10. Adverse Events Relating to Anti-D Immunoglobulin (Anti-D)

Definition

An adverse event relating to anti-D immunoglobulin is defined as relating to the prescription, administration or omission of anti-D immunoglobulin that has the potential to cause harm to the mother or fetus immediately or in the future.

DATA SUMMARY

Total number of cases	**241**	*Implicated components*		*Mortality/morbidity*	
		Red cells	**0**	Deaths due to transfusion	**0**
		FFP	**0**	Deaths *probably/likely* due to transfusion	**0**
		Platelets	**0**	Deaths *possibly* due to transfusion	**0**
		Anti-D Ig	**241**	Major morbidity	**1**
		Unknown	**0**	*Potential for major morbidity*	**165**

Gender		*Age*		*Emergency vs. routine and core hours vs. out of core hours*		*Where transfusion took place*	
Male	**0**	≥18 years	**235**	Emergency	**0**	A&E	**0**
Female	**241**	16 years to <18 years	**4**	Routine	**0**	Theatre	**0**
Not known	**0**	1 year to <16 years	**2**	Not known	**241**	ITU/NNU/HDU/recovery	**0**
		>28 days to <1 year	**0**				
		Birth to ≤28 days	**0**	In core hours	**41**	Wards	**185**
		Not known	**0**	Out of core hours	**10**	Community	**56**
		Total	**241**	Not known	**190**	Outpatient/day unit	**0**
						Not known	**0**

This section describes the main findings from 241 completed questionnaires. The reports are broken down into the reporting categories shown in Table 34. Under current legislation,[1] adverse events related to the administration of anti-D Ig are reportable as 'SHOT-only'. Clinical reactions to anti-D Ig are reportable via the MHRA 'yellow card' system.

Mortality *n* = 0

There was no known fetal mortality following the omission or delay in administration of anti-D Ig, but these data have not been systematically reported or collected.

Potential for major morbidity *n* = 165

In 165 of the 241 cases anti-D Ig was administered more than 72 hours following a potentially sensitising event (PSE) or omitted altogether, resulting in the potential for sensitisation of the patient to the D antigen. This satisfies the current SHOT definition of potential major morbidity. In 1 case an RhD negative patient aged 18 years was reported to have become sensitised after receiving RhD positive platelets during a trauma-associated transfusion, for which no anti-D prophylaxis was administered.

