Wrightington, Wigan and Leigh NHS
NHS Foundation Trust

STANDARD OPERATING PROCEDURE:	**MASSIVE TRANSFUSION**
SOP NO:	**TW10-041 SOP 5**
VERSION NO:	**2**
DATE THIS VERSION APPROVED:	**April 2016**
APPROVING COMMITTEE:	**Hospital Transfusion Team / Governance & Risk Committee**
RATIFYING COMMITTEE:	**PARC (Policy Approval and Ratification Committee)**
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AUTHOR(S) (JOB TITLE)	**Hospital Transfusion Team**
DIVISION/DIRECTORATE	**Medicine/Specialist Services**
TRUST WIDE SOP (YES/NO)	**Yes**
Links to other Policies, SOP's, Strategies etc:	**TW10/041 BLOOD TRANSFUSION POLICY AND GUIDELINES** TW10/041 SOP 1 Blood Products available through Blood Transfusion Laboratory TW10/041 SOP 2 Clinical Applications of Blood Components TW10/041 SOP 3 Procedures for Ordering & Administering Blood & Blood Components Including Patient Identification TW10/041 SOP 4 Adverse Effects of Transfusion TW10/041 SOP 6 Guidelines for Obstetrics TW10/041 SOP 7 Guidelines for Transfusion of Infants & Neonates

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Manager responsible for review (Job title**)**	**Consultant Haematologist in charge of Blood Transfusion**	

AT ALL TIMES, STAFF MUST TREAT EVERY INDIVIDUAL WITH RESPECT AND UPHOLD THEIR RIGHT TO PRIVACY AND DIGNITY

1. GUIDANCE FOR MAJOR HAEMORRHAGE

1.1 Definition

Suspect Major Haemorrhage if any of below:

1.1.1 Loss of one blood volume within a 24-hour period.
OR
1.1.2 50% blood volume loss within 3 hours.
OR
1.1.3 Loss of 150 ml/min of blood

1.2 Consider major haemorrhage if bleeding leads to a heart rate more than 110 beats/ min and/or systolic blood pressure less than 90 mmHg .

1.3 Priorities for treatment are:
1.3.1 Restoration of blood volume to maintain tissue perfusion and oxygenation
1.3.2 Achieving haemostasis by:
1.3.3 Treating any surgical, traumatic or obstetric source of bleeding
1.3.4 Correcting coagulopathy by judicious use of blood component therapy

1.4 It is imperative to recognize major blood loss early and institute effective action promptly if shock and its consequences are to be prevented

2 PROBLEMS

2.1 Blood volume replacement

Aim for normal systolic pressures and pulse rate, a urine output of at least 0.5 - 1 ml/ kg / hour and haematocrit values of 0.32. The accuracy of the assessment of blood loss may be improved by the insertion of a central venous line. A urinary catheter will aid overall assessment of fluid status after the immediate crisis is controlled.

2.2 Thrombocytopenia

Dilutional thrombocytopenia should be anticipated during massive blood replacement, particularly if there is also evidence of disseminated intravascular coagulation (DIC). Platelet counts should be maintained above 50 x 10^9/l (see below).

2.3 Coagulation factor depletion

This may be due to reduced levels in stored plasma reduced blood, dilutional effects and DIC. (See below for guide to ordering fresh frozen plasma).

2.4 Hypocalcaemia

The citrate in anticoagulant fluids binds ionised calcium and potentially lowers plasma calcium levels. This is not usually a clinical problem because the healthy adult liver metabolises citrate very quickly. However, neonates and hypothermic patients are especially vulnerable to citrate toxicity. Where clinical and ECG evidence suggest hypocalcaemia, 5 ml of 10% calcium gluconate (less for children and neonates) should be given at 5-minute intervals IV until ECG is normal.

2.5 Hypothermia

In order to maintain the patient's core temperature, give blood and other fluids through a blood warmer if large volumes are given at > 50 ml/kg/hour (approx 2 units within 1 hour). A warming blanket should also be used.

