EMIG - Haemorrhage in Trauma

Bleeding, M.T.P. and new tests (TEG/ROTEM) in the Emergency Department

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Embryology

Bleeding is the leading cause of death from trauma

- Curry N, Hopewell S, Dorée C, Hyde C, Brohi K, Stanworth S. The acute management of trauma hemorrhage: a systematic review of randomized controlled trials. *Crit Care*. 2011;15(2):R92. doi:10.1186/cc10096

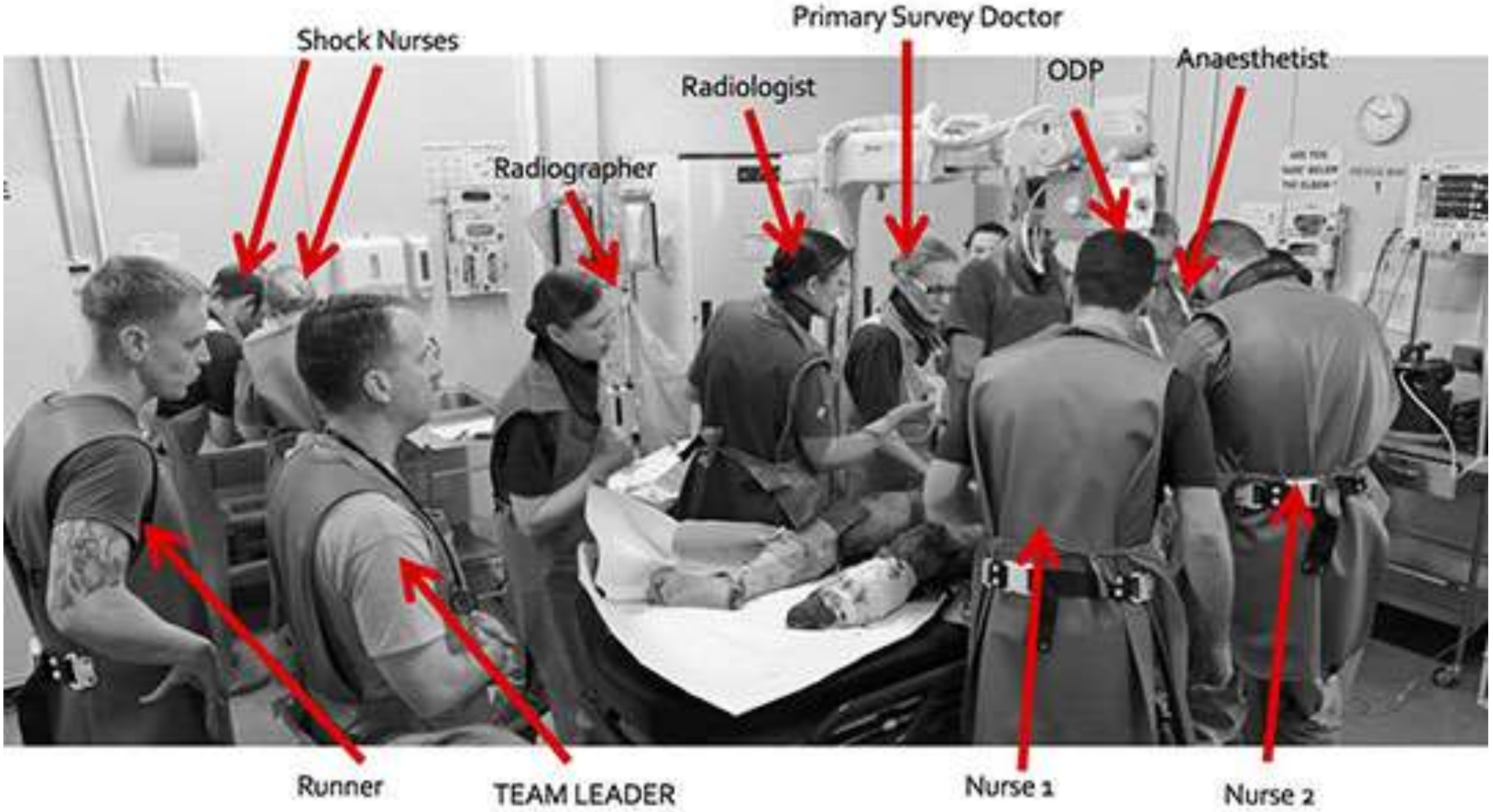
- Massive Transfusion
  - A-D approach

- Review of new coagulation tests (TEG** and ROTEM)
  - What?
  - Why?
  - How?