Figure 7
Cumulative data regarding adverse events relating to anti-D Ig

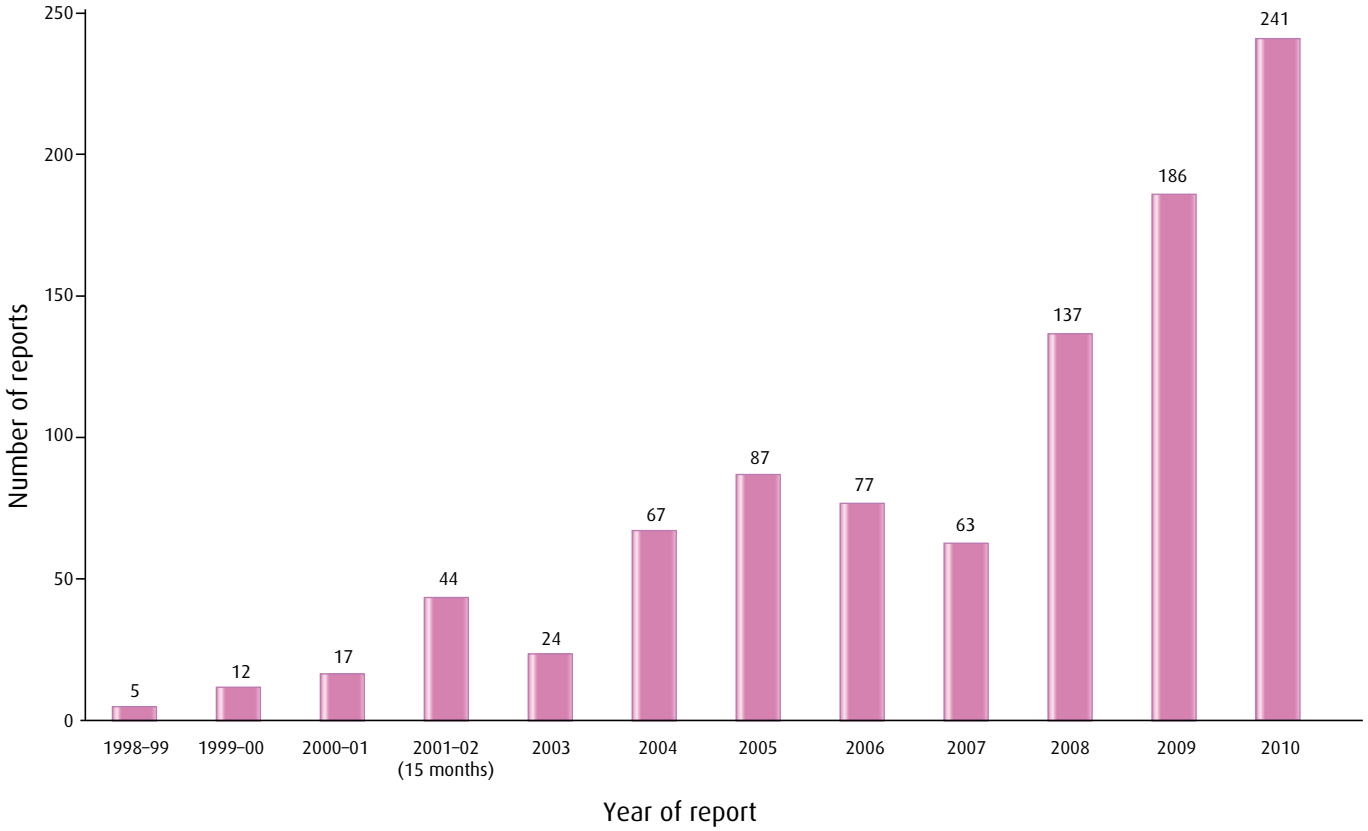

Table 34
Reporting categories of adverse events relating to anti-D Ig

Category of adverse event	No. of cases
Omission or late administration of anti-D Ig	166
Inappropriate administration of anti-D Ig	59
to an RhD positive patient *to a patient with immune anti-D* *to a mother of an RhD negative infant* *given to the wrong patient*	*26* *17* *8* *8*
Wrong dose of anti-D Ig given according to local policy	12
HSE relating to anti-D Ig	4
Total	**241**

Clinical vs. laboratory errors

For the reporting year 2010, 241 events relating to anti-D Ig administration are summarised in Table 35, with a breakdown of the proportion of clinical and laboratory errors that were primarily responsible.

The distribution of cases has in past years reflected general SHOT findings that around 2/3 of reports involve errors by clinical staff and 1/3 laboratory staff. This year, as in 2009, clinical errors accounted for 79% of the total reports relating to administration of anti-D Ig.

Table 35
Adverse incidents involving anti-D Ig administration, with site of primary error

Type of event	Cases	No. of primary errors		
		Midwife	Laboratory	Doctor
Omission or late administration of anti-D Ig	**166**	139	21	6
Anti-D Ig given to RhD positive patient	**26**	13	11	2
Anti-D Ig given to patient with immune anti-D	**17**	9	8	0
Anti-D Ig given to mother of RhD negative infant	**8**	4	4	0
Anti-D given to wrong patient	**8**	7	0	1
Wrong dose of anti-D given	**12**	4	6	2
Anti-D Ig HSE	**4**	2	1	1
Total	**241**	178	51	12

Omission or late administration of anti-D Ig *n* = 166

In 139/166 cases the primary error was made by a midwife. Forty-six cases occurred in the community and 120 in a hospital setting. As in last year's report, there are multiple examples where anti-D Ig has been issued by the laboratory only to be found days or weeks later in maternity fridges, indicating a failure of the discharge checklist and possibly a lack of understanding by some clinical staff of the time limits within which anti-D Ig must be administered.

Case 1
Mis-transcribed group results in omission of prophylaxis
A patient's RhD group was mis-transcribed as positive on the front of her notes, even though all grouping reports from the laboratory clearly stated that the patient was RhD negative. The discrepancy was noted at delivery, but the patient had missed out on any anti-D prophylaxis during her pregnancy.

Case 2
Cord blood group allocated to wrong computer record, resulting in delay in administration
A cord blood group was correctly tested as RhD positive, but the result was erroneously uploaded to the maternal record on the laboratory computer system by a shift BMS who did not normally work in transfusion. The error was only spotted when the clinical area enquired as to why there was no cord group available and why the maternal group was now showing as RhD positive.