2.6 **Adult respiratory distress syndrome (ARDS)**
Prolonged hypotension and shock predispose to ARDS. It is more likely in patients with persistent congestive cardiac failure, sepsis, and those who are either undertransfused or overtransfused.

3 PRINCIPLES OF TRANSFUSION MANAGEMENT OF ACUTE BLOOD LOSS

3.1 Insert at least one large IV cannula (consider central venous line), obtain blood samples for blood group, cross match, FBC, coagulation tests and U+E's, then infuse crystalloid (e.g.: 0.9% saline) as rapidly as possible until an acceptable systolic blood pressure is restored.

3.1.1 Contact key personnel : clinician in charge, Consultant anaesthetist, Blood transfusion biomedical scientist, Consultant Haematologist.

3.1.2 Restore circulating fluid volume to correct hypoperfusion. If less than 20 % of blood volume has been lost (i.e. up to 1 litre in an adult), replace with crystalloid. If more than 20% of blood volume has been lost (i.e. more than 1 litre in an adult) replace with crystalloid and colloid (Haemacel or Gelofusine) until red cells are available.

3.1.3 Achieve surgical control of bleeding.

3.1.4 Maintain adequate blood oxygen transport capacity.

3.1.5 Request early coagulation screen (INR, APTT, FDP's, fibrinogen). The results may help to guide blood component therapy should bleeding persist after attempted surgical haemostasis.

3.2 A successful outcome requires prompt action and good communication between specialties, diagnostic laboratories, hospital laboratory staff and the Blood service. Blood component support takes time to organize.

3.3 Early consultation with senior surgical, anaesthetic and haematology colleagues is essential and the importance of good communication in this situation cannot be overemphasised.

3.4 Accurate documentation of blood components given and the reason for transfusion is necessary in order to enable audit of outcome and satisfy legal requirement for full traceability

3.5 The hospital blood bank should be informed of potential massive transfusion situation at the earliest possible opportunity.

4 GUIDE TO ORDERING BLOOD COMPONENTS

4.1 **Red cells**

4.1.1 The degree of urgency for transfusion should be accurately conveyed to the blood bank.

4.1.2 Routine procedures for blood grouping, antibody screening and compatibility testing should be followed as far as practicable unless it is obvious that massive transfusion is likely.

4.1.3 In emergencies, give group ABO RhD group specific blood if it is possible to wait for emergency blood grouping. In extreme emergencies, where delay would lead to death of patient, group O blood should be supplied; RhD negative and Kell negative blood should always be given to women of childbearing age and consider O RhD Positive in males.

4.2 For such extreme emergencies, **Group O Rh D Negative Blood** is kept in the blood fridges:

Path lab Blood Fridge Room, RAEI, level 3	2 units 2 Paediatric Units
Wigan theatres	2 units
Leigh Path lab	4 units
Wrightington 'blood fridge room' Next to Pathology	4 units

4.3 ABO and RhD matched units can be issued following completion of emergency grouping. As soon as time permits, an antibody screen will be performed on the patient's pre-transfusion sample.

4.4 Red cell transfusion is likely to be required when 30% to 40% blood volume is lost, whilst over 40% blood volume loss is immediately life threatening. Transfusion is rarely indicated when Hb >100 g/L and almost always indicated when Hb <80 g/L.

4.5 **Platelet concentrates**

4.5.1 Platelet concentrates (2 doses) are indicated for continuous non-surgical bleeding when platelet counts are below 50 x 10^9/l or falling towards that value. This should be anticipated when approximately 2 blood volumes have been replaced by plasma poor red cells. These should be ordered through the blood bank during working hours or through the BMS on call at other times.

4.5.2 The platelets come from the Manchester Blood Centre, so there will be a delay of at least 1 hour before they are available.

4.6 **Fresh frozen plasma (FFP) and cryoprecipitate**

Red cell replacement is likely to be in the form of plasma poor red cells in which coagulation factor activity is negligible; under these circumstances, coagulation factor deficiency is the primary cause of coagulopathy.

