

# Transfusion-Associated Circulatory Overload (TACO) Proposed Reporting Criteria Validation Study PHASE-II

CASE VIGNETTES

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## Case Rhesus

A 72-year-old female underwent surgery. She was transfused with two units of RBCs in rapid succession postoperatively for bleeding associated with the surgery. The Estimated Blood Loss (EBL) was 400 ml. Hgb dropped to 7.6 g/dl, from Preoperative Hgb of 8.9 g/dl. Unit #1 was transfused over 66 minutes. Unit # 2 (initiated 15 minutes after completion of unit #1) was given over 75 minutes.

Towards the end of transfusion of unit #2, patient began complaining of “heavy chest” and “mild” difficulties breathing. O2 saturation (on room air) dropped to low-80’s (from >98% previously). She was immediately placed on 4 L O2 by nasal cannula and said she felt “somewhat better”. She also was immediately provided diuresis with Lasix (dosage not provided). AP/lateral chest x-radiograph revealed “prominent and diffuse bilateral radio-opacities”. As she put out >1,100 mL urine during the next 75 minutes, it also was noticed that she had a “+3,400 mL fluid balance” from the time she was admitted in the early morning preoperative area to the time of her reaction (approximately 7 hours later).

The patient’s symptoms/O2 saturation improved quickly following diuresis and within approximately 2 hours she was breathing comfortably and no longer required supplemental O2. Two hours after that her CXR had reverted to normal. There was no history of congestive heart failure or other cardiopulmonary problems, so physicians chose not to order pre-/post-BNPs.

### Parameters

	Preoperative	Postoperative	During reaction	After recovery
Hgb	8.9 g/dl	7.6 g/dl		
O2 saturation	>98%		low-80’s	
AP/lateral chest x-radiograph			Prominent and diffuse bilateral radio-opacities	Within normal limits

## Case Kell

A 65-year-old male with history of kidney disease, hepatitis, cardiac disease admitted for Coronary artery bypass grafting associated to aortic valve replacement (CABG/AVR). He experienced significant intraoperative bleeding and received numerous units of plasma, platelets and cryoprecipitate blood components. Patient developed acute worsening respiratory distress with yellow foam coming from the ET tube. He had evidence of hypoxemia pre-transfusion. After transfusions, patient's pulmonary wedge pressure became elevated with decreased ejection fraction and CXR showed bilateral pulmonary infiltrates. Post-transfusion treatments included antihistamines, bronchodilators, epinephrine, steroids, intubation and Lasix diuresis. Patient showed clinical response to the diuresis but the pulmonary infiltrates were still present at the time this reaction was reported.

## Case Lutheran

A 78-year-old female patient post uterine prolapse surgery presented with pelvic hematoma resulting in left hydro-nephrosis requiring ureteral stent placement. Patient had history of Hypertension, Cardiac arrhythmia (PVC) and asthma. 2 days post-surgery, she was transfused with 80 ml RBC unit. However, she developed chest tightness and dyspnoea with reduced O2 saturation. Pre-and Post transfusion temperature, BP and Heart rate had no significant change. There was no increase in bilirubin. Blood bank work-up ruled out hemolytic transfusion reaction. Gram stain neg, cultures are pending. Covering pathologist recommended CXR to rule out TACO / TRALI, which was not done. Patient was discharged on following day (of transfusion) with no complaints of chest tightness and dyspnoea. Chest was clear to auscultation, with improved O2 saturation.

### Parameters

	Pre-Transfusion	Post-Transfusion	During reaction	After recovery
Hgb	7.9 g/dl	8.5 g/dl		
O2 saturation	96%		88%	94%
NT pro-BNP	Not done	1112 *		

\*Normal (<300)

## Case Lewis

A 79-year-old female, who has been undergoing transfusion (RBC and platelets) once yearly for past few years for myelodysplastic syndrome, presented with dyspnoea, hypoxemia, wheezing or stridor, chest pain, tachycardia, tachypnea, chills/rigors and anxiety during transfusion of 304 ml of apheresis platelet. Post-transfusion chest x-ray revealed pleural effusion with diffuse alveolar interstitial opacity throughout lungs. The patient was treated with Acetaminophen (Tylenol), Antihistamines (Benadryl), steroids, oxygen supplementation and diuretics (Lasix). The patient responded to diuretics and improved clinically with decrease in shortness of breath. It took <24 hours for the pulmonary infiltrates to resolve. Patient was stable after treatment. No gram stain and/or cultures were performed on any residual blood product associated with this reaction. There were no previous history of reaction associated with blood transfusion.

