Patient Blood Management Guidelines: Module 1

Critical Bleeding Massive Transfusion

A/Prof Larry McNicol

What is patient blood management?

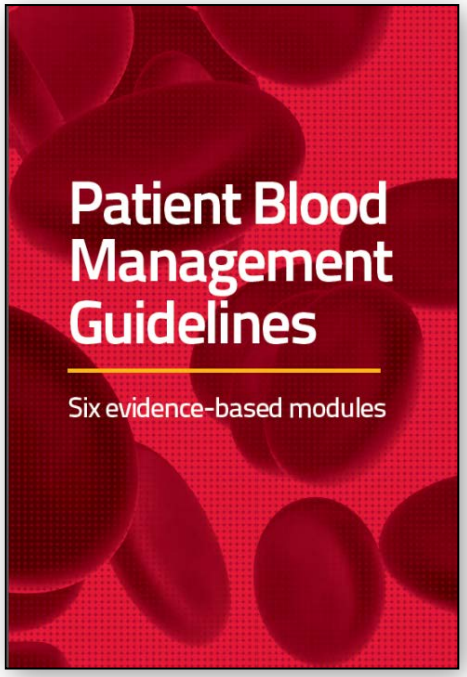
Improves the patient's own blood and avoids unnecessary transfusions.

'THE THREE PILLARS'

- **Optimise blood volume and red cell mass**
- **Minimise blood loss**
- **Optimise patient's tolerance of anaemia**

National Blood Authority Australia

Paradigm Shift



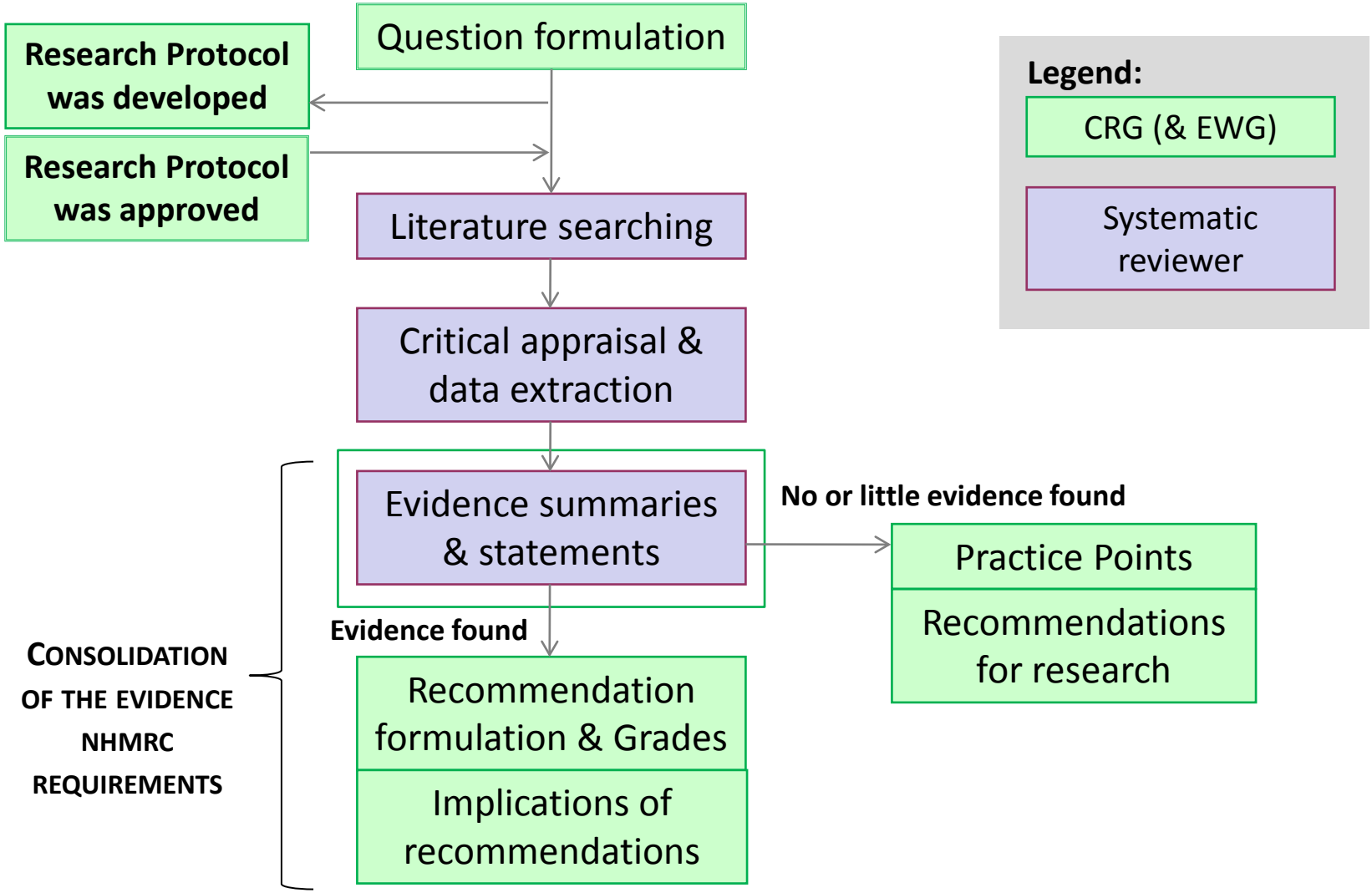
2001 Guidelines for Use of Blood Components

