25 Anti-D Immunoglobulin (Ig) Incidents n=359

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Definition:

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

A total of 389 case reports involving anti-D Ig were submitted via the SHOT online reporting database in 2014. Of these 30 were withdrawn because they did not meet the criteria for anti-D reporting, or were perfectly reasonable decisions made on the information available at the time.

359 case reports, each involving 1 individual, were considered in the final analysis.

The reports are broken down into the reporting categories shown in Table 25.1.

Adverse events related to the prescription and administration of anti-D Ig are not required for the European Union (EU) and so are reportable as 'SHOT-only' (BSQR 2005). Clinical reactions to anti-D Ig are reportable to the Medicines and Healthcare products Regulatory Agency (MHRA) 'Yellow Card' system.

From January 2013 SHOT has been conducting a study to look at women who have produced immune anti-D that is detectable for the first time in the current pregnancy and an analysis of the data collected to the end of December 2014 is included in Chapter 13 Anti-D Immunoglobulin – Prescription, Administration and Sensitisation.

Key SHOT messages

- It does not matter whether staff follow British Committee for Standards in Haematology (BCSH), National Institute for Health and Care Excellence (NICE) or a combination, as long as the Trust/ Health Board has a robust, consistent policy agreed by all stakeholders. Adoption of the SHOT anti-D flowchart has been recommended by the British Committee for Standards in Haematology (BCSH) and the Royal College of Obstetricians and Gynaecologists (RCOG)
- Anti-D Ig must be made readily available for administration to women when they present with potentially sensitising events, rather than putting the onus on them to return for the injection at a later date

Table 25.1: Reporting categories

Category of adverse event	Number of cases	
Omission or late administration of anti-D Ig	273	
Inappropriate administration of anti-D Ig - Total	66	
to a D-positive woman		*24*
to a woman with immune anti-D		*16*
erroneously to a mother of a D-negative infant		*14*
given to the wrong woman		*12*
Wrong dose of anti-D Ig given according to local policy	16	
Handling and storage errors relating to anti-D Ig	4	
Total	**359**	

Deaths n=0

There were no reported fetal deaths following the omission or delay in administration of anti-D Ig.

Major morbidity n=4

There were 3 cases where a woman developed an immune anti-D following delay or omission of prophylaxis during the current pregnancy.

In one case immune anti-D was wrongly assumed to be prophylactic and so the pregnancy continued unmonitored, resulting in a severe case of haemolytic disease of the fetus and newborn (HDFN) requiring intensive transfusion support.

Potential for major morbidity n=270

In a further 270 cases anti-D Ig was administered more than 72 hours following a potentially sensitising event, or omitted altogether, resulting in the potential for sensitisation of the woman to the D antigen. This satisfies the current SHOT definition of potential major morbidity. It is not known whether these events resulted in the production of immune anti-D.

Clinical versus laboratory errors

For the reporting year 2014, 359 events relating to anti-D Ig administration are summarised in Table 25.2 below, with a breakdown of the proportion of clinical and laboratory errors that were primarily responsible.

Type of event	Cases	Staff primarily involved		
		Nurse / midwife	Laboratory	Doctor
Omission or late administration of anti-D Ig	273	239	21	13
Anti-D Ig given to D-positive woman	24	18	5	1
Anti-D Ig given to woman with immune anti-D	16	7	7	2
Anti-D Ig given to mother of D-negative infant	14	0	14	0
Anti-D Ig given to wrong woman	12	11	1	0
Wrong dose of anti-D Ig given	16	7	8	1
Anti-D Ig handling & storage errors	4	3	1	0
Total	**359**	**285**	**57**	**17**

Table 25.2: Staff groups primarily involved in anti-D Ig process failures

This year maintains the pattern of reports described in 2013 with clinical cases involving midwives, nurses and doctors accounting for 302/359 (84.1%) while laboratory cases are reduced accounting for 57/359 (15.9%) of the total reports relating to prescription, requesting and administration of anti-D Ig.