### Parameters

	Pre-transfusion	During reaction	Post-transfusion
BP	110/47	146/70	
O2 saturation			<90% on room air
chest x-radiograph		Diffuse alveolar interstitial opacity throughout lungs	
Pulse	96	73	
Temp	37.2	38.1	

## Case Duffy

A 44-year-old female was admitted to the hospital for abdominal pain, vomiting, and melaena. She was previously diagnosed with SLE, cirrhosis, esophageal varices (s/p banding), ascites, and hypothyroidism; there was no dyspnoea or chest pain on admission. Medications at home included- furosemide 40 mg, spironolactone 100 mg, propranolol 5 mg BID (for variceal prophylaxis), levothyroxine 88 mg. The patient was O positive.

Platelet count was 36 pre-surgical procedure, and the patient was pancytopenic. The patient was transfused with one unit of leukoreduced apheresis platelets (group A positive; volume transfused 198 ml) and 0.9 NS (no record of the volume). There was no use of blood warmer. Transfusion was started at 03:45 am and completed at 04:30 am.

At 04:45 am, 15 minutes after completion of transfusion, the patient complained of chest pain, chills, and headache. Dyspnoea, hypertension and raised pulse were noted (BP 150/62 & pulse 118). Chest X-ray showed mild bibasilar opacities and small bilateral effusions, with no evidence of pneumothorax. There were no pre-transfusion chest X-ray for comparison. EKG showed T wave inversion in V1- V3; no baseline EKG available to compare. BNP and troponin were not increased. Other laboratory results were relatively normal. Patient also had a positive fluid balance of 1.6 L over 24 hours. Symptoms resolved after administration of diuretics. No other radiologic exams were performed.

### Parameters

	Pre-transfusion	Post-transfusion	During reaction
Temp	98.4 <sup>0</sup> F	98.2 <sup>0</sup> F	
BP	91/56	98/61	150/62
Pulse	73	78	118

## Case Kidd

A 48-year-old male with newly diagnosed stage IV lung adenocarcinoma who presented with altered mental status, elevated troponin and anaemia, was transfused Red blood cells for the treatment of anaemia (hemoglobin 6.6 g/dl). Half through the RBC pack, he developed chills, rigors and dyspnoea along with bronchospasm and wheezing. He was tachypneic (RR 26) and tachycardic (PR 120). His BP was relatively stable, and SPO2 was over 90 % in room air. Transfusion was stopped immediately, and the remaining blood was sent to the laboratory for suspected transfusion reaction. The patient's temperature remained stable prior to and after the procedure (37.0 C and 36.4C, respectively). There was no sign of discrepancy during clerical check, no evidence for serologic incompatibility and no signs of hemolysis present on visual check post reaction. DAT was negative.

Post-transfusion chest x-ray demonstrated the following:

1. Slightly increased right trace/small pleural effusion and left lower lobe opacities/early consolidation. Findings favor worsening oedema/volume overload with infectious process at the left lung base not excluded in the appropriate clinical setting.
2. Similar appearing right upper lobe apex soft tissue density/consolidation with resorptive/destructive changes of the right 2nd rib posteriorly.

In the morning following the transfusion, the patient was noted to be tachycardic, with labored breathing and wheezing. He improved following an albuterol treatment and diuresis.

Parameters

	Pre-transfusion	During reaction	Post-transfusion
Temp	37.0 <sup>0</sup> C		36.4 <sup>0</sup> C
BP	150/80	150/80	
O2 saturation		>90% in room air	
Respiratory Rate		26	
Pulse Rate		120	

## Case Diego

A man aged 83 with Type 2 diabetes, COPD and history of paroxysmal AF is admitted with symptomatic iron deficiency anaemia (Hb 4.6 mMol/L/7.4 g/dL). A 1-unit RBC transfusion is prescribed and is administered over 4 hours. At the time of taking down the empty bag he is found to be hypoxic (O2 saturation 80%) and complains of a shortness of breath and cough. Iv furosemide following the transfusion had already been prescribed and is given. A CXR is performed and is reported as “consistent with circulatory overload”. The patient shows good diuresis and recovers.

