Blood transfusion in special situations and poly-trauma

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“Uncontrolled bleeding is a major preventable cause of death in trauma accounting for 25%-35% of trauma deaths”

Challenges from transfusion perspective…

Timely provision

of the right blood components

to the right patient

Timely administration of blood components

Serious Hazards of Transfusion, Haemovigilance Scheme (SHOT)

October 2006-2009

10 deaths and 46 incidents where patient came close to death as a result of the delays in provision of blood in an acute situation

Recommend:

- **Team approach (include porters and switchboard)**
- **Recognise early and communicate clearly**
- **Pre-agreed protocols and empowerment of lab staff supported by training and drills**
- **Nominate clinical team member to liaise with lab and support services**
- **Clear message to trigger response 'Major Haemorrhage Protocol'**
- **Report incidents to SHOT**

NHS
National Patient Safety Agency

Delays in supplying emergency blood costs lives…

Risks are increased if staff are inadequately informed, appropriate urgent procedures are not in place, or because staff are not clear about their own responsibilities or the responsibilities of other staff groups in the transfusion chain

- Team approach (include porters and switchboard)
- Recognise early and communicate clearly
- Pre-agreed protocols and empowerment of lab staff supported by training and drills
- Nominate clinical team member to liaise with lab and support services
- Clear message to trigger response 'Major Haemorrhage Protocol'
- Regularly review activation of MHP
- Report incidents to SHOT

NHS National Patient Safety Agency

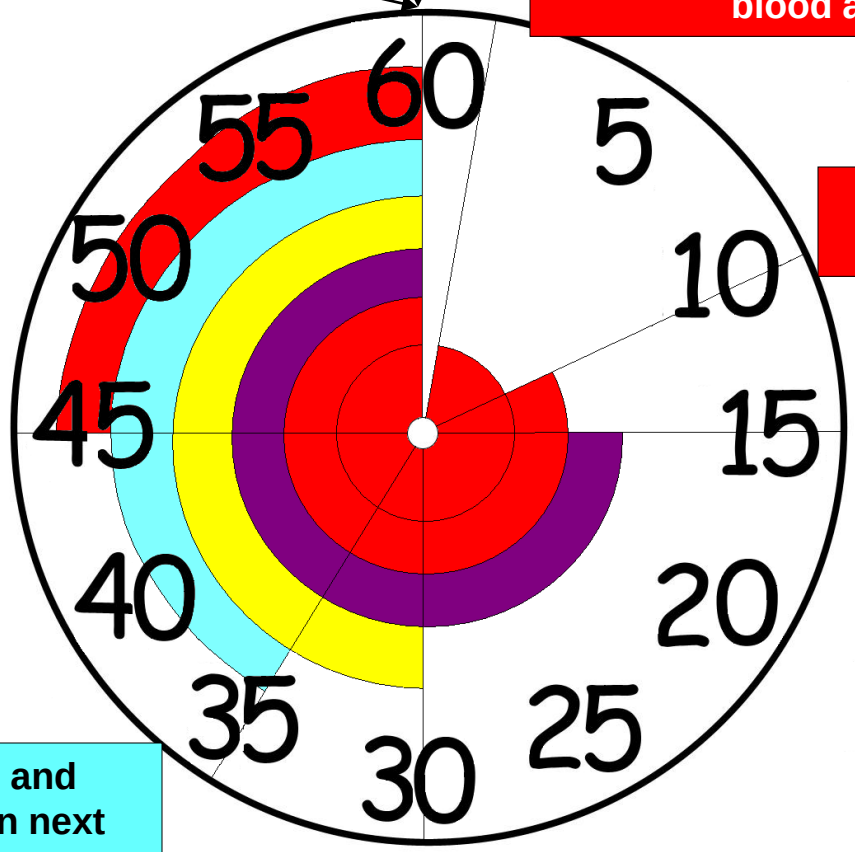
Rapid Response Report

NPSA/2010/RRR017

From reporting to learning

The transfusion of blood and blood components in an emergency

Major Haemorrhage Protocol – The First Hour



Send: Group & save, FBC and coagulation screen

Send: Group & save, FBC and coagulation screen

2 units emergency O negative blood available

Group specific blood available

Urgent FBC result available within next 45mins

4 units fresh frozen plasma available

Coagulation screen and fibrinogen available in next 25mins

Fully cross matched blood available

Transfusion Management of Massive Haemorrhage

Insert local arrangements:
Activation Tel Number(s)

•Emergency O red cells
- location of supply:

*** Time to receive at this clinical area:**
•Group specific red cells

• XM red cells

Transfusion lab ☎

Consultant Haematologist ☎

Patient bleeding / collapses
Ongoing severe bleeding eg: 150 mls/min and Clinical shock
Administer Tranexamic Acid
(1g bolus followed by 1g infusion over 8 hours)

Activate Massive Haemorrhage Pathway

Call for help
'Massive Haemorrhage, Location, Specialty'
Alert emergency response team (including blood transfusion laboratory, portering/ transport staff)
Consultant involvement essential

RESUSCITATE
Airway
Breathing
Circulation

Take bloods and send to lab:
XM, FBC, PT, APTT, fibrinogen, U+E, Ca^{2+}
NPT: ABG, TEG / ROTEM if available
and
Order Massive Haemorrhage Pack 1

Red cells*	4 units
FFP	4 units
Platelets	1 dose (ATD)

(*Emergency O blood, group specific blood, XM blood depending on availability)