Omission or late administration of anti-D Ig n=273

In 239/273 (87.5%) cases the primary error was made by a nurse or midwife, and in 13/273 (4.8%) cases by a doctor. Twenty of 273 (7.3%) cases resulted from failures in the hospital laboratory and 1/273 cases from a Blood Service reference laboratory. The location was in the community for 54 cases, and in a hospital setting for 219:

- There is a persistent theme of failure to collect anti-D Ig that has been issued by the laboratory, or where it has been collected but is not administered and is found days or weeks later in maternity refrigerators. This was reported in 86/273 (31.5%) cases of delayed or omitted anti-D Ig
- In 48 cases it was ‘noted at delivery’ that a woman had not received routine antenatal anti-D prophylaxis (RAADP)

- There were 7 cases where midwifery staff had transcribed the blood group incorrectly as D-positive into the antenatal notes
- There were 6 cases where the laboratory erroneously entered a grouping result (1 maternal, 5 cord) manually to the laboratory information management system (LIMS)
- There were 4 cases where the laboratory supplied D-positive platelets to D-negative women (and children) of childbearing potential without offering prophylactic anti-D Ig
- There were 10 cases where RAADP was not given because the clinical staff erroneously thought that anti-D Ig recently given for a sensitising event would be sufficient
- All 13 cases involving medical staff (including trainees, consultant obstetricians, general practitioners (GPs) and consultant haematologists) involved poor decision-making about the need for anti-D Ig which was clearly not in line with national guidance
    - One obstetrician refused to prescribe anti-D Ig for sensitising events in the third trimester because the woman had received RAADP at 28 weeks of gestation
    - One obstetrician informed a woman that she wouldn't need any anti-D Ig for sensitising events until she had passed 20 weeks of gestation

Case 1: Post-natal visits fail to pick up need for anti-D Ig

A woman was discharged on day 0, and despite home visits by the community midwife team on days 2,3 and 4, the need for anti-D Ig was not noted until post-natal day 6.

Case 2: Anti-D Ig is needed for D-positive platelets

A 2 year old girl (D-negative) with leukaemia was issued with D-positive human leucocyte antigen (HLA)-matched platelets, but the laboratory neglected to offer prophylactic anti-D Ig.

Case 3: Discharge paperwork completed inaccurately

Anti-D Ig was issued for a post-natal woman, but not collected although the laboratory telephoned the ward three times to tell them it was ready. The woman was discharged with a note on her file saying anti-D Ig was not required.

Case 4: Laboratory reports must be clear

The laboratory issued a report following an antepartum bleed at 30 weeks indicating a transplacental haemorrhage of <2mL fetal red cells by Kleihauer, which the obstetric registrar interpreted as meaning no need for anti-D Ig as the woman had received RAADP at 28 weeks.

Case 5: Do not put the onus on the woman to comply with the system

A woman attended the antenatal unit after suffering a vaginal bleed, but was told to return the next day as the unit closed early on a Friday afternoon. At the time the report was submitted to SHOT (14 days later) she had not returned.

Inappropriate administration of anti-D Ig n=66

This group is further subdivided into four categories.

Anti-D Ig given to D-positive women n=24

Overall 18/24 (75.0%) errors were made by a nurse or midwife, 1/24 (4.2%) by a doctor, and 5/24 (20.8%) primary errors arose in the laboratory.

20/24 (83.3%) cases originated in the hospital setting, with 4 (16.7%) in the community.

Case 6: Medical laboratory assistant (MLA) overlooks D-positive result on computer

Anti-D Ig was requested following a surgical termination of pregnancy. The MLA issuing the anti-D overlooked the blood grouping result on the laboratory computer, which clearly showed the woman to be D-positive and issued the anti-D Ig to the clinical area.

Case 7: Laboratory report misinterpreted

Anti-D Ig was issued from clinical stock for a post-natal woman, after staff misinterpreted 'Antibody Screen Negative' as 'D-negative'. The ward procedure has been changed to ensure a check of grouping results by two people before treatment decisions are taken.

Case 8: Transcription of blood groups is dangerous

Anti-D Ig was administered in a private clinic by a consultant, following the incorrect manual entering of the woman's blood group by a clerk onto the clinic computer. The consultant has insisted on sight of validated laboratory reports prior to issuing anti-D Ig in the future.