4.6.1 FFP (12 – 15 ml/kg equivalent to 4 units for adults) should be considered after one blood volume has been lost, particularly where there is microvascular bleeding with laboratory results that show abnormal coagulation (eg: PT ratio > 1.5, APTT > 1.5), or if there is evidence of DIC (abnormal INR, APTT, fibrinogen <1.5g/dl, D-Dimer > 192). Allow 30 minutes thawing time.

4.6.2 Cryoprecipitate (Dose is 1 pooled pack per 33 kg body weight standard dose for adult = 2 pooled packs (5 units in each pack) should be considered when fibrinogen level fall below 1.5g/l, particularly if there is microvascular bleeding or evidence of DIC.

4.6.3 It is preferable for major vessel bleeding to be stemmed surgically before attempting to correct haemostatic abnormalities

5 MANAGEMENT OF MAJOR HAEMORRHAGE FLOW CHARTS

National Patient Safety Agency (NPSA) states that all Trusts should have protocols in place to aid staff when dealing with a major haemorrhage. The following pages contain the flow charts that should be used when a major haemorrhage occurs.

Transfusion Management of Major Blood Loss in Adults

Recognise major blood loss

Severe bleeding e.g.: 150 mls /min, Clinical shock / collapse

Call for help

Consultant / Senior involvement is essential.
Clinical Speciality to use local arrangements to contact emergency team.

Blood Bank Number: 2145 for all sites at all times.
Tell Blood Bank Staff:
- **"I want to activate the Major Blood loss Protocol"**
- **Your location**
- **Name of nominated clinical lead and contact number**
- **Patient information; Full Name, Hospital Number, DOB.**
- **Whether Emergency O Rh D negative blood products have been used and how many units**

Take bloods and send to lab: Correctly labelled: XM, FBC, PT, APTT, U+E, Ca^{2+}, fibrinogen, A(BG)

STOP THE BLEEDING

Haemorrhage Control:
Direct pressure / tourniquet if appropriate.
Stabilise fractures.
Surgical intervention – consider damage control surgery.
Interventional radiology
Endoscopic techniques
Obstetric techniques

Haemostatic Drugs:
Tranexamic acid 1g bolus followed by 1g over 8 hrs
Vitamin K and Prothrombin complex concentrate for warfarinised patients

Use cell salvage if available and appropriate:
Consider ratios of other components:
1 unit of red cells = c.250 mls salvaged blood

Urgent Blood Products required

Order minimum of 4 units of blood and tell Blood Bank how urgently you need blood:
Immediately (use Emergency O Rh D Negative blood), within 15 mins (Group specific, uncross-matched), or within 45 mins (Cross-matched blood).
Remember there will be at least 45 min transport delay for Euxton, Leigh & Wrightington.

If massive transfusion give:
FFP:RBC in 1:2 ratio; consider a dose of platelets
(For Trauma FFP:RBC in 1:1 ratio)
NB FFP takes 30 minutes to defrost, Platelets take up to 90 mins to arrive on site at Wigan

Aims for therapy

Aim for:	
Hb	8-10g/dl
Platelets	>50 x 10^9/l
PT ratio	< 1.5
APTT ratio	<1.5
Fibrinogen	>1.5g/l
Ca^{2+}	>1 mmol/l
Temp	> 36°C
pH	> 7.35 (on ABG)

Monitor for hyperkalaemia

Reassess

Suspected continuing haemorrhage requiring further transfusion:

Take repeat bloods and send to lab:
FBC, PT, APTT, fibrinogen, U+E, Ca^{2+} A(BG)

If fibrinogen <1.5g/l (<2g/l in obstetric haemorrhage) give 2 packs of cryoprecipitate (NB Cryoprecipitate takes 30mins to defrost)

If there is life threatening uncontrolled bleeding, despite all measures, discuss with Consultant Haematologist

Location of Emergency O Rh D Negative blood:

RAEI
2 units Path Lab Blood Fridge room

2 units Theatre

Wrightington
4 units Ward/Dept Blood fridge outside pathology

Leigh
4 units Path lab

Euxton
2 units Hospital Fridge

When patient is stable: STAND DOWN

Inform Blood Bank. Return unused components.
Complete documentation, including audit proforma.