Continuous cardiac monitoring

Prevent Hypothermia
Use fluid warming device
Used forced air warming blanket

Consider 10 mls Calcium chloride 10% over 10 mins

2 packs cryoprecipitate if fibrinogen < 1.5g/l or as guided by TEG / ROTEM

STOP THE BLEEDING

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

Haemostatic Drugs

Vit K and Prothrombin complex concentrate for warfarinised patients and
Other haemostatic agents: discuss with Consultant Haematologist

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

Give MHP 1

Reassess
Suspected continuing haemorrhage requiring further transfusion
Take bloods and send to lab:
FBC, PT, APTT, fibrinogen, U+E, Ca^{2+}
NPT: ABG, TEG / ROTEM if available

Aims for therapy
Aim for:

Hb	8-10g/dl
Platelets	>75 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	

Order Massive Haemorrhage Pack 2

Red cells	4 units
FFP	4 units
Platelets	1 dose (ATD)

and subsequently
request Cryoprecipitate 2 packs if fibrinogen <1.5g/l or according to TEG / ROTEM

Give MHP 2

Once MHP 2 administered, repeat bloods:
FBC, PT, APTT, fibrinogen, U+E,
NPT: ABG, TEG / ROTEM if available
To inform further blood component requesting

STAND DOWN
Inform lab
Return unused components
Complete documentation
Including audit proforma

Thromboprophylaxis should be considered when patient stable

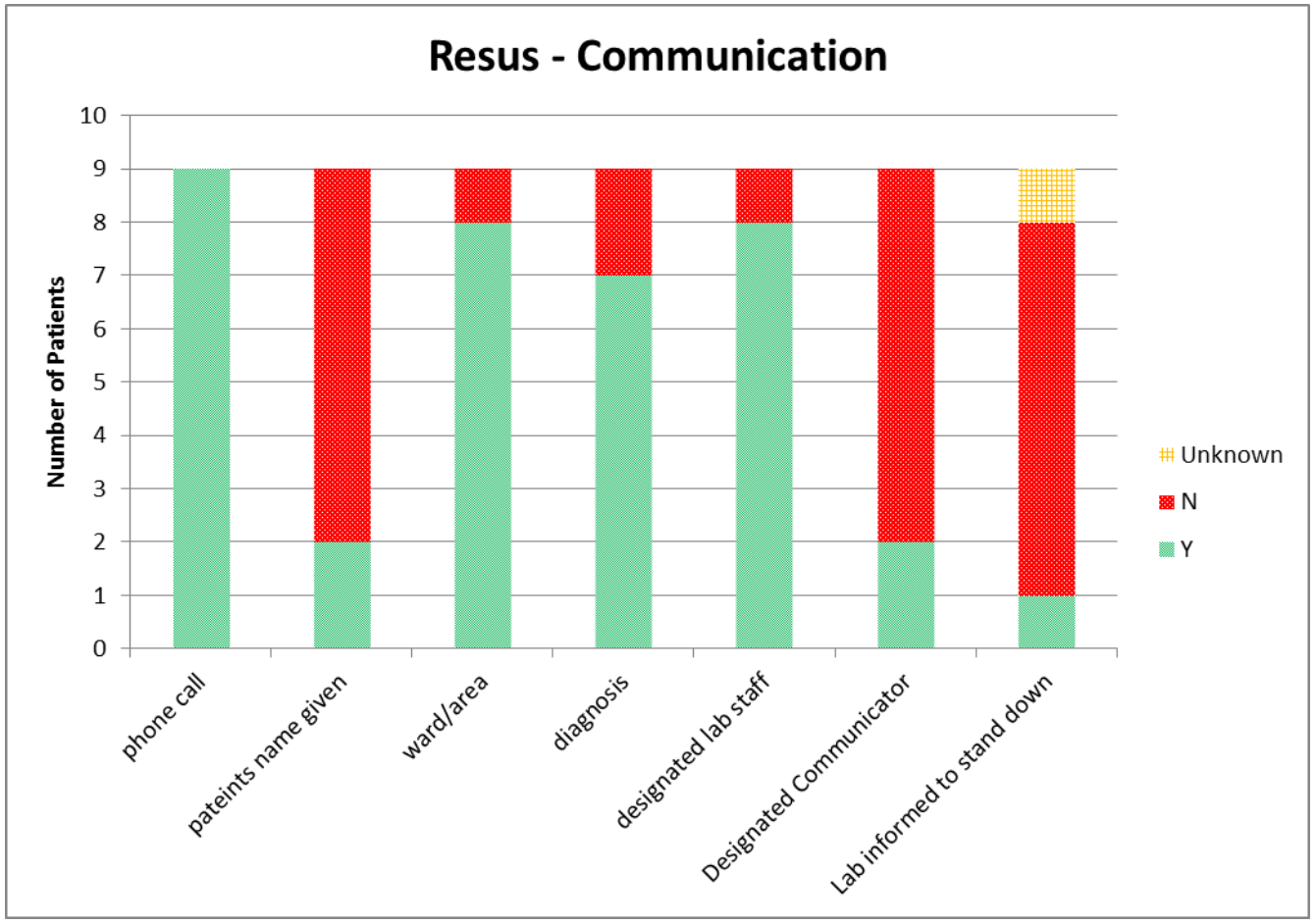
- **Alert Transfusion Lab**
- **Use the agreed phrase that triggers the massive haemorrhage protocol**