Anti-D Ig given to women with immune anti-D n=16

- 9/16 (56.3%) resulted from a primary clinical error
- 7/16 (43.7%) resulted from a laboratory error

All 16 cases occurred in the hospital setting.

- Five of these cases involved issue of anti-D Ig from stocks held in the clinical area to women known to have immune anti-D
- Another five of these cases involved issue of anti-D Ig to women who were clearly marked on the laboratory system as having immune anti-D

Case 9: Assumption leads to unmonitored pregnancy and HDFN

A biomedical scientist (BMS) assumed that a positive antenatal antibody screen was due to prophylactic anti-D (the woman had received none at all), resulting in the pregnancy progressing unmonitored beyond basic antenatal appointments. The woman had anti-D levels of 67.0IU/mL at term, and her child was born suffering severe HDFN requiring exchange and top-up transfusions.

Case 10: Poor advice from haematologist

A pregnant woman identified as having immune anti-D (9 years previously) was referred to a consultant haematologist because of essential thrombocythaemia. During the appointment, she asked advice on anti-D Ig prophylaxis, and was told that she needed routine prophylaxis at 28 weeks.

Anti-D Ig given erroneously to mothers of D-negative infants n=14

All 14 of these errors originated in the laboratory, and all 14 occurred in the hospital setting.

- 3/14 cases involved issue of anti-D Ig before testing the cord group
- 5/14 involved the cord blood group being manually entered (incorrectly) onto the LIMS
- 5/14 involved issue of anti-D Ig without reference to LIMS results
- 1/14 involved assumption that a maternal sample was related to a potentially sensitising event (PSE) rather than post-natal

Case 11: Laboratory assumption regarding maternal sample

Mother and cord samples were sent to the laboratory, but the maternal sample was rejected due to incomplete labelling. The cord sample was tested as D-negative. A repeat maternal sample arrived, which the duty BMS assumed was related to a PSE in late pregnancy, and proceeded to issue 500IU anti-D Ig.

Anti-D Ig given to the wrong woman n=12

- 11/12 cases were clinical errors, involving failure by nurses and midwives to carry out positive patient identification. Nine cases occurred in the hospital setting, with 3 in the community
- 1/12 cases was a laboratory error, involving selection of the wrong woman from the laboratory computer system in order to print labels (both women were present at the same time on the post-natal ward)

Case 12: Checking and administration must be a continuous process

Anti-D Ig was issued by the laboratory for a post-natal woman. The anti-D Ig was checked by two qualified midwives, but then placed in the drug refrigerator as the woman was asleep. A midwife on the next shift then administered the anti-D Ig to the wrong woman without performing positive patient ID checks.

Wrong dose of anti-D Ig given n=16

Thirteen of these 16 cases occurred in hospital, and 3 in the community setting.

Eight cases involved a primary clinical error, with 8 errors in the laboratory.

Case 13: Communication failure leads to incorrect dosing

The laboratory informed the midwife that the woman should receive 500IU anti-D Ig, but the midwife administered a 250IU dose from stock held in the clinical area.

Case 14: Doctor administers inadequate dose of anti-D Ig

An obstetric registrar prescribed 500IU anti-D Ig from clinical stock for a woman due to receive 1500IU RAADP at 28 weeks of gestation.

Case 15: Misinterpretation of Kleihauer film leads to over-dosing with anti-D Ig

A BMS interpreted a Kleihauer film as showing a raised transplacental haemorrhage (TPH) of 25mL fetal red cells, and issued 3000IU anti-D Ig to cover the bleed. Flow cytometry showed the TPH to be <1mL and later examination of the Kleihauer film by a senior member of staff gave a result consistent with the flow cytometry estimation.

Case 16: Misinterpretation of Kleihauer film leads to under-dosing with anti-D Ig

A BMS interpreted a Kleihauer film as showing a raised TPH of 3.3mL fetal red cells, and issued 500IU anti-D Ig to cover the bleed. Flow cytometry showed the TPH to be 8.4mL, requiring double the original dose. The extra was administered 4 days later as the woman had been discharged after receiving the first injection. Examination of the Kleihauer film by a senior member of the laboratory staff indicated a TPH consistent with the flow cytometry estimation.

