Annual SHOT Report 2014 – Supplementary Information

Chapter 27: Transfusion-Related Acute Lung Injury (TRALI)

DATA SUMMARY
Total number of cases: n=9

Implicated components (with concordant antibodies)	
Red cells	**2**
Fresh Frozen Plasma	**0**
Platelets	**0**
Cryoprecipitate	**0**
Granulocytes	**0**
Anti-D Ig	**0**
Multiple components	**1**
No concordant antibodies identified	**6**

Mortality/morbidity	
Deaths *definitely* due to transfusion	**0**
Deaths *probably/likely* due to transfusion	**1**
Deaths *possibly* due to transfusion	**1**
Major morbidity	**7**
Potential for major morbidity *(Anti-D or K only)*	**0**

Gender	
Male	**4**
Female	**5**
Not known	**0**

Age	
≥ 18 years	**8**
16 years to <18 years	**0**
1 year to <16 years	**1**
>28 days to <1 year	**0**
Birth to ≤28 days	**0**
Not known	**0**

Emergency vs. routine and core hours vs. out of core hours	
Emergency	**3**
Urgent	**0**
Routine	**6**
Not known	**0**
In core hours	**4**
Out of core hours	**2**
Not known/Not applicable	**3**

Where transfusion took place	
Emergency Department	**0**
Theatre	**0**
ITU/NNU/HDU/Recovery	**4**
Wards	**4**
Delivery Ward	**0**
Postnatal	**0**
Medical Assessment Unit	**1**
Community	**0**
Outpatient/day unit	**0**
Hospice	**0**
Antenatal Clinic	**0**
Other	**0**
Unknown	**0**

(ITU=Intensive therapy unit; NNU=Neonatal unit; HDU=High dependency unit)

Additional Tables – not included in the main 2014 report

Table 1: Patient characteristics and component details

Case number	Sex/age	Diagnosis	Reason transfused	Transfused components				Implicated component (concordant antibody)	Interval between transfusion and symptoms
				RBC	Plt	FFP	Cryo/ other		
1	M/42	Renal allograft	Post op anaemia	2	0	0	0	None	2 hours
2	F/62	Splenic trauma during colonoscopy	Splenic tear	4	3	4 SD	0	RBCOA	3 hours
3	M/1	'Posterior Fossa Ependymoma	Chemotherapy	0	1(aph)	0	0	None	5 hours
4	F/75	CMML	Symptomatic anaemia	2	0	0	0	RBCOA	9 hours
5	M/48	T Prolymphocytic leukaemia post BMT and sepsis	Thrombocytopenia and anaemia	0	1(pool)	0	0	None	10 minutes
6	F/22	C section	Post partum haemorrhage	2	0	2	2 pools	Cryoprecipitate and RBCOA	During 2nd cryo pool
7	F/23	Haemophagocytic syndrome, renal failure, candida septicaemia	Platelets to cover line insertion	4	1(pool)	0	0	None	6 1/2 hours
8	M/69	Myelodysplasia, cirrhosis/portal hypertension and COPD, emphysema	Epistaxis, platelet count 28 x 10^9/L	0	1 (pool)	0	0	In progress	1 hour 45 minutes
9	F/40	Pancytopenia secondary to malnutrition and folate deficiency. Hb 37g/l	Anaemia and presumed sepsis	1	0	0	0	Not tested only donor was male	2 hours

Table 2: Clinical characteristics and radiological features of cases reported as TRALI

