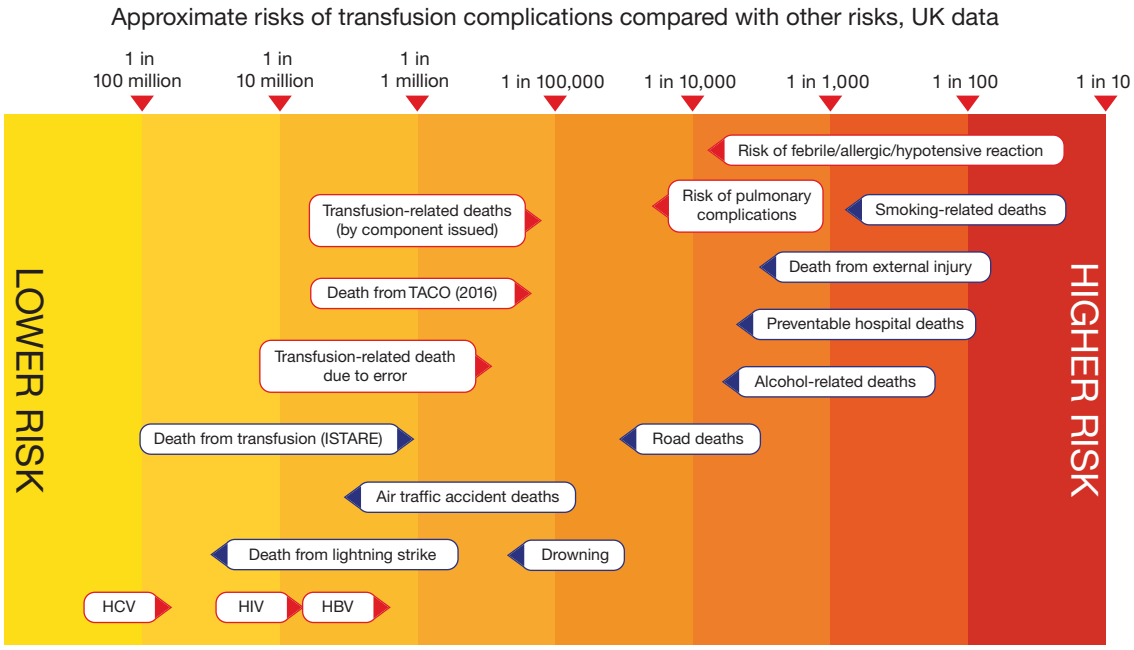
Figure 3.7: Cumulative data for SHOT categories 1996 to 2017 n=19815

Risks for transfusion are calculated per 100,000 components issued. This translates into a risk of death close to 1 in 114,000 and of serious harm close to 1 in 21,000. These risks are considered in relation to other risks of daily living in Figure 3.8. The risks of transfusion-transmitted infection are much lower than all other transfusion-related complications.

Table 3.1: Risks of death or major morbidity from transfusion in 2017

Total morbidity	4.67 per 100,000 components issued	1 in 21,426
Total mortality	0.88 per 100,000 components issued	1 in 114,273

Figure 3.8: Risks associated with transfusion compared with other potential life events



Sources of data: Many of these are found online in the UK office for national statistics. Red outline indicates SHOT data, blue outline indicates data from other sources. ISTARE is the International Haemovigilance Network database for the surveillance of adverse reactions and events in donor and recipients. Viral transmissions denote risk of infection, not deaths. HCV=hepatitis C virus; HIV=human immunodeficiency virus; HBV=hepatitis B virus. A full list of sources is available in supplementary information on the SHOT website www.shotuk.org.

ABO-incompatible red cell transfusions n=1

A single ABO-incompatible red cell transfusion was reported in 2017. This was a clinical administration error due to failure to complete the bedside check and is fully described in Chapter 10, Incorrect Blood Component Transfused (IBCT) (Case 10.2). The patient suffered some symptoms but recovered fully.

The trend over time towards reduced numbers of (potentially lethal) ABO-incompatible red cell transfusions is encouraging (Figure 10.2). However, review of near miss data shows that these are the tip of a much larger iceberg. Data for 2016 and 2017 show that although there were 4 ABO-incompatible red cell transfusions there were 606 near misses where an ABO-incompatible transfusion would have resulted. Most of these in 2017, 317/342, resulted from wrong blood in tube (WBIT) errors. These will not be detected unless there is a previous record in the transfusion laboratory and demonstrate the importance of the group-check policy (BSH Milkins et al. 2013). In reports of WBIT samples, the majority of institutions (77.4%) had this policy in place and 215 instances of WBIT were detected as a result of this (Chapter 12, Near Miss Reporting). These errors, which could have lethal outcomes, demonstrate the importance of correct patient identification at the time of sampling, and also the correct full completion of the final bedside check (a rule not a guideline, see Chapter 4, Key Messages and Recommendations).