Comment: Cases 15 and 16 are included to underline that the Kleihauer (Acid Elution - AE) test is known to be an inaccurate method for estimation of TPH, subject to variation in film-making and staining technique, and misinterpretation by inexperienced members of staff. Laboratories relying on the Kleihauer test for estimating TPH should ensure that staff are appropriately trained and competent, and that the laboratory participates in regular National External Quality Assessment Service (NEQAS) exercises (as previously recommended by SHOT in the 2012 Annual SHOT Report (Bolton-Maggs et al. 2013).

The BCSH Fetomaternal Haemorrage (FMH) guidelines (BCSH Austin et al. 2009) state that any FMH greater than 2mL by AE should be confirmed by the Flow Cytometry (FC) method, using the original sample. If the FC result will not be available within 72 hours, the AE test should be repeated by a second operator before referral. In this case the AE results should be acted upon until the FC result is available.

SHOT Good Practice Point: The Kleihauer test should be repeated from scratch from the original sample – it is pointless a second operator assessing what may be a badly made or eluted slide.

Handling and storage errors relating to anti-D Ig n=4

Three of these four errors occurred in the clinical area and one was a laboratory error, all occurring in the hospital setting.

Case 17: Lack of understanding of sensitisation by blood components

A BMS issued anti-D Ig to cover D-positive fresh frozen plasma (FFP) given to a D-negative woman during a major haemorrhage (there are no cells in FFP to sensitise recipients).

Case 18: Alteration of laboratory report to 'fit' the hospital electronic record

Anti-D Ig was issued to the ward, but it was noted that some of the patient ID on the request and subsequent laboratory report did not match the hospital electronic patient record (EPR). Ward staff manually amended the laboratory issue report and traceability record so that the details matched those on the EPR.

Near miss anti-D Ig cases n=43

Similar lessons can be learnt from near miss Anti-D cases that were detected before the patient was put at risk of harm.

Point in the process	Type of error made	Number of cases	Percentage of cases
Request	Wrong volume requested	5	23.3%
	Requested for D-positive woman	3	
	Requested for woman with immune anti-D	1	
	Not requested	1	
Sample receipt	Entered to incorrect patient record	1	2.3%
Testing	Misinterpretation	2	7.0%
	Incomplete testing prior to issue	1	
Component selection	Issued for D-positive woman	10	53.5%
	Wrong volume issued	9	
	Issued to woman with immune anti-D	2	
	Issued to mother of D-negative baby	1	
	Wrong component selected (PCC*)	1	
Component labelling	Anti-D Ig mislabelled	5	11.6%
Collection	Time expired anti-D Ig available	1	2.3%
Total		**43**	**100%**

PCC = Prothrombin complex concentrate

Table 25.3: Near misses that could have led to errors related to anti-D Ig n=43

IT-related anti-D cases n=11

There were 11 cases that also had an IT element and these are described below. The numbers are included in the tables above where appropriate, so these are not additional cases. There were 7 clinical errors and 4 laboratory errors.

Table 25.4: IT errors relating to administration of anti-D Ig

Error	Reports	Unnecessary anti-D Ig administered	Failure to administer anti-D Ig	Anti-D Ig given to the right patient but with wrong patient details
Error when manually transcribing data	4	2	1	1
LIMS not updated with reference laboratory result	1	1		
Failure to consult historical record	3	3		
Failure to use flags, logic rules	1	1		
Discrepancy between electronic patient record or PAS and LIMS	2			2
Total	**11**	**7**	**1**	**3**

Unnecessary anti-D Ig involving IT errors n=7

Two D-negative women with immune anti-D were given unnecessary anti-D Ig. One occurred because the midwife who requested anti-D Ig assumed it was a passive rather than immune antibody and the BMS did not consult the LIMS when issuing the injection. The other occurred because the immune anti-D, although correctly recorded on the LIMS, was not flagged in such a way as to prevent anti-D Ig issue.

Four D-positive women were given anti-D Ig in error.