### Parameters

	At start of Transfusion	During reaction	After recovery
BP	133/61	153/58	149/61
O2 saturation	94%	80%	95%

(Temp not stated)

## Case Scianna

A woman aged 61, under treatment for haematological malignancy, receives a single unit RBC transfusion over two hours (indication: low Hb). 1h 30 mins after the end of transfusion she develops a rise in temperature ( $\geq 1 < 2$  °C), rigors and drop in blood oxygen saturation, and the report states that there is iatrogenic circulatory overload for which an IV furosemide infusion with a pump is started.

### Parameters

	At start of Transfusion	During reaction	After recovery
Temp (°C)	36.4	37.3	38.3
BP(mm Hg)	97/64	121/65	
O2 saturation (%)	94%	80%	95%
Hemoglobin (mMol/L)	Before: 4.7, after 2 RBC total: 5.7		
LDH u/L	Before: 102, after: 138 (on 2nd day)		
Bilirubin mMol/L	Before: 10, after: 5 (on 2nd day)		
Haptoglobin g/L	5.24		

Chest: CXR (10 mins after symptoms were noted) with image from three days previously for comparison. Sitting AP film, cardiac silhouette appears slightly enlarged but comparable to previous examination. At most, mild lung vessel congestion which could be consistent with a degree of circulatory overload. No infiltrative changes.

Further investigations: no blood group serological abnormalities. Patient blood cultures negative, culture of empty bag negative.

The oxygen saturation recovers to 100% with 15 litres O<sub>2</sub>, and the dyspnoea subsides.

## Case Dombrock

A woman in her 70s with haematological malignancy has been admitted with cellulitis. An RBC transfusion is prescribed because of Hb 4.8 mMol/L. The transfusion is started at 10.45 in the morning. After two hours (approximately 200 ml has been infused) she has a rise in body temp of  $\geq 2^{\circ}\text{C}$ , rigors, dyspnoea and a drop in the oxygen saturation. Her lips are cyanotic and she has marbled legs and urine production drops, but despite the clinical deterioration she remains responsive.

Parameters

	At start of Transfusion	During reaction	After recovery
Temp ( $^{\circ}\text{C}$ )	36.3	38.3	
BP (mm Hg)	127/60	185/113	156/96
O2 saturation (%)		73	98

She is treated with oxygen supplementation, IV clemastine, prednisone and furosemide. She recovered gradually over the next two hours.

Chest X-ray 30 mins after symptom onset: reduction of pneumonia in right basal lung fields but not yet completely resolved. Moderate cardiac decompensation.

Further investigations: no blood group serological abnormalities. Patient blood cultures negative, culture of empty bag negative.

## Case Colton

A man in his 60s with COPD, a previous myocardial infarction (over 30 years ago) atherosclerotic vascular problems and stable angina pectoris, has been admitted to a cardiology ward because of chest pains in combination with anaemia from ongoing melaena. He is prescribed a transfusion of RBC (three units were intended) and the first unit is administered over 4 hours (8.45 till 12.45). At the time of taking down the empty bag he has an increased body temperature ( $\geq 1 < 2$  °C), shortness of breath and a drop in the oxygen saturation. The physician suspects TRALI and the patient is transferred to the ICU and intubated.

### Parameters

Hemoglobin (mMol/L)	before: 4.5 after: 5.3
LDH u/L	before: 200 after: 209
Bilirubin mMol/L	before:4 after: 5
Haptoglobin g/L	after 2.3

No cultures are taken; blood group serology shows no abnormalities.

Chest X-ray (AP) on the ICU shows the tube in a good position. Extensive consolidation in the right lung, most dense in the lower lung fields. Consistent with extensive pneumonia. Left lung normal though slightly radiolucent consistent with pre-existing emphysema.

Ultrasound examination 1 week prior to admission showed reasonable left ventricular function and good right ventricular function. During the ICU admission, the ultrasound examination shows poor LV function.

During the ICU admission, ECG shows ST segment depression and marginally increased cardiac enzymes (CK max 205, reference range  $< 200$  U/L). The patient is treated with inotropic support (noradrenalin and enoximone) and the diuresis improves combined with clinical improvement. He is de-tubated on the next day.

### NOTES

1. Patient took no diuretics before or during admission
2. Radiologist comments that asymmetrical congestion (in this case essentially one-sided) can occur if there is asymmetry of the emphysema.