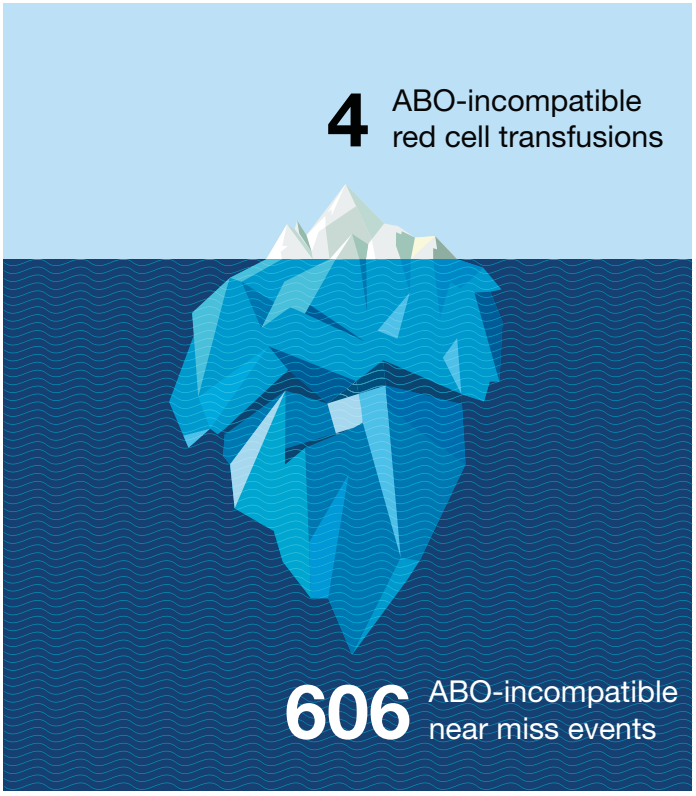


Figure 3.9: ABO-incompatible red cell transfusions 2016 and 2017

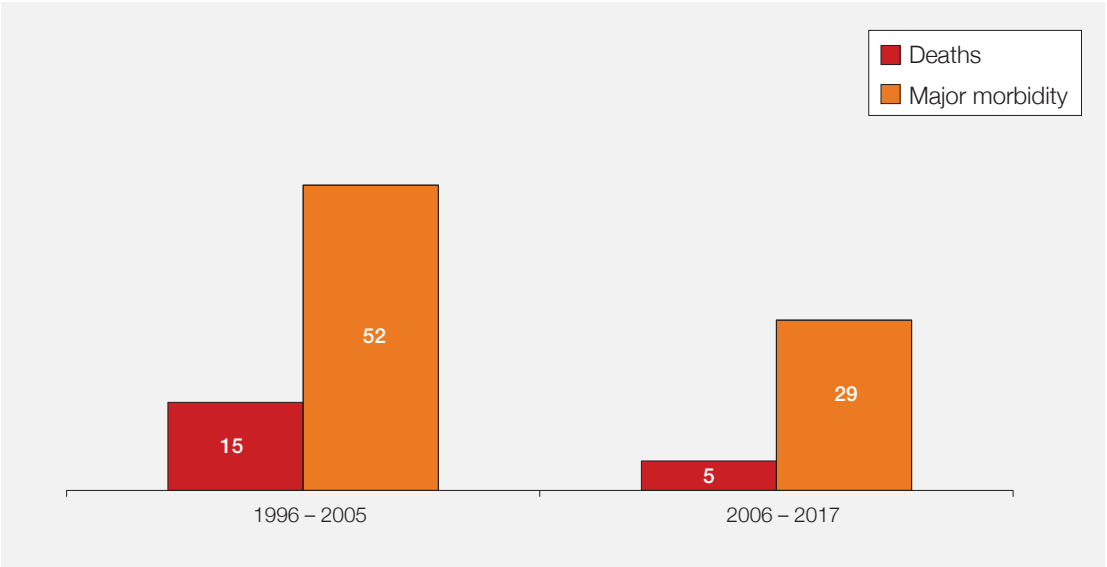


Figure 3.10: Reduction of ABO-incompatible transfusion of red cells resulting in death or major morbidity over two decades of SHOT reporting

In addition to the single ABO-incompatible red cell transfusion in 2017, there were 4 inadvertent transfusions of ABO-incompatible fresh frozen plasma and two of platelets; no harm resulted.

These incidents and others described in previous years demonstrate that staff involved in transfusion do not check compatibility properly at the time of transfusion. Staff must not assume that the bag in their hands is necessarily safe. Compatibility check is one of the essential steps in the bedside check (BSH Robinson et al. 2018, DH 2017).

References

BSH Milkins C, Berryman J et al. Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories. *Transfus Med* 2013;**23(1):**3-35. http://onlinelibrary.wiley.com/doi/10.1111/j.1365-3148.2012.01199.x/full [accessed 21 February 2018].

BSH Robinson S, Harris A et al. The administration of blood components: a British Society for Haematology Guideline. *Transfus Med* 2018;**28(1):**3-21. http://onlinelibrary.wiley.com/doi/10.1111/tme.12481/full [accessed 26 February 2018].

BSH Treleaven J, Gennery A et al. Guidelines on the use of irradiated blood components prepared by the British Committee for Standards in Haematology blood transfusion task force. *Br J Haematol* 2010;**152(1)**:35-51.

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Elliot J, Addison J et al. Outcome of failure to irradiate cellular components: a retrospective review of SHOT reports 2010-2016. *Br J Haematol* 2018;**181 (Suppl. 1)**:143.