AUDIT OF RED CELL GENOTYPING IN SICKLE CELL DISEASE PATIENTS IN TWO LONDON TRUSTS

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BACKGROUND

Red cell (RC) transfusion plays a crucial role in the management of patients with sickle cell disease (SCD) both in the acute and chronic setting. However, these patients are at increased risk of alloimmunisation from both higher numbers of RC units transfused, and differences in RC antigens expressed (in particular RH genetic diversity) between recipient and donor populations (Chou et al. 2018, Rosse et al. 1990). Alloimmunisation rates are reduced by provision of extended RH and K matched RC units for this group of patients (Lasalle-Williams et al. 2011). Current BSH guidelines on red cell transfusion in SCD (Davis et al. 2016) recommend that all patients with SCD have extended RC antigen typing (including C, c, E, e, K, k, Jka, Jkb, Fya, Fyb, S, s) at baseline to allow, at least, provision of extended RH and K matched blood, but also to guide RC selection in those with haemolytic transfusion reactions or other complex transfusion requirements (e.g. multiple alloantibodies).

RC antigen typing can be done serologically if the patient has not been transfused in the last 3 months, or by genotyping if recently transfused. Genotyping also has the advantage of being able to identify RH variants, which can cause sensitisation even when extended RH matched blood phenotypically has been provided (Chou et al. 2013), so can guide better selection of RC units.

From April 2015 to June 2016, NHS Blood and Transplant (NHSBT) offered extended genotyping including RH variants, free of charge, to all haemoglobinopathy patients in England (Haemoglobinopathy Genotyping Project). Over 4000 samples were tested with results available on Sp-ICE (NHSBT Update July 2016).

METHODS

We conducted a retrospective review of all adult and pediatric patients with SCD under follow-up at two London trusts: Imperial College Healthcare NHS Trust (ICHNT) and London North West University Healthcare NHS Trust (LNWH).

Our primary aims were:

- **To identify how many patients had RC genotyping**
- **To identify for those who did not have RC genotyping, if they had extended phenotyping instead (albeit that this does not identify RH variants)**

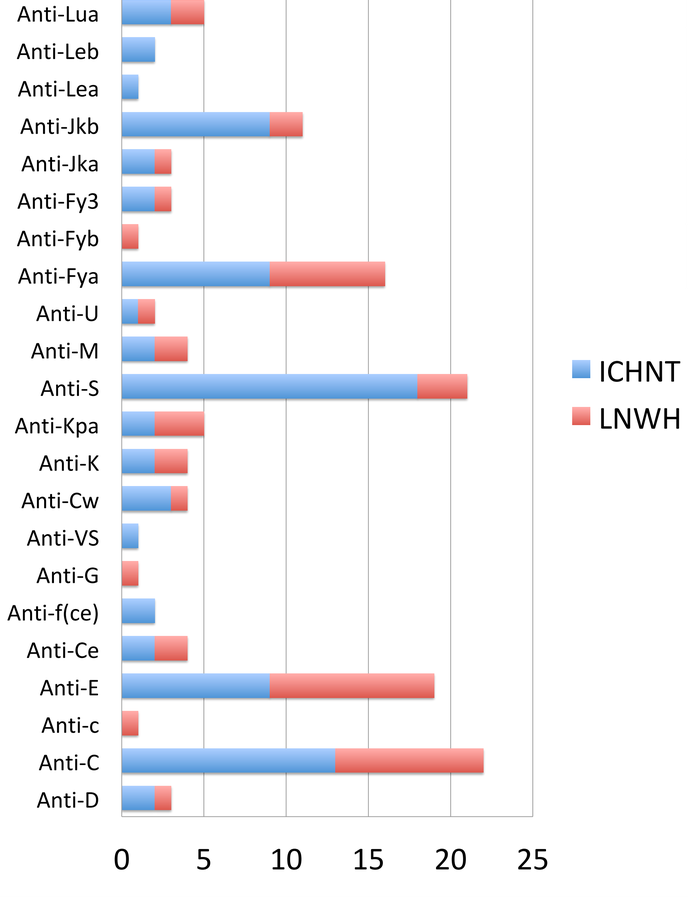
We also identified how many patients had RH variants and antibodies to RC antigens (both autoantibodies and alloantibodies), in order to review the potential complexity of transfusion requirements in this SCD patient population.