## Case Landsteiner-Wiener

An 86-year-old female weighing 41.8 Kg with a history of respiratory tract infection and 3-month history of shortness of breath, was admitted with diabetic ketoacidosis. The pre-transfusion chest x-ray showed the heart size on the upper limit of normal with interstitial oedema and bilateral effusions. No overt collapse or consolidation. Ill-defined airspace shadowing in right lower zone which could be inflammatory. She was found to be anaemic. There were no other reported co-morbidities. She was transfused with 2-unit red cell. The transfusion was discontinued after 150ml of second unit. Patient developed dyspnoea and respiratory failure within 0-2 hours of transfusion and required non-invasive ventilation on ITU. Post transfusion chest x-ray showed marked airspace shadowing in-keeping with pulmonary oedema. The patient was treated with Diuretic, adrenaline and vasopressors. She improved after the treatment.

### Parameters

	At start of Transfusion	During reaction
Heart Rate	100	115
BP(mm Hg)	160/70	179/69
Respiratory Rate	24	26
O2 saturation (%)	97%	reduced (no figure given)
Chest x-ray (pre-transfusion)	Heart size on the upper limit of normal with interstitial oedema and bilateral effusions. No overt collapse or consolidation. Ill-defined airspace shadowing in right lower zone which could be inflammatory.	
Chest x-ray (Post-transfusion)	Marked airspace shadowing in-keeping with pulmonary oedema	
Fluids	1000ml concomitant fluid in the 24 hours prior to the reaction. Fluid balance +2000ml positive	

## Case Chido

A 70-year-old female with a history of Acute Myeloid Leukaemia (transfusion dependent) and asthma, presented with shortness of breath due to symptomatic anaemia. The patient received three units of red cells and developed, dyspnoea, tachypnoea, wheeze, and increased oxygen requirements within 6-12 hours of transfusion. She also developed peripheral oedema and remained afebrile. No post transfusion chest x-ray reported but reporting organisation mentions the development of pulmonary oedema (presumably a clinical diagnosis). The patient was treated with steroid, diuretic and bronchodilator. Her respiratory symptoms improved after the treatment.

### Parameters

	At start of Transfusion	During reaction
Heart Rate	100	103
BP(mm Hg)	114/57	163/99
Respiratory Rate	22	32
O2 saturation (%)	96% on room air	96% on 2L oxygen
Fluids	Some drugs in small volume of IV fluids (total volume unknown). No fluid balance reported.	

## Case Knops

A woman aged 18 with a haematological condition attends the day care unit for a unit of platelets after which bone marrow aspiration is planned. Shortly after the transfusion she shows a rise in temperature of  $\geq 2$  °C, rigors, dyspnoea, drop in saturation and in blood pressure. She is very unwell and is admitted to the ward from the day care unit.

### Parameters

	At start of Transfusion	During reaction	After recovery
Temp (°C)	37.0		39.1
BP (mm Hg)	103/55	69/45	109/49

Chest X-ray: bilateral patchy consolidations, could be bilateral infiltration.

Other investigations: blood group serology and hemolysis parameters no abnormalities; patient blood culture and bacteriological culture of remnant of unit: negative.

Treatment: clemastine, hydrocortisone, IV normal saline, non-rebreathing mask with 15L O<sub>2</sub>. Bone marrow is postponed. Antibiotic treatment is initiated because of the fever. CRP=78 mg/L (increased).

## Case Gerbich

A female patient aged 73 with stable diabetes mellitus is being treated with chemotherapy for oesophageal cancer (curative intent). Five hours after the start of a single RBC transfusion she develops hypercapnic respiratory failure.

The pre-transfusion chest X-ray image shows COPD features with some Left-Right asymmetry. At the time of reaction interstitial markings are increased with a tendency to become confluent in the upper right lung fields. (No redistribution, no peribronchial cuffing, not consistent with pulmonary oedema)

No blood cultures taken. She is admitted to the ICU, intubated and ventilated. Two days later respiratory problems have resolved and she is detubated.

## Case Cromer

A man aged 60, one-week post haematopoietic stem cell transplantation, receives a unit of irradiated leukodepleted pooled platelets. Three hours later he acutely becomes dyspnoeic with shivers and a temp of T 38.2°C (before transfusion 38.0 °C); he remains hemodynamically stable. He is given oxygen supplementation with a non-rebreathing mask, 8 mg dexamethason and 2 mg clemastine IV. Chest X-ray (recumbent): patchy appearance over all lung fields, consistent with ARDS. Blood culture and culture of remnant of unit negative. Blood group serology negative.