→ Thromboprophylaxis should be considered when patient is stable

APTT – Activated partial thromboplastin time
PT- Prothrombin Time
FBC- Full blood count
U+E- Urea & Electrolytes
FFP- Fresh Frozen plasma
XM – Crossmatch
A(BG) – Arterial Blood Gas

Transfusion Management of Major Blood Loss in Children

Recognise major blood loss

Ongoing severe bleeding (overt / covert) and received 20ml/kg of red cells or 40ml/kg of any fluid for resuscitation in preceding hour. Signs of hypovolaemic shock and / or coagulopathy.

Call for help

Consultant / Senior involvement is essential.
Clinical Speciality to use local arrangements to contact emergency team.

Blood Bank Number: 2145 for all sites at all times.
Tell Blood Bank Staff:
- **"I want to activate the Major Blood loss Protocol"**
- **Your location**
- **Name of nominated clinical lead and contact number**
- **Patient information; Full Name, Hospital Number, DOB.**
- **Whether Emergency O Rh D negative blood products have been used and how many units**

Take bloods and send to lab: Correctly labelled XM, FBC, PT, APTT, U+E, Ca^{2+}, fibrinogen, (A)BG

STOP THE BLEEDING

Haemorrhage Control:
Direct pressure / tourniquet if appropriate.
Stabilise fractures.

Surgical intervention – consider damage control surgery.
Interventional radiology
Endoscopic techniques

Haemostatic Drugs:
Tranexamic acid 15mg/kg bolus over 10mins (max 1.0g) and 2mg/kg/hr infusion (max 125mg/hr until bleeding controlled).

Vitamin K and Prothrombin complex concentrate for warfarinised patients

Urgent Blood Products required

Order minimum of 40 ml/kg blood and tell Blood Bank how urgently you need blood:
Immediately (use Emergency O Rh D Negative blood),
within 15 mins (Group specific uncross-matched) or within 45 mins (Cross-matched blood).

If major trauma / massive transfusion give:
- **20ml/kg Methylene blue treated FFP**
- **10 ml/kg Platelets (give paediatric platelets if patient is less than 10 kg)**

NB FFP takes 30 mins to defrost, Platelets take up to 90 mins to arrive on site at Wigan

Aims for therapy

Aim for:

Hb	80-100g/L
Platelets	>75 x 10^9/l
PT ratio	< 1.5
APTT ratio	<1.5
Fibrinogen	>1.5g/l
Ionised Ca2+	>1.0 mmol/l
Temp	> 36oC
pH	> 7.35 (on (A)BG)
pH	> 7.25 (capillary BG)

Monitor for hyperkalaemia

Reassess

Suspected continuing haemorrhage requiring further transfusion

Take repeat bloods and send to lab:
FBC, PT, APTT, fibrinogen, U+E, A(BG), Ca^{2+}

If fibrinogen <1.5g/l give 10ml/kg cryoprecipitate (methylene blue treated if patient is less than 5kg).
NB Cryoprecipitate takes 30mins to defrost.

Location of Emergency O Rh D Negative blood:

RAEI
2 adult units Path lab Blood Fridge room
2 paediatric units Path Blood Fridge room
2 adult units Theatre fridge

(Neonates & infants under the age of 1 year must be given paediatric units as HEV Negative)

When patient is stable: STAND DOWN

Inform Blood Bank. Return unused components.
Complete documentation, including audit proforma.

→ Thromboprophylaxis should be considered when patient is stable

APTT – Activated partial thromboplastin time
PT- Prothrombin Time
FBC- Full blood count
U+E- Urea & Electrolytes
FFP- Fresh Frozen plasma
XM – Crossmatch
A(BG) – Arterial Blood Gas

Laboratory Management of Major blood loss

Transfusion receives Call; "I want to Initiate the Major Blood loss Protocol"

Details Recorded:

- **Location of the patient**
- **Name of nominated clinical lead and contact number**
- **Patient information; Full Name, Hospital Number, DOB.**
- **Whether Emergency O Rh D negative blood products have been used and how many**

Clarify X-match sample and request form have been sent

If a valid Group & Screen sample for the patient is still available no further X-match sample is required.
Check Telepath to confirm.