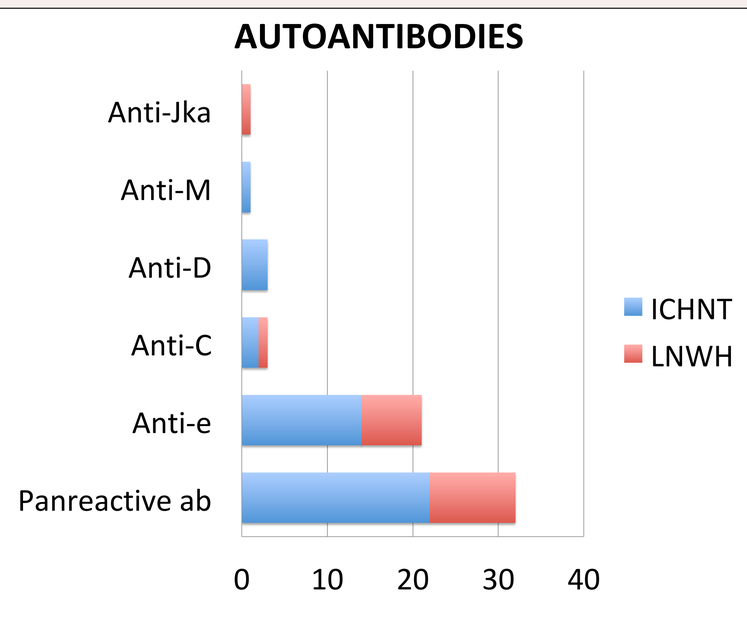
All data was collected from Sp-ICE.

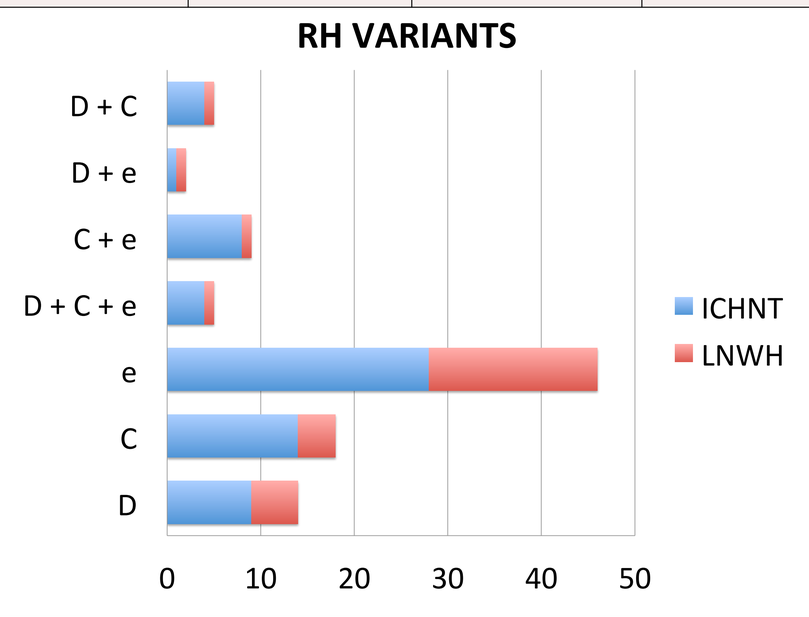
RESULTS

- 482 (298 adult, 184 paediatric) and 346 (226 adult, 120 paediatric) SCD patients were followed-up at ICHNT and LNWH respectively.
- At ICHNT, 311 (64%; 238 adult, 73 paediatric) patients had genotyping and of the remaining 171 patients, 61 (13%; 14 adult, 47 paediatric) had extended phenotyping.
- At LNWH, 181 (52%; 130 adult, 51 paediatric) patients had genotyping and of the remaining 165 patients, 30 (9%; 15 adult, 15 paediatric) had extended phenotyping.
- 68 (14%) patients at ICHNT and 31 (9%) patients at LNWH had RH variants.
- 62 (13%) patients at ICHNT and 32 (9%) patients at LNWH had antibodies to RC antigens