Within a few hours he starts to improve and the oxygen supplementation is gradually withdrawn.

## Case Raph

~ 60-year-old, ~ 60 kg female, with a history of a coagulation factor deficiency and anti-E, K alloantibodies received two units of Fresh Frozen Plasma (~600 ml) without incident status post radial head fracture surgery. No other fluids given. Approximately four hours after transfusion and discharge from the outpatient setting, the patient noted malaise, fever, shortness of breath, and new onset of a non-productive cough. After discussions with her hematologist, who recommended she return to the Emergency Department, she elected to forgo further evaluation until the next day at which time she presented with worsened dyspnoea and persistence of her previously described symptoms.

On admission she was found to be hypoxic (oxygen saturation decreased to 90%) and was placed on 2 liters of oxygen. A chest x-ray compared to a previous one obtained ~ 18 months prior revealed no change in heart size but the new onset of small bilateral pleural effusions overlying the posterior costophrenic sulci and diffuse alveolar space densities were noted.

Her symptoms improved with oxygen and supportive care.

Chart review showed that the patient's vital sign values were essentially unchanged except her BP which decreased over the course of the hemotherapy (HT) from 134/70 mm Hg to 104/60 mmHg (95/63 mm Hg ~ 24 hours post HT).

Testing was performed per Blood Bank protocol and showed that the donor of the second unit (multiparous female positive for antibodies to both Class I and Class II HLA antigens) had five anti- HLA DR antibodies with cognate specificities matching HLA antigens of the recipient.

## Case Globuside

A 53-year old male patient presented for outpatient follow-up at infusion/ transfusion clinic for surveillance of cytopenias following a recent hematopoietic progenitor cell transplant. The patient's blood type was A positive. He received an A positive apheresis platelet transfusion for bleeding prophylaxis in the setting of a platelet count of  $9.0 \times 10^9/L$ . The patient developed fever, rigors and dyspnoea within one hour following the conclusion of the transfusion requiring oxygen supplementation by nasal cannula. There was no pretransfusion x-ray. Subsequent chest x-ray revealed bilateral pulmonary infiltrates. There was no history of congestive heart failure prior to reaction (post-reaction ejection fraction was 61%). Patient recovered approximately one day later. Testing showed HLA cognate or cross-reactive antigen present in the platelet and the recipient.

	Pre-transfusion	Post-transfusion
BNP		1046 (normal range < 62)
O2 saturation	98	85 on nasal canula O2

## Case Indian

A 70-year old male with mitral valve endocarditis was ordered for one unit of packed red blood cells prior to mitral valve replacement surgery. There was no history of blood bank serology problems or of transfusions. ~15 minutes into the transfusion the patient complained of chills and painful difficulty breathing and the transfusion was stopped by the nurse and the physician called to evaluate the patient. Clinical assessment at the bedside revealed the patient to be afebrile but an increase in blood pressure was noted and wheezes were auscultated bilaterally. Antihistamines were given and a respiratory treatment performed. Status post these interventions the patient's oxygenation saturation improved from 90% to 100%. The Blood Bank was notified and a suspected transfusion reaction (STR) evaluation was requested.

Evaluation in the Blood Bank revealed all clerical checks to be in order. Although a visual check of the post-transfusion specimen was positive for hemolysis, the repeat antibody screen was negative. The direct antiglobulin test (DAT) performed on the post-transfusion specimen was weakly positive using anti-polyspecific and anti-IgG reagents; an RBC eluate was performed and was negative. Bacterial culture studies were requested on the unit.

Repeat ABO/RhD testing was performed on the pre-transfusion specimen of the patient and was typed as group A RhD positive. The patient's post-transfusion specimen typed as group O RhD positive. Typing of the involved unit revealed it to be A Rh positive. A urinalysis was 3+ positive for hemoglobin. Natriuretic peptide (NT Pro-BNP) testing was performed and revealed the following values: Pre-Transfusion level = 7,977 pg/mL; Immediate Post-Transfusion level = 9,013 pg/mL; Delayed Post-Transfusion level (~ 15 hours post) = 8,087pg/mL

## Case ABO

A 73-year-old male with A positive blood type, was transfused with a unit of A positive irradiated and leukoreduced pooled platelets, for an internal bleed. Thirty-five minutes post transfusion, he developed chills, rigors, fever, and shortness of breath. There was no previous transfusion reaction.