2012 Patient Blood Management Guidelines

Generic, specific, & background questions

Question type	Answered based on	Uses
Specific to this module	Systematic review	Used to develop: ▪ recommendations ▪ practice points
Generic (i.e. relevant to all six modules in the series)	Systematic review	Used to develop: ▪ recommendations ▪ practice points
Background specific to this module	Background material	Used to: ▪ capture information considered as being outside the scope of the systematic review questions ▪ provide general information for the guidelines.

Guideline Development Process



Recommendations

- The CRG developed recommendations where sufficient evidence was available from the systematic review of the literature.

- The recommendations have been carefully worded to reflect the strength of the body of evidence.

National Blood Authority Australia

Definition of NHMRC grades for recommendations

Table 2.3 Definitions of NHMRC grades for recommendations

Grade	Definition
A	Body of evidence can be trusted to guide practice
B	Body of evidence can be trusted to guide practice in most situations
C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
D	Body of evidence is weak and recommendations must be applied with caution

Source: NHMRC 2009[10]

National Blood Authority Australia

Practice Points

- The CRG developed practice points by consensus where, the systematic review found insufficient high-quality data to produce evidence-based recommendations, but the CRG felt that clinicians require guidance to ensure good clinical practice.

National Blood Authority
Australia

What is Critical Bleeding?

- ‘Critical bleeding’ may be defined as major haemorrhage that is life threatening and likely to result in the need for massive transfusion.

National Blood Authority Australia

What is Massive Transfusion?

- In adults, ‘massive transfusion’ may be defined as a transfusion of half of one blood volume in 4 hours, or more than one blood volume in 24 hours (adult blood volume is approximately 70 ml/kg).

National Blood Authority Australia

In patients with critical bleeding requiring massive transfusion, what is the effect of RBC transfusions on patient outcomes?

Practice points

PP6 In patients with critical bleeding requiring massive transfusion, the use of RBC and other blood components may be life saving. However, transfusion of increased volumes of RBC and other blood components may be independently associated with increased mortality and ARDS.

PP7 In patients with critical bleeding requiring massive transfusion, the use of an MTP to facilitate timely and appropriate use of RBC and other blood components may reduce the risk of mortality and ARDS.

ARDS, acute respiratory distress syndrome; MTP, massive transfusion protocol; PP, practice point; RBC, red blood cell

In patients with critical bleeding requiring massive transfusion, does the dose, timing and ratio (algorithm) of RBCs to blood component therapy (FFP, platelets, cryoprecipitate or fibrinogen concentrate) influence morbidity, mortality and transfusion rate?

Recommendation

R1	C	It is recommended that institutions develop an MTP that includes the dose, timing and ratio of blood component therapy for use in trauma patients with, or at risk of, critical bleeding requiring massive transfusion (Grade C).[4,5]

Practice points

PP3 In critically bleeding patients requiring, or anticipated to require, massive transfusion, an MTP[a] should be used. A template MTP is provided within this module.[b]

a The use of the word 'protocol' in 'massive transfusion protocol' throughout this report is not strictly prescriptive.
b The template MTP is intended for local adaptation.

PP4 In patients with critical bleeding requiring massive transfusion, insufficient evidence was identified to support or refute the use of *specific* ratios of RBCs to blood components.

MTP, massive transfusion protocol; PP, practice point; R, recommendation; RBC, red blood cell

PP8 An MTP should include advice on the administration of rFVIIa when conventional measures – including surgical haemostasis and component therapy – have failed to control critical bleeding.