	ICHNT ADULTS	ICHNT PAEDS	LNWH ADULTS	LNWH PAEDS
NUMBER OF SCD PATIENTS	298	184	226	120
NUMBER OF PATIENTS GENOTYPED	238 (80%)	73 (40%)	130 (58%)	51 (43%)
NUMNER OF PATIENTS NOT GENOTYPED BUT PHENOTYPED	14 (5%)	47 (26%)	15 (7%)	15 (13%)
NUMBER OF PATIENTS WITH EXTENDED RC ANTIGEN TYPING	252 (85%)	120 (65%)	145 (64%)	66 (55%)
NUMBER OF PATIENTS WITH RH VARIANTS	52 (17%)	16 (9%)	16 (7%)	15 (13%)
NUMBER OF PATIENTS WITH ANTIBODIES TO RC ANTIGENS	48 (16%)	14 (8%)	25 (11%)	7 (6%)







CONCLUSION

The majority of SCD patients at ICHNT (77%, n=372) and LNWH (61%, n=211) had extended RC antigen typing in accordance with BSH guidance. However, a significant number (ICHNT 23% n=110; LNWH 39% n=135) had neither genotyping nor extended phenotyping. This may compromise selection of suitable RC units, so can increase the risks from undetected antibodies, particularly in those with complex transfusion requirements or in times of difficulty in serological identification of an antibody.

We also showed, as expected, a significant number of patients with RH variants and antibodies to any RC antigens, thus highlighting the complex transfusion requirements in SCD patients.

Our data also shows that fewer paediatric than adult patients had extended RC antigen typing, which is significant as they may potentially receive more transfusions throughout their lifetime.

RECOMMENDATIONS

- We recommended that all patients without extended RC antigen typing should have their notes flagged to prompt a sample for genotyping (including RH variants) at the next clinical encounter, ideally within 12 months.
- We aim to re-audit in 12 months' time.

REFERENCES

- Chou, S.T., Evans, P., Vege, S., Coleman, S.L., Friedman, D.F., Keller, M., and Westhoff, C.M. (2018). RH genotype matching for transfusion support in sickle cell disease. *Blood*, vol 132 (11), 1199-1207.
- Chou, S.T., Jackson, T., Vege, S., Smith-Whitley, K., Friedman, D.F. and Westhoff, C.M. (2013). High prevalence of red blood cell alloimmunization in sickle cell disease despite transfusion from Rh-matched minority donors. *Blood*, vol 122, 1062-1071.
- Davis, B.A., Allard, S., Qureshi, A., Porter, J.B., Pancham, S., Win, N., Cho, G., and Ryan, K. (2016). Guidelines on red cell transfusion in sickle cell disease. Part I: principles and laboratory aspects. *British Journal of Haematology*, vol 176, 179-191.
- Lasalle-Williams, M., Nuss, R., Le, T., Cole, L., Hassell, K., Murphy, J.R. & Ambruso, D.R. (2011) Extended red blood cell antigen matching for transfusions in sickle cell disease: a review of a 14-year experience from a single center (CME). *Transfusion*, vol 51, 1732-1739.
- NHSBT Update July 2016. 2.4. Haemoglobinopathy Genotyping Initiative – close of project. https://nhsbtdbe.blob.core.windows.net/umbraco-assets-corp/14313/theupdatejuly2016.pdf
- Rosse, W.F., Gallagher, D., Kinney, T.R., Castro, O., Dosik, H., Moohr, J., Wang, W. & Levy, P.S. (1990) Transfusion and alloimmunization in sickle cell disease. The Cooperative Study of Sickle Cell Disease. *Blood*, **76**, 1431– 1437.

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Transfusion

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