### Parameters

	Pre-transfusion	Post-transfusion
Temp	97.6 °F	103.9 °F
BP	127/45	149/84
Respiratory Rate	18	38
O2 saturation	NA	NA

Post transfusion patient blood culture grew Staph aureus

## Case Forssman

A woman aged 77 is anaemic following vascular surgery and a unit of red blood cells is started. After 30 mins (roughly 125 ml has been infused) she becomes dyspnoeic and the transfusion is stopped. A chest X-ray shows no pulmonary oedema. She is treated with nebulisation and 5L/min of supplementary oxygen and makes a full recovery. Bacteriological culture of the remainder of the unit gives negative results.

### Parameters

	at start	at reaction	After recovery
Temp. °C		38.0	38.9
Heart rate/min		85	81
BP		117/69	124/60
O2 saturation		79%	93%

## Case Langereis

A male patient, 79 years old, is receiving treatment for haematological malignancy. He is admitted with low-grade fever and antibiotics have been started. He receives a leukodepleted red blood cell unit over 4 hours and shortly afterwards develops fever and dyspnoea.

Chest X-ray is taken soon after start of symptoms: unchanged cardiomediastinal contour in comparison to previous image. No peripheral consolidation, no features of ARDS or TRALI. No consolidation or congestive features.

### Parameters

	at start (23.15 hrs)	at reaction (03.15)	Next afternoon
BP	124/40	141/50	95/55
Heart rate	87	110	70
Temp. °C	39.1		Normal

Blood group serology and hemolysis parameters: no abnormalities

Patient blood culture and culture of remainder of unit: negative.

No diuretics are administered. Any other treatment given: not stated.

## Case Junior

A male patient aged 67 is transfusion-dependent with myelofibrosis. A transfusion of red blood cells is started but after 15 minutes (30 ml approximately have been given) he shows a drop in oxygen saturation to 82%. Increasing the oxygen flow to 4L by nasal prongs provides insufficient benefit so he is given a non-rebreathing mask. With this his condition improves. No chest X-ray is taken. A blood culture taken at the time of the reaction gives negative results.

### Parameters

	at start	at reaction	After recovery
Temp. °C	36.7	37.1	37.2
BP	118/55	111/62	117/63
O2 saturation	90%	82%	100%

## Case Vel

A man of 57, receiving chemotherapy treatment for a haematological malignancy, is neutropenic and febrile. After an uneventful transfusion with one unit of red blood cells a second unit is started but after 45 minutes (200 ml has been given) he develops dyspnoea, chills with a rise in body temperature and feels unwell.

### Parameters

	at start	at reaction	After recovery (next morning)
Temp. °C	37.8	39.3	39.0
BP	118/63	120/68	123/61
Heart rate (per min)	89	124	
O2 saturation		84	96%

Treatment was administered: hydrocortisone and pethidine and 5L O<sub>2</sub>; he improved over the next half hour. The blood culture taken at the time of the reaction gave negative results. Chest X-ray showed no pulmonary infiltrates or pulmonary pathology.

## Case MNS

A 72-year-old male weighing 86 Kg was admitted to ITU with heart failure, sepsis and history of diarrhea. He had a history of renal impairment, ischaemic heart disease, MI and coronary stents. The pre-transfusion chest x-ray showed patchy perihilar opacification suggesting early pulmonary oedema. He received two units of red cells. Within 6-12 hours of transfusion he developed worsening respiratory function and increased oxygen requirements. The post-transfusion chest x-ray showed gross bilateral airspace filling more marked and extensive on the left with a differential diagnosis of pulmonary oedema/fluid overload, infection, aspiration and ARDS. Echocardiography showed a normal ventricular size and a mild reduction in LV function.

Three doses of diuretics were given producing a good diuresis of 1580ml but with there was no change in respiratory function.

### Parameters

	At start of Transfusion	During reaction
Heart Rate	61	52
BP(mm Hg)	108/41	129/41
Respiratory Rate	22	22
O2 saturation (%)	95%	89%
Chest x-ray (pre-transfusion)	Patchy perihilar opacification suggesting early pulmonary oedema.	
Chest x-ray (Post-transfusion)	Gross bilateral airspace filling more marked and extensive on the left with a differential diagnosis of pulmonary oedema/fluid overload, infection, aspiration and ARDS.	
Fluids	Colloid and crystalloid in the 24 hours prior to transfusion. Fluid balance +727ml positive.	