TITRE SCORES: A COST SAVING ALTERNATIVE FOR MEASURING PASSIVE ANTI-D IN PREGNANCY

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BACKGROUND

- Haemolytic Disease of the Fetus and Newborn (HDFN) is a serious disease which is caused by maternal sensitisation due to either a transfusion of an incompatible red cell unit or a feto-maternal haemorrhage during a past or current pregnancy[1]. Maternal alloimmunisation results in haemolysis of fetal red blood cells, which may cause presentation of symptoms in the fetus and/or neonate ranging from mild to severe in nature[2]
- Historically, the primary antibodies implicated in HDFN were Anti-D, closely followed by Anti-c and Anti-K. Cases of HDFN have dropped dramatically since the introduction of postnatal administration of Anti-D Immunoglobulin (Anti-D IP), along with Routine Antenatal Anti-D IP (RAADP) and Anti-D IP for potentially sensitising events (PSEs) to RhD negative pregnant women[3]
- Due to the administration of antenatal Anti-D IP, antibody screens tested from RhD negative women throughout the antenatal period may be positive due to Anti-D IP. The British Standards of Haematology guideline advises that any Anti-D detected in pregnancy, whether it be immune in nature or resulting from administration of Anti-D IP, be measured by Continuous Flow Analysis (CFA)
- Anti-D Quantitation (ADQ) by CFA is performed in The Irish Blood Transfusion Service (IBTS) and provides a result in IU/ml. Antibody Titres (ATs) by Column Agglutination Technology (CAT) are performed in the Blood Transfusion (BT) Lab in the NMH to determine the strength of a red cell antibody (RCA) and its risk of causing HDFN. ADQs of <0.4IU/ml are generally considered to be prophylactic in nature with a history of intravenous injection of Anti-D IP, with ADQs of <0.2IU/ml considered to be prophylactic in nature with a history of intramuscular injection of Anti-D IP
- Titre Scores (TSs) may provide a more comprehensive picture of the strength of the antibody by considering the reaction of each dilution in an AT to give an overall TS which is a better reflection of the status of RCA. TSs may also be a more cost efficient way of monitoring prophylactic Anti-D in RhD negative pregnant women

AIMS

- The main objective of this project was to investigate manual TSs using ATs by CAT as an alternative method for monitoring of prophylactic Anti-D detected antenatally in RhD negative pregnant women
- Additional aims were to perform a cost analysis of referral of samples to the IBTS for ADQ compared with performing ATs in the BT lab of the NMH.
- Furthermore, the project sought to gain an insight into the opinions of the clinical staff of the NMH in relation to cost and testing turnaround times (TATs) of ADQs and ATs

METHODS

- A survey titled: 'Antibody Monitoring User Satisfaction Survey', designed using Survey Monkey, was distributed to all clinical staff who are responsible for reviewing and acting on ADQ and AT results
- A retrospective audit was carried out using WinPath, the laboratory information system, to ascertain the number of samples referred to the IBTS for ADQ where Anti-D IP was administered antenatally from the period of January 2019 to June 2021. This data was used to perform a cost analysis of the samples referred to the IBTS for ADQ, compared to the cost of analysing these samples in the BT lab of the NMH using manual TSs
- Selection of samples for testing was based on defined inclusion and exclusion criteria along with an algorithm currently in use by the BT lab which determines whether samples require referral to the IBTS for ADQ
- ADQs were carried out in the RCI lab at the IBTS using the Astoria 2 CFA Auto Analyser
- ATs were performed in the BT lab of the NMH using CAT technology. Doubling dilutions of patient plasma were made and each dilution was titrated against a heterozygous red cell for the corresponding antigen. Once ATs and ADQs were carried out on all samples accepted into the study, each AT result was converted into a TS. The conversion of AT results to TSs was based on the method employed by the AABB Technical Manual[4]

RESULTS

Survey:

- 70% thought that an ADQ result should be available for viewing in the patient's chart within 5 days of sample phlebotomy (current TAT approx 13 days). 45% were satisfied with the current TAT of 3.08 days for ATs
- 90% were not aware of the cost of an ADQ and 90% believed an ADQ should cost <€100 (current cost €175.10). 100% of respondents did not know the cost of performing an AT, and 63% thought that an AT should cost <€60 (current cost €13).