- One D-positive patient with the same name but the wrong DOB was selected from a computer pick-list and anti-D Ig issued in error
- Another D-positive patient was given anti-D Ig because the negative antibody screen was misread from a computer screen as a negative D-group
- Unnecessary anti-D Ig was given to a D-positive woman after a fall. The blood group was recorded on the electronic record and LIMS but neither IT systems were consulted before administration
- The last D-positive woman in this group was given anti-D Ig because the wrong group was transcribed into the notes and a check on the IT system was not possible because the look-up facility was not functioning properly

A woman with confirmed weak D was given anti-D Ig because the LIMS had not been updated with the reference laboratory report.

Omission of anti-D Ig involving IT errors n=1

One D-negative woman did not get RAADP because the wrong D group was manually transcribed into the patient record. It was reported that a bidirectional interface has now been implemented between LIMS and the EPR to transfer results electronically.

Handling and storage errors n=3

In three patients anti-D Ig was given to the right patient despite a discrepancy in patient demographic details (name, DOB, 1st line of address) between the LIMS and PAS.

Learning points and suggested actions

- Standardisation of laboratory reports so they cannot be misinterpreted
- Standardisation of patient records with electronic transfer of D-grouping results where possible

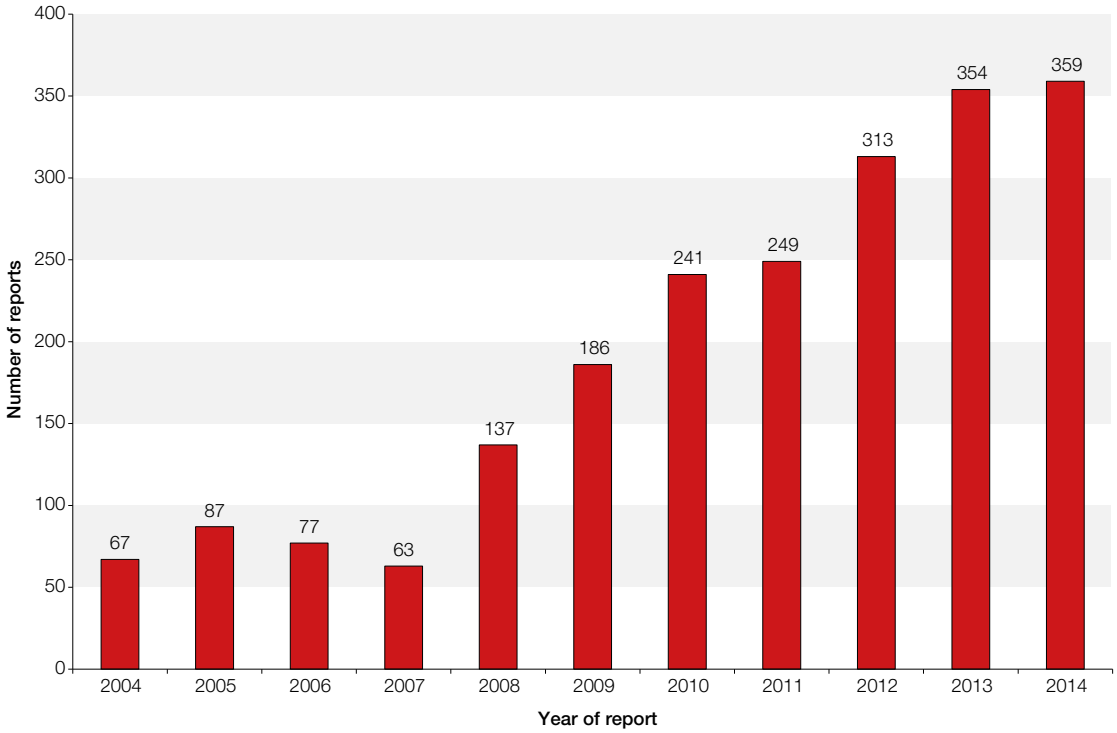

Figure 25.1: Cumulative data for anti-D events 2004-2014

Good practice points from previous years and examples of system failures are available in the 2013 report and on the SHOT website

References

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