Clarify urgency of blood product request(s)

Red cells needed immediately: Tell staff to use Emergency O Rh D Negative red cells and replace used units ASAP
Red cells needed within 15 mins: If patient has no transfusion history issue uncross -matched Group specific units.
If patient has a valid Group & Screen available and patient has a negative antibody screen use Electronic issued units.
Red cells needed within 45 mins: Issue X-matched or Electronic issued red cells, as appropriate.

Advise clinical lead to liaise with Haematology Consultant

If life threatening uncontrolled bleeding despite all measures laboratory staff can advise clinical lead to discuss with Consultant Haematologist.

Check current blood / blood product stocks

Order more blood / blood products if required.
If more products are required ASAP (e.g. platelets) order via 'Blue Light'

Ask Haematology & Biochemistry staff to inform clinical lead of any abnormal test results

Ring clinical lead when blood components are ready

Advise regular repeat of laboratory tests:
FBC, PT, APTT, fibrinogen, U+E, A(BG), Ca^{2+}

Once stand down notification has been received

Ensure all satellite fridges contain a full stock of Emergency O Rh Negative blood
Sort out any returned, unused blood products.

Senior BMS staff to fill in audit proforma and send to Clinical Lead for completion.

APTT – Activated partial thromboplastin time
PT- Prothrombin Time
FBC- Full blood count
U+E- Urea & Electrolytes
FFP- Fresh Frozen plasma
XM – Crossmatch
A(BG) – Arterial Blood Gas

6 SEVEN STEPS FOR SUCCESSFUL COORDINATION IN MASSIVE HAEMORRHAGE

6.1 Recognise trigger and activate pathway for management of massive haemorrhage; assemble the emergency response team

6.2 Allocate team roles
- 6.2.1 Team leader
- 6.2.2 Communication lead – dedicated person for communication with other teams, especially the transfusion laboratory and support services
- 6.2.3 Sample taker / investigation organiser / documenter
- 6.2.4 Transporter - member of team from clinical area.

6.3 Complete request forms / take blood samples, label samples correctly/recheck labelling U+E, FBC, Cross-match, PT, APTT, Fibrinogen, A(BG), Calcium, lactate.

6.4 **Request blood / blood components**
Tell blood bank how urgently you need the blood; Immediately, within 15 mins or within 45 mins. Emergency O Rh D Neg blood (for immediate use).

6.5 **Communication lead to contact laboratory:**
Inform the BMS of the following:
- 6.5.1 Your name, location and ext number
- 6.5.2 I want to initiate the Major Blood Loss Protocol'
- 6.5.3 The patient's details: ideally surname, forename, hospital number, DOB and whether any Emergency O Rh D Neg has been used and how many units
- 6.5.4 Contact lab if blood has been transferred in with the patient from another Trust or patient is being transferred to another Trust.

6.6 **The clinical/laboratory interface**
- 6.6.1 Communication lead to arrange for transport of samples/request form to the laboratory
- 6.6.2 BMS to ring communication lead with results of urgent investigations
- 6.6.3 BMS to ring communication lead when blood/blood components are ready
- 6.6.4 Communication lead to arrange to collect blood and blood components from the laboratory.

6.7 **Communicate stand down of pathway** and let lab know which products have been used.

6.8 **Ensure documentation is complete**
- 6.8.1 Clinical area: monitoring of vital signs, timings of blood samples and communications, transfusion documentation in patient casenote record, return traceability information to laboratory, completion of audit proforma.

- 6.8.2 Laboratory: keep record of communications / telephone requests in patient laboratory record.

7 TRAINING AND EDUCATION

7.1 Relevant clinical areas need to be familiar with the protocol and ensure that staff understand where to find the protocol and be familiar with it. Regular training and drills also need to be performed.