ABG – Arterial Blood Gas
FFP- Fresh Frozen plasma
PT- Prothrombin Time
APTT – Activated partial thromboplastin time
MHP – Massive Haemorrhage Pack
TEG/ROTEM- Thromboelastography
ATD- Adult Therapeutic Dose
NPT – Near Patient Testing
XM - Crossmatch

v1 2011

Hospital Transfusion Team
&LTHT Transfusion Laboratory Team

Massive Haemorrhage Executive Feedback
Accident and Emergency Resus



Making thawed universal donor plasma available rapidly for massively bleeding trauma patients: Experience from the Pragmatic Randomized Optimal Platelets and Plasma Ratios (PROPPR) Trial

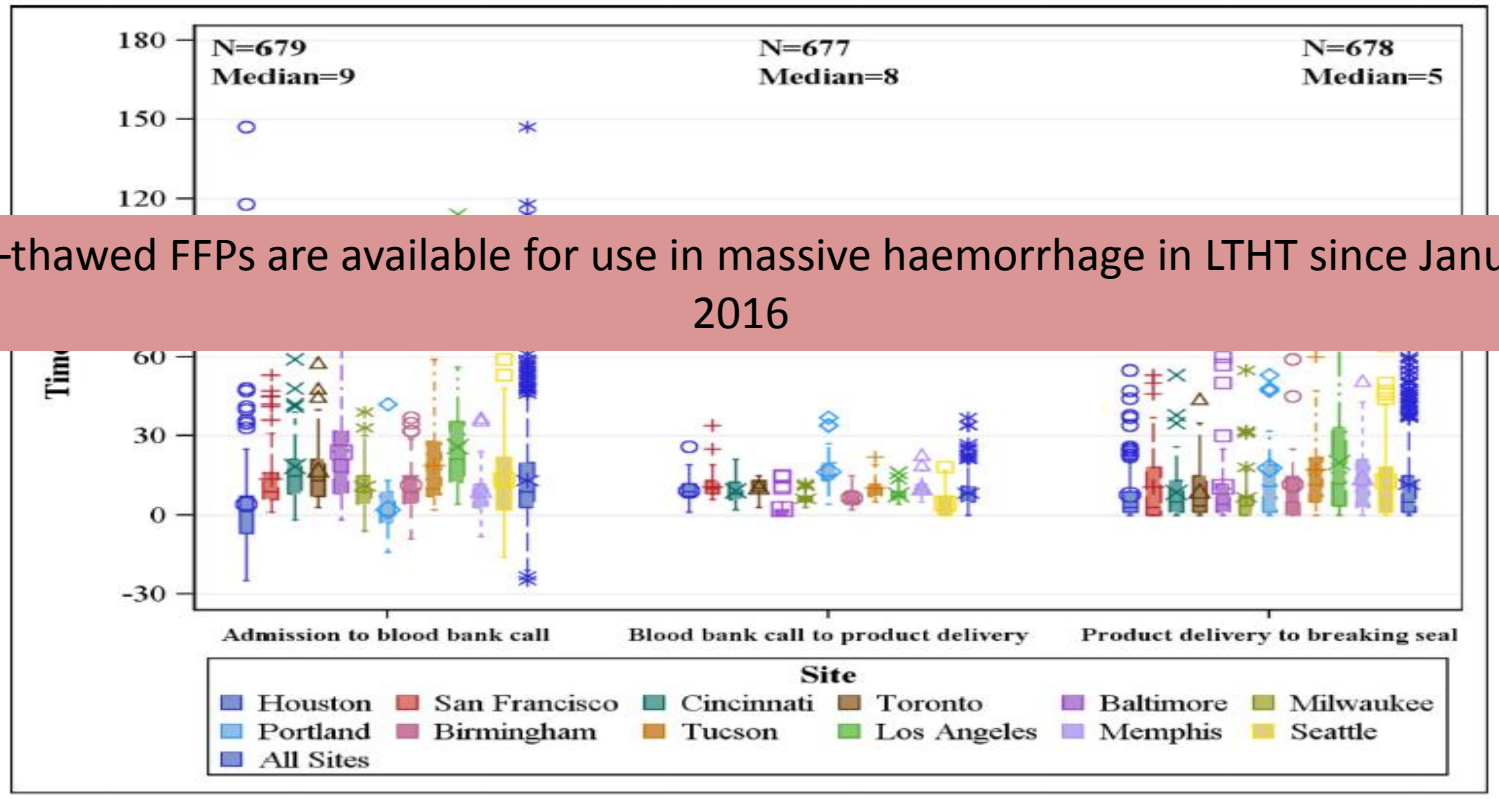
Rossaint et al. Critical Care (2016) 20:100
DOI 10.1186/s13054-016-1265-x

Critical Care

RESEARCH Open Access

The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition

Pre –thawed FFPs are available for use in massive haemorrhage in LTHT since January 2016



Right blood components

Why we transfuse patients?