Cost Analysis:

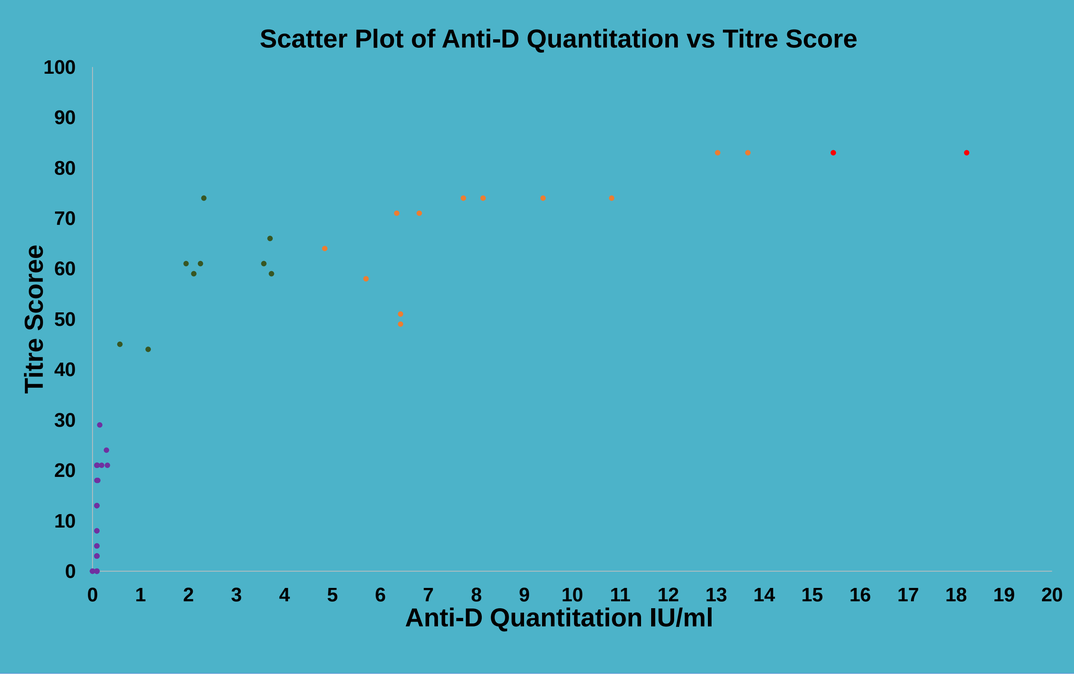
- The results of the cost analysis showed a potential average saving of **91% equating to approximately €8000 per year** if manual TSs for Anti-D detected antenatally were to be introduced as an alternative method to referring samples for ADQ

ADQ vs TS:

- A total of 63 samples were tested by ADQ in the IBTS and TS using CAT in the BT laboratory. The IBTS classified 40 of these samples as prophylactic Anti-D and 23 as immune Anti-D
- ROC Curve analysis indicated that a TS of <30 accurately predicted an ADQ of <0.4IU/ml and a TS of >30 accurately predicted an ADQ of >0.4IU/ml with a sensitivity and specificity of 100%

RESULTS

Figure 1



CONCLUSION

- This project set out to investigate the use of manual TSs for monitoring of Anti-D detected in pregnancy where Anti-D IP was administered antenatally. The study found that a TS of <30 accurately predicted an ADQ of <0.4IU/ml.
- The implementation of this method in the BT laboratory of the NMH will result in cost savings for the NMH, decreased workload for the IBTS and improved TATs for these results

References:

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