A036

Transfusion Reaction Investigation EQA, a six-year review

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Introduction

Transfusion reaction (TR) is a serious complication that can occur after a blood transfusion[1]. To ensure patient safety during a blood transfusion, it is crucial for the trained-staff to recognise, investigate and manage transfusion reactions correctly.

In 2014, the RCPAQAP introduced an additional Transfusion Reaction Investigation (TRI) challenge in their General Compatibility Module (with the exception of 2015).

Aim

To review how well participants recognised transfusion reactions and if they had appropriate measures in place to carry out the relevant follow-up investigations.

Method

A review of RCPAQAP survey returns for TRI over a 6-year period was undertaken. Participating laboratories were provided with whole blood aliquots and asked to perform TRI in accordance to their standard protocols. Samples were dispatched in EDTA tubes, with 15 – 20% red cells suspended in plasma and Celpresol™.

The surveys included a pre-transfusion sample, a post-transfusion sample and two donor unit samples. Participants were asked to perform routine blood grouping and antibody screening on the pre-transfusion sample and to crossmatch the two donor units against the pre-transfusion sample.

In addition, participants were provided with a clinical scenario on the patient's post-transfusion outcome (e.g. haematuria) and asked to perform their own TRI using the samples provided.

The participants were scored on patient identification, blood grouping, antibody screening, direct antiglobulin test (DAT) , crossmatches and transfusion decisions; however, elution studies were not scored.

The returned results were analysed and reviewed by the RCPAQAP Transfusion team and RCPAQAP Transfusion Advisory Committee prior to release. The survey target values are not defined from the statistical analysis, but are based on the clinical scenarios selected by the program's Advisory Committee.

Results and Discussion

Table 1. Number of participants who have conducted TRI and the percentage of laboratories that have successfully identified the correct targets.

Year	Program	Direct Antiglobulin Test (DAT)	Elution Result	Eluate Identification
2014	AGAB2014-3	402 (98%)	234 (99%)	235 (96%)
2016	AGAB2016-3	423 (98%)	307 (91%)	213 (98%)
2017	AGAB2017-1	419 (90%)	295 (89%)	260 (97%)
2018	AGAB2018-3	414 (98%)	286 (70%)	239 (100%)
2019	AGAB2019-1	431 (95%)	309 (69%)	284 (99%)

i. Direct Antiglobulin Test (DAT)

DAT is a part of scored assessment criteria in the RCPAQAP Transfusion surveys and overall labs performed well (≥ 90% correct responses) across surveys (Table 1). Although a positive DAT alone may not be clinically significant, it is often associated with acute and delayed haemolytic transfusion reactions. DAT is recommended for patients with suspected haemolysis to distinguish immune from non-immune haemolysis (Table 2)[1].

ii. Elution

Table 1 shows a decline in performance for elution results over the 6-year period. Elution dissociates antibodies from sensitised red cells consequently allowing the recovery of bound antibodies in a usable form for further investigation. This segment is not mandatory in the RCPAQAP Transfusion surveys and subsequently not scored.

iii. Eluate Identification

An average of 98% of laboratories who successfully completed the elution subsequently correctly identify the related antibodies coating the red cells (Table 1). This segment was also not scored by the RCPAQAP Transfusion.