7.2 The clinical areas that need to have this in place in particular include:
- 7.2.1 Medicine, especially Gastroenterology and Cardiac Catheter Lab

7.2.2 Surgery, especially Vascular and Theatres (Wrightington, Wigan & Leigh)
7.2.3 ICU / Anaesthetics
7.2.4 A&E
7.2.5 Maternity
7.2.6 Haematology / Blood Transfusion
7.2.7 Paediatrics

7.3 Training and education needs to be undertaken as part of local training.

8 DRILLS

8.1 A drill is to test the use of the protocol for major bleeding and to assess the local emergency system and modify local protocol.

8.2 Preparation for a drill:
8.2.1 Staff should be faced with the drill in a normal clinical area and be unprepared.

8.2.2 Drills should not conflict with patient care.

8.3 The drill organiser should have informed the clinical leads in advance.

8.4 An example of a drill should be prepared by each clinical area.

8.5 Clinical lead informs staff to proceed to act according to protocol for a situation that involves urgent blood. The situation is assessed:
8.5.1 On the use of the protocol
8.5.2 Communications with the lab
8.5.3 The collection of blood
8.5.4 The reassessment made on results
8.5.5 The completion of documentation including audit proforma

8.6 Each clinical area must undertake at least 1 drill per year and include all relevant staff. Drills should be co-ordinated by the clinical lead plus senior nurse for that speciality.

9 AUDIT

Each event is recorded and a laboratory audit proforma completed. Participation in regional major haemorrhage audit (see North West RTC Audit of Massive Haemorrhage form appendix 2). All incidents, where there are delays or problems, are to be investigated locally and reported to SHOT and MHRA.

10 HUMAN RIGHTS ACT

Implications of the Human Rights Act have been taken into account in the formulation of this policy and they have, where appropriate, been fully reflected in its wording.

11 ACCESSIBILITY STATEMENT

This document can be made available in a range of alternative formats e.g. large print, Braille and audiocd.
For more details, please contact the HR Department on 0194277(3766) or email equalityanddiversity@wwl.nhs.uk

Appendix 1

Wrightington, Wigan and Leigh NHS
NHS Foundation Trust

Massive Haemorrhage Transfusion Laboratory Checklist / Audit

This list should be completed in real time to ensure that the correct action is taken whenever the massive haemorrhage policy is activated. Tick when each activity is completed. BMS staff band 5 or above should deal with the phone call.

Name of person who has activated the policy: _____

Date and time of activation (24 hour clock) ___/___/_____ at ____:____ hours

Name of laboratory staff member (give your name as laboratory contact):
_____

Name of Consultant or Clinician responsible for Patient_____

Name of Patient_____

Patient's Hospital ID number_____ Location of patient_____

Communications Lead clinical area_____ Contact number_____

Agree what is required for provision of red cells:

- ☐ Immediate uncrossmatched group O Number of units : _____
- ☐ Group specific (15 mins)
- ☐ Fully crossmatched (45 mins)
- ☐ None- cell salvage is in use

Check for availability of platelets, if no stock order 1 by emergency delivery (group A HT neg if unknown) ☐

Check stocks of red cells and FFP when patient group is known Re-order if necessary. (Use AB FFP if group unknown). ☐

Inform Haematology and Reception areas of the patient's details and ask one staff member to phone all results as soon as available to the contact number and clinical contact provided (not applicable during night period) ☐

Note details of any problems or delays on the reverse of this form

Lab ID number:_____

Appendix 2

North West RTC Audit of Massive Haemorrhage

Part A

Audit code

Massive haemorrhage date DD MM YY

Time HH MM

Patient Age (years)

Diagnosis

Patient location Theatre | A&E | Ward | ICU | Labour ward | Other (specify)

Specialty

General Surgery	Vascular Surgery	Cardiac Surgery	Ortho-paedics/ trauma	A&E	ICU	Obstetrics	SCBU	Gastro-enterology	Plastics/ burns	Other (specify)

Was the pathway activated? Yes | No | If no, what happened?