TRALI case number	TRALI probability	Other risk factors	Symptoms/signs					
			Fever or rigors	Reduced blood pressure	Dyspnoea or tachypnoea	Signs of heart failure	Reduced pO2	Chest X ray
1	Probable	Renal impairment, 2L saline and 2 units RBC. AF post cardiac arrest	N	Y	Y	Y	Y	Pulmonary oedema
2	Probable	Fluid overload	N	N	Y	N	Y	Patchy bilateral lung shadowing
3	Unlikely	Positive fluid balance	N	N	Y	N	Y	Diffuse bilateral infiltration
4	Probable	WCC more than 30, cardiac valvular dysfunction, renal impairment	N	N	Y	No	Y	Bilateral diffuse infiltrates
5	Unlikely	Infection, possible fluid overload	Y both	Y	Y	Y	Y	CTPA large bilateral pleural effusions, multifocal consolidation predominantly at base, small pericardial effusion
6	Highly likely	Haemorrhagic shock and massive transfusion	N	N	Y	N	Y	Extensive pulmonary shadowing consistent with oedema. An inflammatory component cannot be excluded but the appearances may well be due to pulmonary oedema
7	Unlikely	Septicaemia, renal failure	N	N	N	N	Y	Initially new left sided consolidation progressed overnight to bilateral consolidation. Consistent with TACO, sepsis or TRALI
8	Possible	Cardiomegaly, raised JVP, COPD, cirrhosis	N	Y	Y	N	Y	pulmonary vascular congestion/ pulmonary oedema, cardiomegaly
9	Unlikely	Sepsis and large fluid load	Y	N	Y	N	Y	CXR: Bilateral infiltrate, bibasal pleural effusions and basal consolidation. ? Pulmonary oedema ? ARDS, diffuse consolidation in both lower zones more suggestive of pulmonary oedema than infection.

Table 3: Treatment, outcomes, investigation results and likelihood of case being TRALI

	TREATMENT				TRALI INVESTIGATION RESULTS				
TRALI case number	Treatment	ITU admission	Ventilation (number of days)	Outcome (imputability)	Donors	Patient	White Cell cross match	Reason given by reporter for suspecting TRALI	Likelihood of case being TRALI
1	Oxygen, inotropes	Y	Y (1)	Died-(likely /probable :imputability 2)	2 male donors tested and negative for HLA and granulocyte antibodies	Not tested	ND	Normal coronary angiography, CT pulmonary angiogram. No evidence of impaired LV function	PROBABLE
2	Furosemide, bronchodilators	Y	Y (8)	Full recovery	1 F RBCOA donor had concordant HLA-DR7 antibodies	HLA-DR7 positive	ND	Continued to deteriorate despite furosemide (dose 20 mg iv with diuresis of 1180mL)	PROBABLE
3	Steroids, bronchodilators, iv fluids	Y	Y (2)	Full recovery	1 M donor tested and found negative for HLA and granulocyte antibodies	Not tested	ND	No evidence of heart failure	UNLIKELY
4	Furosemide	N	N	Full recovery	1 F donor had multispecific HLA class 1 and class II antibodies including concordant HLA-B27 and HLA-DR4 antibodies .The other donor had multispecific HLA class I antibodies but none concordant	HLA-B27 positive, HLA-DR4 positive	ND	Registrar thought it was TRALI due to the frothy sputum and the speed at which it appeared when cardiac function was normal	PROBABLE
5	Chlorphenamine, hydrocortisone, ventilatory support	Y	Y (56)	Died ARDS multiorgan failure (unlikely: Imputibility 0)	Donor investigations found no concordant antibodies. An IgM anti-HNA was found but patient was HNA-1a negative	HNA-1a negative	ND	CXR post event showed large pleural effusions and pericardial effusion and basal atelectesis	UNLIKELY