NB: rFVIIa is not licensed for this use. Its use should only be considered in exceptional circumstances where survival is considered a credible outcome (see **Template MTP** example).

Development of a massive transfusion protocol

- Local adaptation
- Activation and cessation

National Blood Authority Australia

Massive transfusion protocol (MTP) template

The information below, developed by consensus, broadly covers areas that should be included in a local MTP. This template can be used to develop an MTP to meet the needs of the local institution's patient population and resources

Senior clinician determines that patient meets criteria for MTP activation

Baseline:
Full blood count, coagulation screen (PT, INR, APTT, fibrinogen), biochemistry, arterial blood gases

Notify transfusion laboratory (insert contact no.) to:
'Activate MTP'

Laboratory staff

- Notify haematologist/transfusion specialist
- Prepare and issue blood components as requested
- Anticipate repeat testing and blood component requirements
- Minimise test turnaround times
- Consider staff resources

Haematologist/transfusion specialist

- Liaise regularly with laboratory and clinical team
- Assist in interpretation of results, and advise on blood component support

Senior clinician

- **Request:**[a]
  - 4 units RBC
  - 2 units FFP
- **Consider:**[a]
  - 1 adult therapeutic dose platelets
  - tranexamic acid in trauma patients
- **Include:**[a]
  - cryoprecipitate if fibrinogen < 1 g/L

a Or locally agreed configuration

Bleeding controlled?

YES → Notify transfusion laboratory to: **'Cease MTP'**

NO → Senior clinician

OPTIMISE:

- oxygenation
- cardiac output
- tissue perfusion
- metabolic state

MONITOR
(every 30–60 mins):

- full blood count
- coagulation screen
- ionised calcium
- arterial blood gases

AIM FOR:

- temperature > 35^0C
- pH > 7.2
- base excess < –6
- lactate < 4 mmol/L
- Ca^{2+} > 1.1 mmol/L
- platelets > 50 × 10^9/L
- PT/APTT < 1.5 × normal
- INR ≤ 1.5
- fibrinogen > 1.0 g/L

Suggested criteria for activation of MTP

- Actual or anticipated 4 units RBC in < 4 hrs, + haemodynamically unstable, +/– anticipated ongoing bleeding
- Severe thoracic, abdominal, pelvic or multiple long bone trauma
- Major obstetric, gastrointestinal or surgical bleeding

Initial management of bleeding

- Identify cause
- Initial measures:
  - compression
  - tourniquet
  - packing
- Surgical assessment:
  - early surgery or angiography to stop bleeding

Specific surgical considerations

If significant physiological derangement, consider damage control surgery or angiography

Cell salvage

Consider use of cell salvage where appropriate

Dosage

Platelet count < 50 x 10^9/L	1 adult therapeutic dose
INR > 1.5	FFP 15 mL/kg[a]
Fibrinogen < 1.0 g/L	cryoprecipitate 3–4 g[a]
Tranexamic acid	loading dose 1 g over 10 min, then infusion of 1 g over 8 hrs

[a] Local transfusion laboratory to advise on number of units needed to provide this dose

Resuscitation

- Avoid hypothermia, institute active warming
- Avoid excessive crystalloid
- Tolerate permissive hypotension (BP 80–100 mmHg systolic) until active bleeding controlled
- Do not use haemoglobin alone as a transfusion trigger

Special clinical situations

- Warfarin:
  - add vitamin K, prothrombinex/FFP
- Obstetric haemorrhage:
  - early DIC often present; consider cryoprecipitate
- Head injury:
  - aim for platelet count > 100 × 109/L
  - permissive hypotension contraindicated

Considerations for use of rFVIIa[b]

The routine use of rFVIIa in trauma patients is not recommended due to its lack of effect on mortality (Grade B) and variable effect on morbidity (Grade C). Institutions may choose to develop a process for the use of rFVIIa where there is:

- uncontrolled haemorrhage in salvageable patient, and
- failed surgical or radiological measures to control bleeding, and
- adequate blood component replacement, and
- pH > 7.2, temperature > 340C.

Discuss dose with haematologist/transfusion specialist

[b] rFVIIa is not licensed for use in this situation; all use must be part of practice review.

ABG	arterial blood gas	FFP	fresh frozen plasma	APTT	activated partial thromboplastin time
INR	international normalised ratio	BP	blood pressure	MTP	massive transfusion protocol
DIC	disseminated intravascular coagulation	PT	prothrombin time	FBC	full blood count
RBC	red blood cell	rFVIIa	activated recombinant factor VII		