Case 3
Change in laboratory reporting procedure results in significant delays in administration of RAADP
A laboratory changed the mechanism of reporting blood groups from paper forms to an electronic system. The community midwives had relied on the paper reports to generate appointment lists for RAADP, but the change in procedure resulted in a series of 15 reports regarding patients whose RAADP was delayed by anything from 1 to 10 weeks, and in 1 case omitted altogether. The laboratory now produces a regular paper list of RhD negative antenatal patients for the midwives.

This case highlights the need for a formal change control process involving all stakeholders when making changes to laboratory procedures.

Case 4

Lack of knowledge around RAADP results in omission of anti-D Ig dose in response to a PSE

A RhD negative patient presented on the labour ward with a significant per vaginam (PV) bleed at 35 weeks' gestation, but the SpR on duty refused to administer anti-D Ig as they were under the impression that RAADP covered all sensitising events up to delivery.

Case 5

Lack of knowledge around anti-D prophylaxis results in omission of routine antenatal anti-D Ig dose

A 1500 iu dose of anti-D Ig was issued to a GP surgery for use as RAADP at 28 weeks' gestation. The anti-D Ig was returned unused as the patient had previously received prophylaxis for a PSE while in hospital and the midwives thought the further dose was not necessary.

Learning point

- Anti-D Ig must still be administered in response to a PSE even if the patient has received, or is due to receive, RAADP. RAADP must still be administered at the appropriate time, even if the patient has recently received anti-D prophylaxis for a PSE.

Inappropriate administration of anti-D Ig *n* = 59

This group is further subdivided into four categories.

Anti-D Ig given to RhD positive patients *n* = 26

Overall 15/26 errors were clinical: 13 by midwives and 2 by a doctor. Eleven of the 26 primary errors arose in the laboratory. Of the 26 errors, 24 were made in the hospital setting and 2 in the community.

Case 6

Anti-D Ig issued to a patient on the basis of an old result and rapid confirmatory test

Anti-D Ig was issued by the laboratory on the basis of an RhD negative grouping result from 10 years earlier, confirmed by a rapid spin test on the current sample. Routine grouping of the sample later showed that the patient was weak RhD positive.

The patient in this case received anti-D Ig, which was undoubtedly the correct outcome, but this case highlights the inappropriate use of manual spin tests, which have repeatedly been demonstrated to be less robust than routine laboratory testing.

Case 7

Failure to check the computer record results in inappropriate administration of anti-D Ig

A midwife misread the laboratory grouping report and made a verbal request for 1500 iu anti-D Ig following a PSE. The BMS on duty did not check the patient's LIMS record and issued the anti-D Ig, which was subsequently administered to a patient known to be RhD positive.

Case 8

Anti-D Ig administered without checking the patient's blood group

A consultant 'thought that the patient was RhD negative' and prescribed 500 iu anti-D Ig following a PSE. The anti-D Ig was issued from a remote clinical stock and administered. At no point in the process was the blood group report ever checked – it showed clearly that the patient was RhD positive.

Case 9

Manual entry of grouping results onto LIMS results in inappropriate administration of anti-D Ig

A patient was correctly grouped in the laboratory as A RhD positive, but the result was manually entered onto the LIMS as A RhD negative; 1250 iu anti-D Ig was issued on the basis of this result and administered to the patient. The grouping discrepancy was only noted after patient discharge when the laboratory report was being filed in the notes, which already contained reports stating the patient was RhD positive.

Case 10

Mis-filed laboratory reports lead to inappropriate administration of anti-D Ig

A traceability record returned to the laboratory indicated that 250 iu anti-D Ig had been issued by a gynaecology ward from clinical stock to a patient known to be RhD positive. It emerged that a grouping report from an RhD negative patient had been wrongly filed in the notes.

Anti-D Ig given to patients with immune anti-D *n* = 17

Of these 17 reported cases 9 resulted from a primary clinical error and 8 from a laboratory error.