	TREATMENT				TRALI INVESTIGATION RESULTS				
TRALI case number	Treatment	ITU admission	Ventilation (number of days)	Outcome (imputability)	Donors	Patient	White Cell cross match	Reason given by reporter for suspecting TRALI	Likelihood of case being TRALI
7	Furosemide	Y	Y (1)	Full recovery	3 female cryo donors had concordant HLA antibodies Donor 1: HLA-B44; donor 2: HLA-B44, DR4, DR13 and DR52; donor 3: HLA-DR4, DR13, DR52. 1 female RBCOA donor had HLA-DR13 and DR52 concordant antibodies	Patient was positive for HLA-B44, DR4, DR13, DR52,DR53, DQ7 and DR13	ND	Deteriorated after 2 L diuresis	HIGHLY LIKELY
8	Adrenaline and full ICU support	Y	Y (?), was already on ventilator	Recovered from event	1 F and 3 M donors to plt pool all tested and negative for HLA and granulocyte antibodies	N/A	ND	Considered unlikely to be TACO because on CVVH	UNLIKELY
9	Bipap/ high flow oxygen, IV furosemide, hydrocortisone and piriton, IV antibiotics	N	N	Died (possible, imputability 1)	In progress	In progress	ND	Period of time between the transfusion and CXR results. Patient was afebrile and normotensive prior to transfusion.	POSSIBLE
10	High flow oxygen, furosemide, antibiotics	Y	N	Full recovery	RBCOA donated by male donor with no history of transfusion-not tested	N/A	ND	The patient tolerated much fluid in the 24 hrs pre transfusion but then had this serious reaction within short period of 200mls of blood. While the patient had many other ongoing issues, she proceeded to get worse before getting better and the CXR changes are unexplained	UNLIKELY

Transfusion-Related Acute Lung Injury (TRALI) - Previous Recommendations

Year first made	Action	Recommendation
2013		No new recommendations
2012	**Hospital Transfusion Teams and Reporters**	Reporters are asked to provide as much of the information requested on the SHOT pulmonary questionnaire as possible. There is significant overlap between categories of pulmonary complications and clinical detail is essential to allow accurate assessment of these cases
2012	**Hospital Transfusion Teams and Reporters**	Transfusions should only take place where there are facilities and staff trained to recognise and manage adverse incidents
2011	**Hospital Transfusion Teams (HTTs)**	If it has been concluded, following hospital case review, that a case reported to SHOT as transfusion related acute lung injury (TRALI) would be better categorised in an alternative category (e.g. transfusionassociated circulatory overload (TACO), transfusion-associated dyspnoea (TAD), acute transfusion reaction (ATR) please inform the SHOT office
2010	**UK Blood Services**	Robust systems must be put in place to prevent issue of female FFP or platelet pools suspended in female donor plasma
2010	**UK Blood Services**	A risk assessment should be conducted of screening existing female platelet apheresis donors for HLA and granulocyte antibodies, and for retesting for these antibodies after subsequent pregnancies
2010	**HTTs**	Transfusion-related respiratory events that occur later than the accepted 6-hour definition for TRALI should be reported to SHOT in another category (e.g. TAD).
2008	**UK Blood Services**	UK Blood Services that have not yet achieved 100% male FFP and plasma to platelet pools must make this a priority. Exchange of male FFP for previously issued female FFP should be undertaken whenever feasible.

2006	**UK Blood Services**	UK Blood Services should continue to investigate and apply methods to reduce the continuing risk of TRALI associated with apheresis donations, reducing the number of female donors on the panel, and testing those remaining for HLA antibodies. This year only 1 case involved an apheresis donor with a concordant antibody but this recommendation remains relevant.
2005	**HTTs**	Hospital staff should continue to be aware of TRALI and report possible cases to the local Blood Centre to facilitate investigation. Detailed clinical information is needed to allow accurate clinical assessment of these cases. Blood samples (clotted and EDTA) from affected patients should be sent promptly for laboratory investigation. Continued education of all relevant staff about this condition is encouraged.
2005	**Clinical users of blood and consultant haematologists with responsibility for transfusion**	Cases should be evaluated early by the consultant(s) involved and prompt discussion with the Blood Service is helpful. A team approach including the haematologist and chest physician and/or ITU consultant is recommended.
2005	**Blood Services, clinical users of blood and consultant haematologists with responsibility for transfusion**	Case 3 from the 2005 report emphasises the importance of avoiding transfusing whole blood