Maintain tissue oxygenation

RBC

- Emergency blood group O RhD neg
- Group specific

Reverse trauma coagulopathy

FFP

Platelets

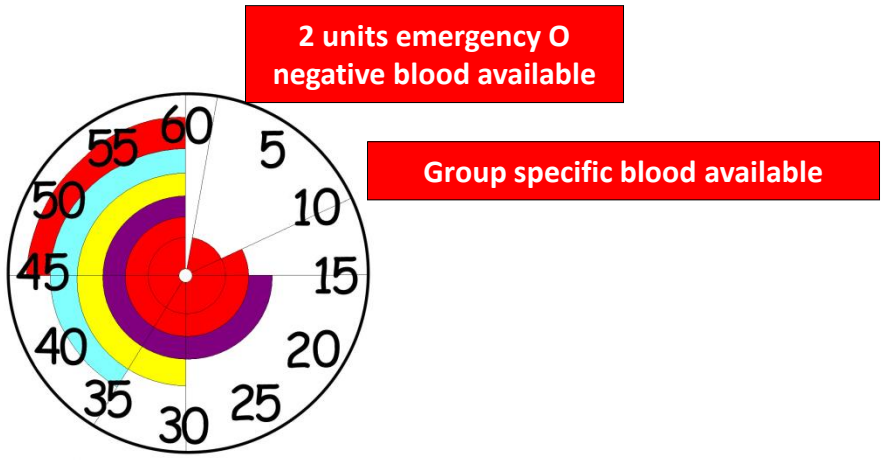
Cryoprecipitates

Prothrombin complex concentrate

Factor VII a

Fibrinogen concentrate

Why to transfuse group specific blood as soon as possible ?



Group O RhD neg blood is a scarce resource

Britain heading for blood donor crisis as new numbers giving blood drops by 40%

7 Jun 2015, Mirror

NHS calls for rare blood group donors at O and B negative stocks hit four-year low

15 March 2014 , Independent

Plea for people with blood groups O and B negative to donate

The Times

Group O RhD neg is not safe for everybody

SHOT report

Patient with a GI bleed was transfused in A+E with 2 units of O RhD neg blood.

During transfusion the bleeding increased and he was transfused with 2 more O RhD neg units.

During the transfusion patient deteriorated and eventually died.

The results of the sample sent to the Transfusion Lab showed that the patient was group B RhD pos with anti-c

Antibodies against antigens expressed on Rh D neg red cells are clinically significant causing intravascular haemolysis

Patients can developed antibodies against Rh D neg antigens from previous transfusions or pregnancies

ANNUAL SHOT REPORT 2012

Fig 2.3d – All events in trauma & orthopaedics

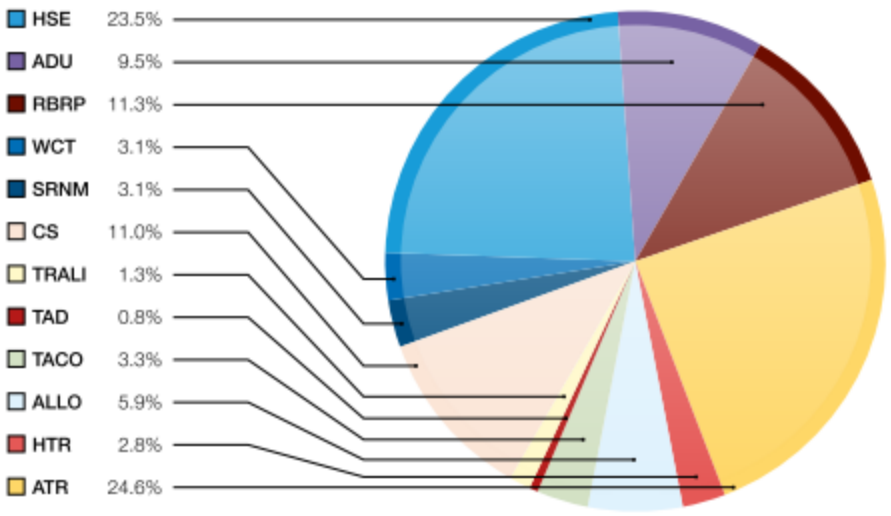
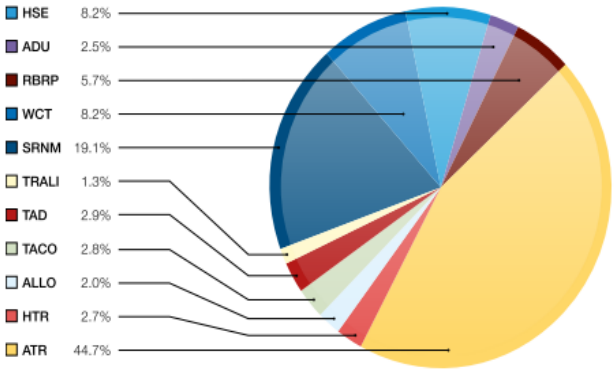


Figure 2.3: Proportions of incidents in erent specialties

Fig 2.3a – All events in haematology



Key:

- **HSE:** handling and storage errors
- **ADU:** avoidable, delayed or undertransfusion
- **RBRP:** right blood right patient
- **WCT:** IBCT-WCT: incorrect blood component transfused – wrong component transfused
- **SRNM:** IBCT-SRNM: incorrect blood component transfused – specific requirements not met
- **CS:** cell salvage
- **TRALI:** transfusion-related acute lung injury
- **TAD:** transfusion-associated dyspnoea
- **TACO:** transfusion-associated circulatory overload
- **ALLO:** alloimmunisation
- **HTR:** haemolytic transfusion reactions
- **ATR:** acute transfusion reactions