Who activated pathway? Staff group | Grade | Specialty

Baseline

BP	Pulse	Resp rate

Was the pathway activation appropriate? Yes | No | Comments

Was Emergency O blood used? Yes | No | If yes, how many units and was it Pos or Neg?

	Date	Time	N/A
Start of red cell transfusion – Emergency O			
Group specific			
Crossmatched			
Salvaged red cells			
Start of FFP transfusion			
Start of platelet transfusion			
Start of cryoprecipitate transfusion			

In first 24 hours, total dose: *units, bags or ml (delete as appropriate)*

Allogeneic red cells	Salvaged red cells	FFP	Platelets	Cryoprecipitate
Units/ml	ml	Units/ml	bags/ml	bags/ml

Part A –cont'd

Results set:	Date	Time	Hb	Plt	PT	APTT	Fn		Yes	No
1								TEG?		
	Date	Time	Hb	Plt	PT	APTT	Fn			
2								TEG?		

Advice sought from Consultant Heamatologist/Haematology SPR? Yes ☐ No ☐ Time ☐☐ (HH MM)

What advice was given?

Were any other treatments used?
e.g.

	Yes	No	Dose	Date	Time	N/A
Tranexamic acid						
Fibrinogen concentrate						
rVIIa						
Prothrombin complex concentrate						

Did the patient have any other haemostatic challenge?

Warfarin	Yes ☐	No ☐	Corrective action		
LMWH	Yes ☐	No ☐	Corrective action		
Unfractionated heparin	Yes ☐	No ☐	Corrective action		
Aspirin	Yes ☐	No ☐	Corrective action		
Clopidogrel	Yes ☐	No ☐	Corrective action		
Coagulopathy - describe	Yes ☐	No ☐	Corrective action		

Where there any delays in treatment? Yes ☐ No ☐

If yes, please describe

Please returned completed part A to: Jane Murphy – RTC Administrator NWRTC
(Part B – patient outcome/follow up should be completed and returned when information available)

North West RTC Audit of Massive Haemorrhage

Part B

Audit code | | | | | |

Massive haemorrhage date | | | | (DD MM YY)

Time | | | (HH MM)

Patient Age (years) | |

Diagnosis | |

Patient outcome

	Alive	Deceased	Morbidity	N/A
24 hours				
4 weeks				

Please state morbidity: | |

Please state morbidity: | |

Blood product wastage? *(please write amount in units or ml)*

Red cells | | FFP | | Platelets | | Cryoprecipitate | |

Any other comments?

Please returned completed part B to: Jane Murphy – RTC Administrator NWRTC

References

1. The transfusion of blood and blood components in an emergency: National Patient Safety Agency Rapid Response Report NPSA/2010/RRR017 October 2010 http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=83659
2. Blood transfusion and the anaesthetist: management of massive haemorrhage. *Anaesthesia* 2010;95:1153-1161
3. Australian Patient Blood Management Guideline Module 1 Critical bleeding / massive transfusion 2010, currently in draft out to consultation
4. Management of bleeding following major trauma: an updated European Guideline *Critical Care* 2010,14:R52 Rossaint R et al
5. Johansson PI et al. Proactive administration of platelets and plasma for patients with a ruptured abdominal aortic aneurysm: evaluating a change in transfusion practice *Transfusion* 2007: 47; 593-8
6. *British Committee for Standards in Haematology* Guidelines on the management of massive Haemorrhage 2015 (British Journal of Haematology, 2015, 170, 788–803)
7. *Confidential Enquiries into Maternal and Child Health (CEMACH)* "Saving mothers" lives, reviewing maternal death to make motherhood safer - 2003-2005"
8. *Serious Hazards of Transfusion (SHOT) Scheme* SHOT has collected, analysed and reported on adverse reactions to transfusion and errors in the process of giving transfusions.
9. *Royal College of Obstetricians and Gynaecologists (RCOG)* The college issued in 2007 and updated in 2008 a document entitled *Blood transfusion in obstetric, further updated in 2015*
10. Green-*top guide 47: Blood transfusion in obstetrics*. Available at: *https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg47/*