- 13/17 occurred in the hospital setting and 4/17 in the community.
- 4/8 of the laboratory errors involved failure to consider that a strongly positive antibody screen could have been from immune anti-D rather than assuming that it must be prophylactic anti-D.
- 2/8 of the laboratory errors involved failure to consult the patient's computer record prior to issue.
- 2/8 of the laboratory errors involved staff who had inadequate knowledge around the issue of anti-D Ig. One was a non-transfusion BMS who offered poor advice to the clinical team, and the other was an unsupervised medical laboratory assistant (MLA) who issued 1500 iu anti-D Ig for RAADP to a patient known to have immune anti-D.
- 7/9 clinical errors involved issue of anti-D Ig from stocks held in the clinical area, outside of laboratory. control.
- 2/9 clinical errors resulted from a community midwife admitting not reading the laboratory grouping report.

Case 11

Misreading the computer record leads to false assumption and inappropriate issue of anti-D Ig

Anti-D Ig was requested following a miscarriage. A grouping sample was sent, which showed a positive antibody screen, identified as anti-D. The BMS misread the laboratory computer record, which indicated that the patient had received anti-D prophylaxis during a previous pregnancy some four years earlier, assumed it applied to the current pregnancy and proceeded to issue the anti-D Ig.

Case 12

Disregard of instructions results in inappropriate administration of anti-D Ig

500 iu anti-D Ig was issued from clinical stock for a patient known to already have immune anti-D. The lead midwife had written clear instructions in the notes that anti-D Ig was not to be given to this patient under any circumstances.

Anti-D Ig given to mothers of RhD negative infants *n* = 8

Four of these errors originated in the clinical area and 4 in the laboratory. All 8 occurred in the hospital setting.

- 2/4 laboratory errors involved inappropriate issue of anti-D Ig by a lone worker BMS on shift duty.
- 2/4 laboratory errors involved mis-transcription of cord grouping results on manual entry to the LIMS.
- 4/4 clinical errors involved inappropriate issue from stock held in the clinical area: 3 where the laboratory report was not consulted even though it was available, and 1 case where a positive cord direct antiglobulin test (DAT) result was misinterpreted as the RhD group.

Case 13

Manual entry of results onto the laboratory computer system leads to inappropriate administration of anti-D Ig

A cord sample was received and grouped (correctly) by a BMS as AB RhD negative, but during manual entry of the blood group into the laboratory computer the result was mis-transcribed as AB RhD positive. There was no double check of the group entry, and 1500 iu anti-D Ig was subsequently issued on the basis of the computer record.

Case 14

Failure to take account of the laboratory report results in inappropriate administration of anti-D Ig

Twins were born to an RhD negative mother and both were grouped (correctly) as RhD negative. The laboratory report was available on the ward for over 24 hours, but midwives still administered 500 iu anti-D Ig to the mother from stock held in the clinical area.

Anti-D Ig given to the wrong patient *n* = 8

These were exclusively clinical errors, involving failure to identify the correct patient. Of the 8 cases, 7 occurred in the hospital setting and 1 in the community.

Case 15

Bedside check performed in the clinic room

Anti-D Ig had been correctly issued by the laboratory for a named post-natal patient. Two qualified midwives performed the bedside check in the ward clinic room, then one went onto the ward and administered the anti-D Ig to a completely different patient, without any further checks.

Case 16

No checks performed in theatre

Anti-D Ig had been issued for a named patient on a gynaecology theatre list. An anaesthetist administered the anti-D Ig to the wrong patient on the list, without making any ID or blood group checks.

Wrong dose of anti-D Ig given *n* = 12

Four of the 12 errors were by midwives, 6 errors occurred in the laboratory, 1 was an incorrect verbal report by a NHSBT consultant and 1 was an incorrect prescription by a medical officer. Ten cases occurred in hospital and 2 in the community.

Case 17

Incorrect prescription results in inadequate dose of anti-D Ig

The laboratory reported a raised transplacental haemorrhage (TPH) of 13.5 mL, for which a 1750 iu dose of anti-D Ig was indicated. The laboratory issued 1 × 1500 iu, and 1 × 250 iu. The attending medical officer wrote a prescription for only 750 iu, and the midwives administered half of the 1500 iu vial, returning the rest to the laboratory. By the time the mistake was realised, and the rest of the anti-D Ig re-issued and administered, more than 72 hours had elapsed.

Case 18

Use of old laboratory SOP results in excessive administration of anti-D Ig

The laboratory reported a raised TPH of 11 mL, for which a 1375 iu dose of anti-D Ig was indicated. The laboratory SOP contained a table indicating numbers of vials of anti-D Ig required to make up a range of doses. However, this table was based on 1250 iu vials, which were no longer stocked by the laboratory and had been replaced by 1500 iu vials. The SOP had not been updated, and this resulted in the issue of 2 × 1500 iu anti-D Ig when a single vial would have been sufficient.