Use of FFP upfront

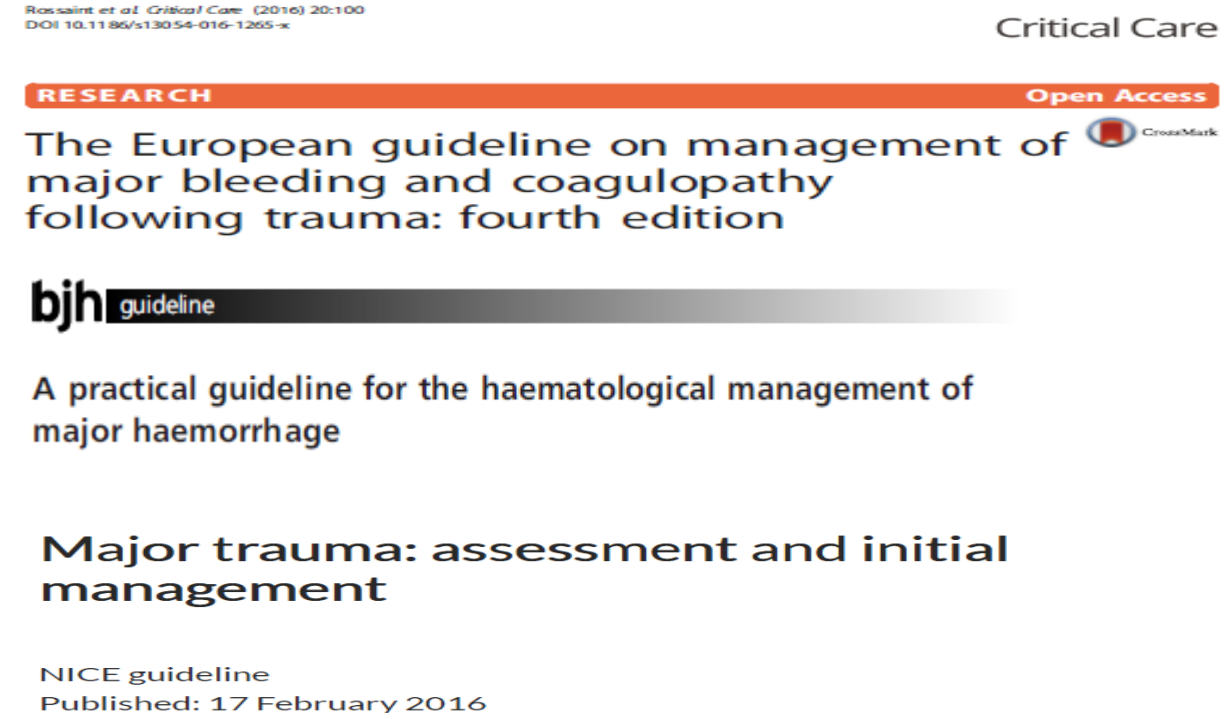
Research

Open Access

Management of bleeding following major trauma: a European guideline

Donat R Spahn[1], Vladimir Cerny[2], Timothy J Coats[3], Jacques Duranteau[4], Enrique Fernández-Mondéjar[5], Giovanni Gordini[6], Philip F Stahel[7], Beverley J Hunt[8], Radko Komadina[9], Edmund Neugebauer[10], Yves Ozier[11], Louis Riddez[12], Arthur Schultz[13], Jean-Louis Vincent[14] and Rolf Rossaint[15]

2007



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Critical Care

RESEARCH

Open Access

The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition

2016

bjh guideline

A practical guideline for the haematological management of major haemorrhage

2015

Major trauma: assessment and initial management

NICE guideline
Published: 17 February 2016

2016

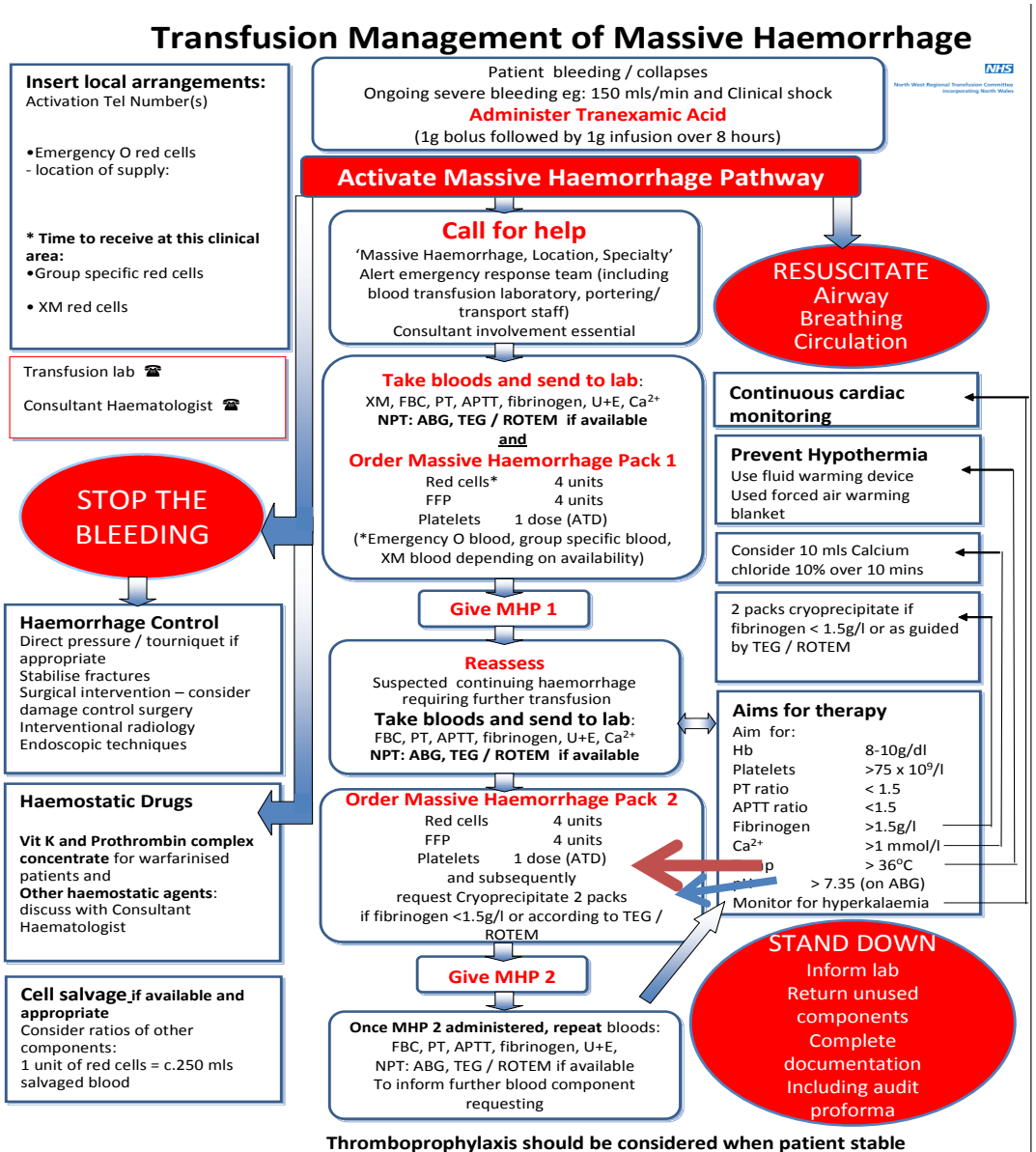
Use of FFP ratio?