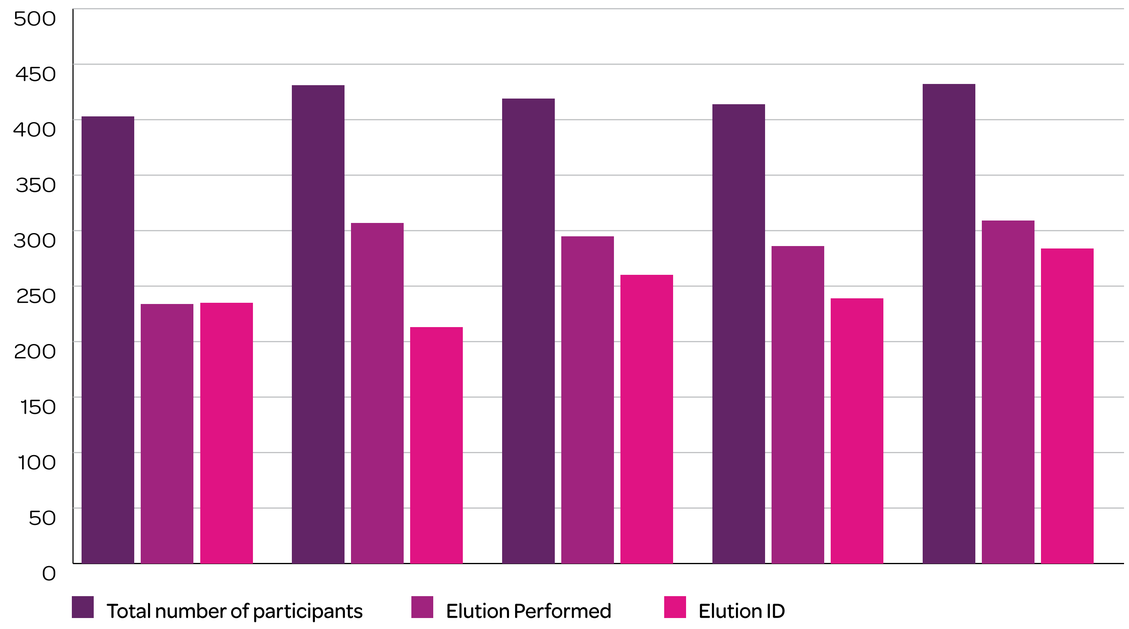

Figure 1. Number of participating laboratories in the RCPAQAP Transfusion General Compatibility Module and their rate of conducting TRI.

Since the introduction of Transfusion Reaction Investigation as a scenario in the General Compatibility Module back in 2014, the number of participants enrolling in the RCPAQAP Transfusion program has been consistent (average 420 pa) demonstrating the need for this type of external quality assurance program which is unique to RCPAQAP (Figure 1).

Table 2. Categories and follow-up tests after Adverse Transfusion Reactions[2].

Type	Incidence	Cause	Clinical Presentation	Diagnostic Tests
Haemolytic Mismatch 1:40,000	ABO/Rh incompatibility	Red cell	• Chills • Pyrexia • Hypotension • Haemoglobinuria • Back pain • Renal failure • Disseminated intravascular coagulation	• Patient ID check (clerical) • DAT (followed by elution studies) • Visual inspection (check for haemolysis/free haemoglobin), • Repeat patient group and antibody screen on pre-transfusion and post-transfusion samples • Biochemistry (bilirubin, lactate dehydrogenase)

Significant adverse reactions after a blood transfusion must be reported to the blood bank/transfusion medicine laboratory immediately. It is crucial that the laboratory staff appropriately investigate the cause by conducting relevant laboratory tests[2].

To correctly rule out an acute haemolytic transfusion reaction, the diagnostic tests listed in Table 2 should be carried out. Based on the return rates in Figure 1, not all laboratories are routinely performing elution studies, however, this is improving (from 58% to 72% between 2014 and 2019). Similarly, the proportion of laboratories following through with the eluate identification has increased as well.

It is important to recognise that not every participating laboratory is equipped with elution kits, however laboratories that do perform elutions as part of their routine work should be undertaking elution studies where required in the Transfusion RCPAQAP even though the elution components are not a scored criteria in the current RCPAQAP Transfusion General Compatibility Programs.

Conclusion

This review demonstrated the value of a transfusion reaction investigation component in a Transfusion QAP. While most participating laboratories demonstrated satisfactory performance in DAT, we recommend a greater uptake in elution studies be considered where the technology is available.

References
1. Tinegate H, Birchall J et al. Guideline on the investigation and management of acute transfusion reactions Prepared by the BCSH Blood Transfusion Task Force. (2012).
2. Roback J, Grossman B et al. AABB Technical Manual (17th Ed). (2011).