Case 19

Incorrect verbal report results in excessive administration of anti-D Ig

An NHSBT reference laboratory reported a fetomaternal haemorrhage (FMH) result of 183 mL, requiring 18,300 iu anti-D Ig to be given intravenously (IV). The anti-D Ig was administered by the hospital, but the NHSBT consultant later telephoned to say that the result given was in fact the hospital's own Kleihauer figure submitted to the reference laboratory. The correct FMH result was 130 mL, so the patient had received 5000 iu anti-D Ig more than necessary.

Case 20

Lone worker BMS issued insufficient anti-D Ig

A BMS working a night shift issued 250 iu instead of 500 iu anti-D Ig for a patient with a PV bleed at 22 weeks. Anti-D Ig issue is subject to double checking during normal working hours, but not out of hours.

HSE relating to anti-D Ig *n* = 4

Three of the 4 errors occurred in the clinical area and 1 was a laboratory error. Three errors occurred in a hospital and 1 in the community.

Case 21

Incorrect route of administration

A consultant in theatre administered 250 iu anti-D Ig IV rather than intramuscularly (IM).

Case 22

Incorrect paperwork issued with anti-D Ig

A laboratory issued 3 doses of anti-D Ig for RAADP with the incorrect batch number on all the paperwork. The discrepancy was not noted in the clinical area and the anti-D Ig was administered.

Case 23

Anti-D Ig stored inappropriately on a ward

A patient due to receive anti-D Ig discharged herself before it could be given. The midwives failed to return the unused vial to the laboratory, but kept it in an unspecified location on the ward. It was administered to the patient when she returned 1 month later.

COMMENTARY

The number of cases reported to SHOT under the anti-D Ig category has increased again in 2010. This represents the continuation of an upward trend in reporting since SHOT reporting commenced in 1996 (see Figure 7), and probably indicates an increasing awareness of the need to report rather than a decline in standards of practice.

Recurring themes in the 241 cases analysed this year include the following:

- Patient ID checks are not being performed at all stages of the process.
- There is evidence of incorrect information, misunderstanding and incorrect transcription when results are telephoned, and a robust recording and readback system needs to be in place for both giving and receiving results.
- Transcribing blood grouping results onto care plans or the front of notes is not a secure way of recording results.
- There is a general lack of understanding of the principles around anti-D Ig prophylaxis and the need to still cover sensitising events following RAADP.
- Decision-making regarding issue of anti-D Ig by laboratory staff lacking relevant knowledge and experience.

- Failure to consult the historical group and/or antibody results on the laboratory IT record before issue of anti-D Ig.
- Issue of anti-D Ig outside the relative security of the laboratory IT system.
- Poor advice given by midwives to patients in six cases regarding the need for anti-D Ig following PSEs.
- Clinical staff not reading or misreading laboratory reports before making treatment decisions.
- Inappropriate administration from stocks of anti-D Ig held in the clinical area outside of laboratory control.
- Laboratory reports need to be clearer with respect to the need for anti-D Ig prophylaxis.
- The use of rapid techniques for D typing, which are clearly not robust.
- The inappropriate use of the Kleihauer test to decide whether or not anti-D Ig needs to be given in the first place.

It is pleasing to note from comments made in 3 case analyses that hospitals are beginning to risk-assess the requirement to maintain stocks of anti-D Ig in the clinical area, away from laboratory oversight, but it is still clear that inappropriate issue of anti-D Ig from remote stocks continues to occur.

Engagement between clinical and laboratory areas is still lacking, illustrated by the change in the format of laboratory reports from paper to electronic by one department that resulted in significant problems for midwives generating follow-up appointments, and now necessitates the laboratory producing a separate paper list of patients eligible for RAADP.

Recommendations

- All healthcare professionals involved in the issue and administration of anti-D Ig must complete the anti-D modules in the Learn Blood Transfusion e-learning programme.

  Action: Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of General Practitioners

- If there is any doubt as to the true RhD status of a patient, or whether anti-D detected in an antibody screen is of immune or prophylactic origin, and these questions cannot be quickly resolved, then prophylactic anti-D Ig should be administered rather than place the patient at risk by withholding it.

  Action: HTCs

For active recommendations and an update on their progress, please refer to the SHOT website.