1:2 or 1:1

Transfusion of Plasma, Platelets, and Red Blood Cells in a 1:1:1 vs a 1:1:2 Ratio and Mortality in Patients With Severe Trauma:

The PROPPR Randomized Clinical Trial

Use of platelets upfront



Transfusion of Plasma, Platelets, and Red Blood Cells in a 1:1:1 vs a 1:1:2 Ratio and Mortality in Patients With Severe Trauma:

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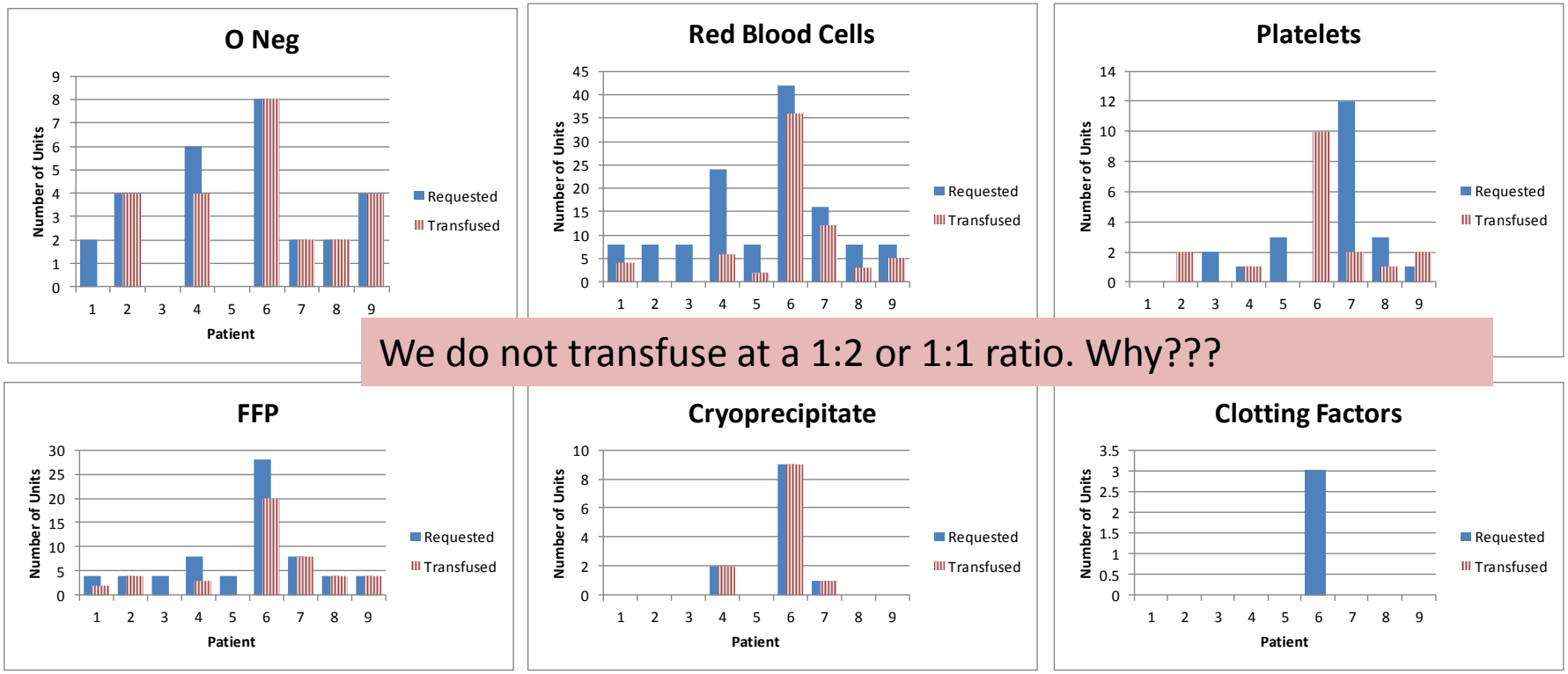
Hospital Transfusion Team
& LTHT Transfusion Laboratory Team

Massive Haemorrhage Executive Feedback
Accident and Emergency Resus

Figure 1- The amount Emergency O Negative, Red cells, Platelets, Fresh Frozen Plasma, Cryoprecipitate and Clotting Factors requested and used during a Massive Haemorrhage within the Emergency Department.

Resus Request and Usage



Patients on anticoagulants

Warfarin

- **Vitamin K and Prothrombin complex concentrate** for warfarinised patients
- **Other haemostatic agents**: discuss with Consultant Haematologist

New anticoagulants

Idarucizumab (praxbind) for reversal of Dabigatran.

No specific reversal agent for Rivaroxaban, Apixaban

2016 LTHT guideline on reversal of NOC recommends
use of Prothrombin Complex Concentrate for reversal of NOC in massive haemorrhage

Patients with specific requirements

CMV NEGATIVE

To ke
(~50

- Children < 1yr
- Intrauterine transfusions
- Congenital immunodeficiency

and unless known to be CMV IgG +ve:

- Pregnant women having elective transfusion

HEV NEGATIVE

To keep at-risk patients HEV free

- Solid organ and BMT transplant patients
- Children < 1yr

IRRADIATED

Ignore **special** requirements

graft versus host disease (rare)
in specific T-cell immunodeficiency cases

Intrauterine transfusions

Congenital immunodeficiency

Hodgkin Lymphoma

Stem cell / marrow transplant patients

After purine analogue chemo

VIRAL INACTIVATED PLASMA/CRYO

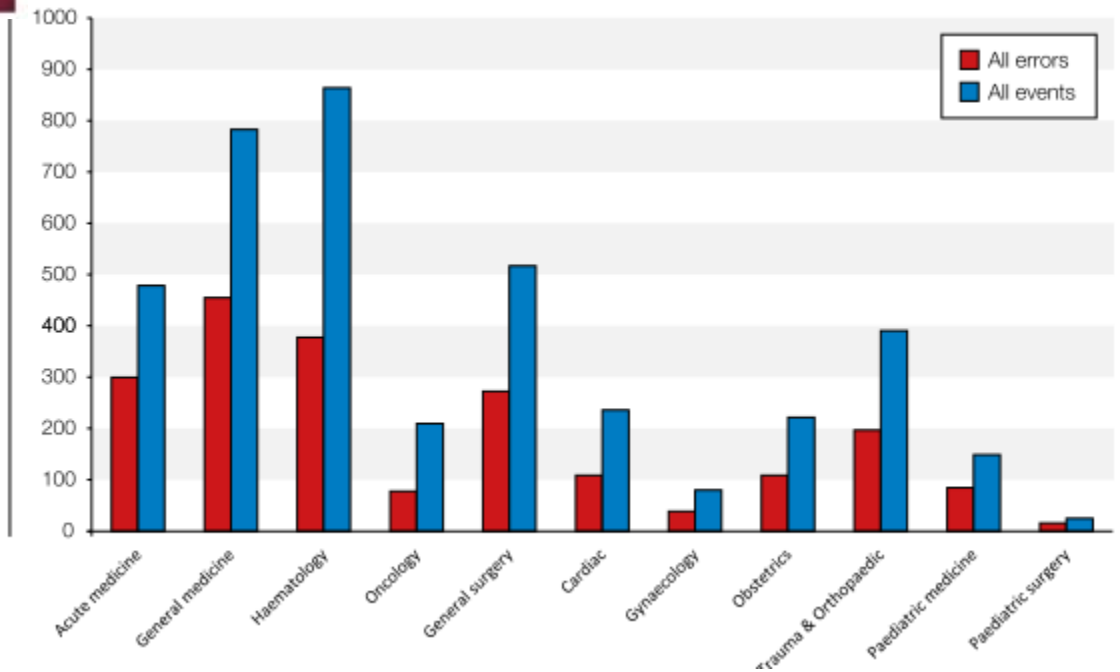
To prevent vCJD

Everybody born after 1998

Right patient
patient identification

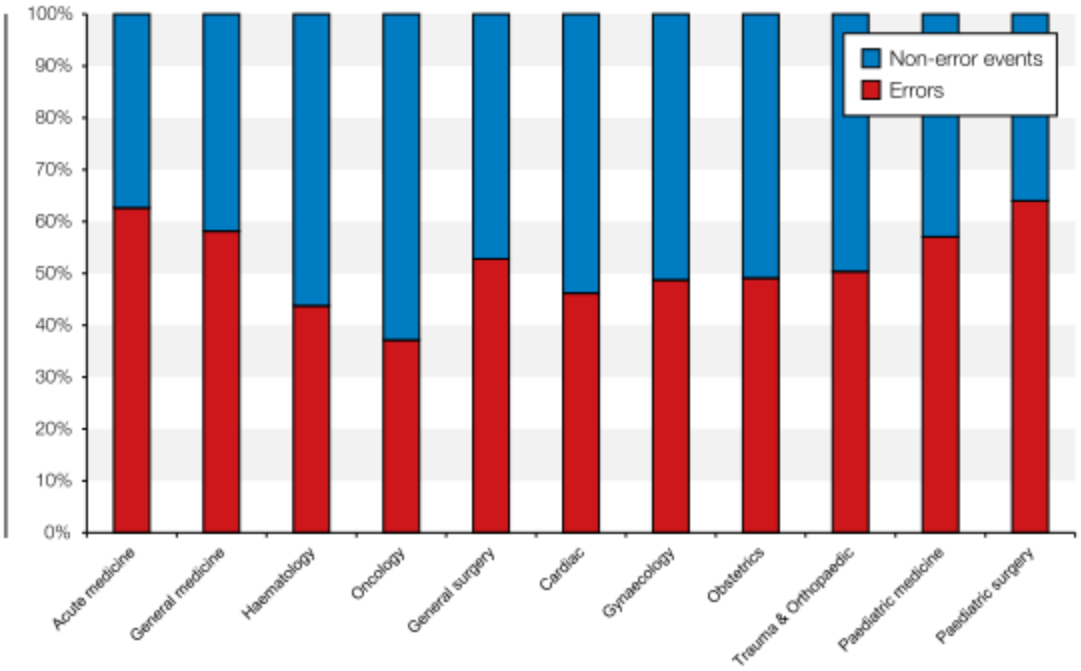
ANNUAL SHOT REPORT 2012

Figure 2.1:
The number of incidents by specialty for the three year period 2010 to 2012 (n=3956)

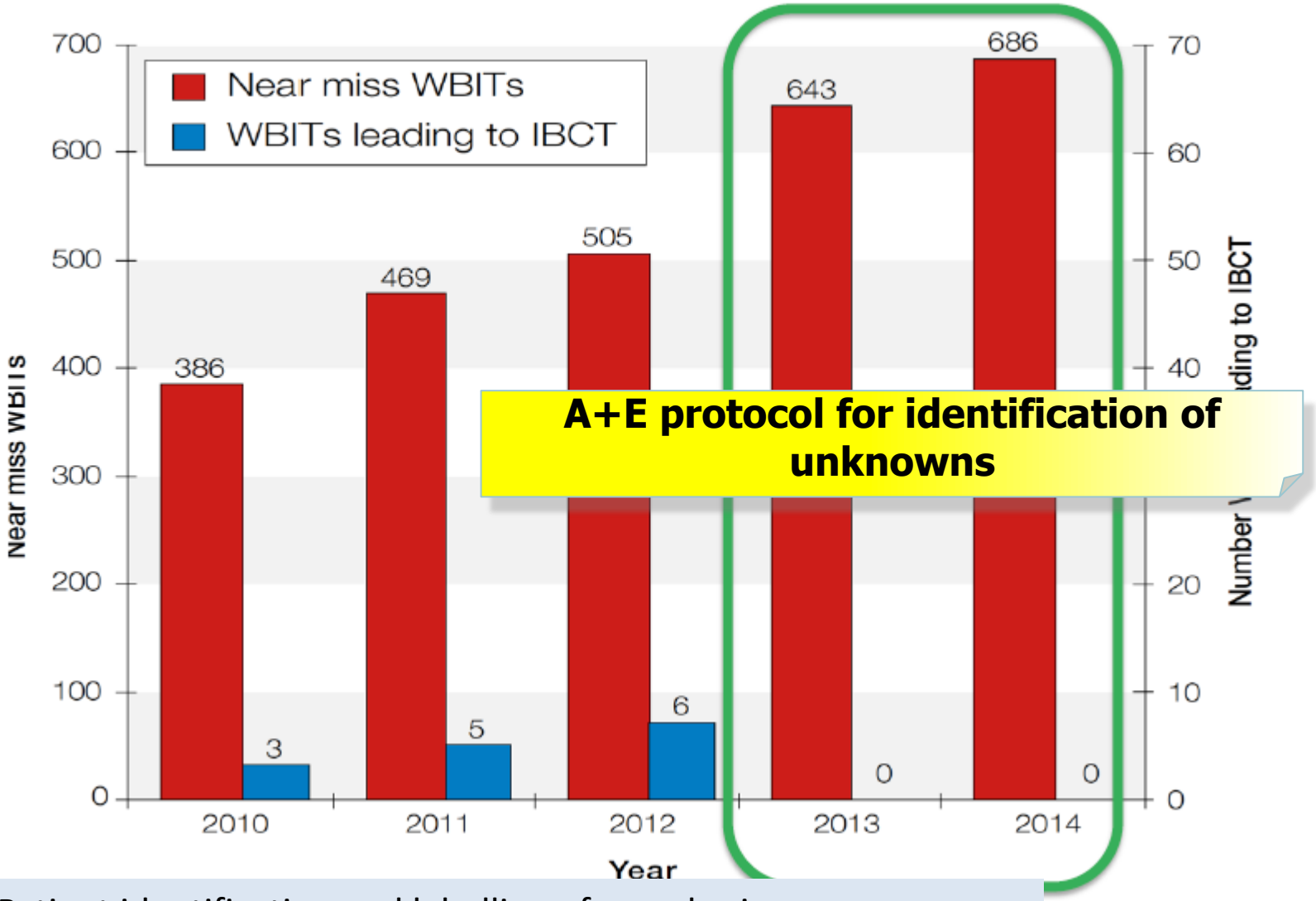


ANNUAL SHOT REPORT 2012

Figure 2.2:
The same data as Figure 2.1 but showing the proportion of all incidents in each specialty caused by error (excluding 'near miss')



‘Near Miss’ incidents demonstrate that there is a problem



Patient identification and labelling of samples in emergency

BSCH guidelines on unique identification of “unknowns”

Resources

Trust Guidelines and Policies

Hospital Transfusion Team

The Transfusion Handbook

www.transfusionguidelines.org.uk

Thank you

Questions??