BLACKTOWN
HOSPITAL

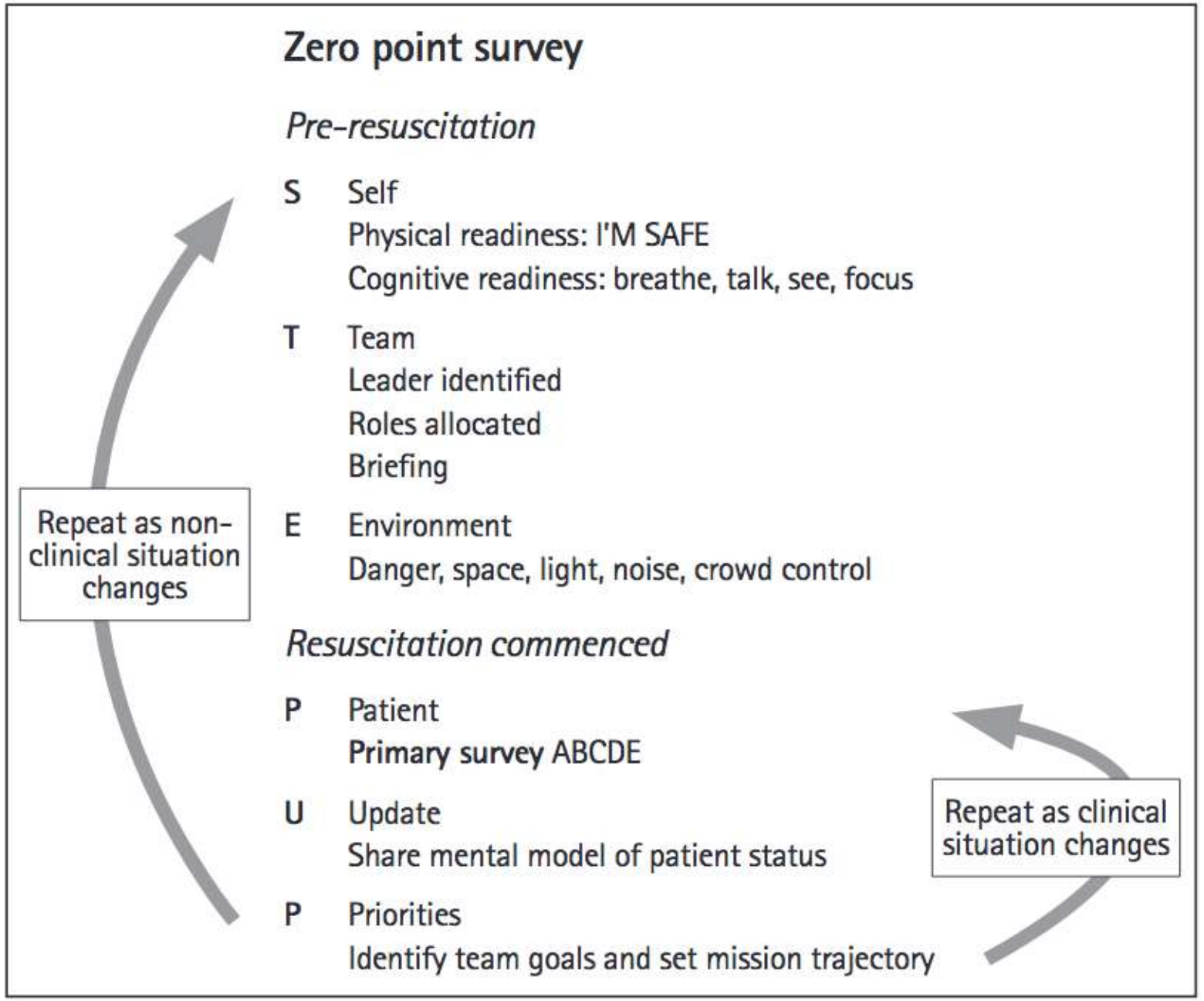

WESTMEAD
precinct


AUBURN
HEALTH
SERVICES
CAMPUS
Hospital
Main Entrance
Patient Drop-Off
Parking
EMERGENCY
Community Health Centre



Mercer Simon J, Kingston Elizabeth V, Jones Clinton P L. The trauma call BMJ 2018; 361 :k2272

Managing the challenge…



Reid C, Brindley P, Hicks C, et al. Zero point survey: a multidisciplinary idea to STEP UP resuscitation effectiveness. Clin Exp Emerg Med. 2018;5(3):139-143. doi:10.15441/ceem.17.269

Some points in the clinical approach to trauma

- **Mechanism** – Blunt (MVC, MBC, Falls) or Penetrating (GSW, knife)
- The **ABC** becomes – C.A.C.B.C.
  - Control Bleeding (external), Airway, C spine, Breathing, Circulation etc
- **Where** is the bleeding – Pelvis, Long Bones, Abdomen, Chest, External, Scalp

Trauma Bleeding

Mechanism

C-A©BC

P.L.A.C.E.S.

Team/System Factors

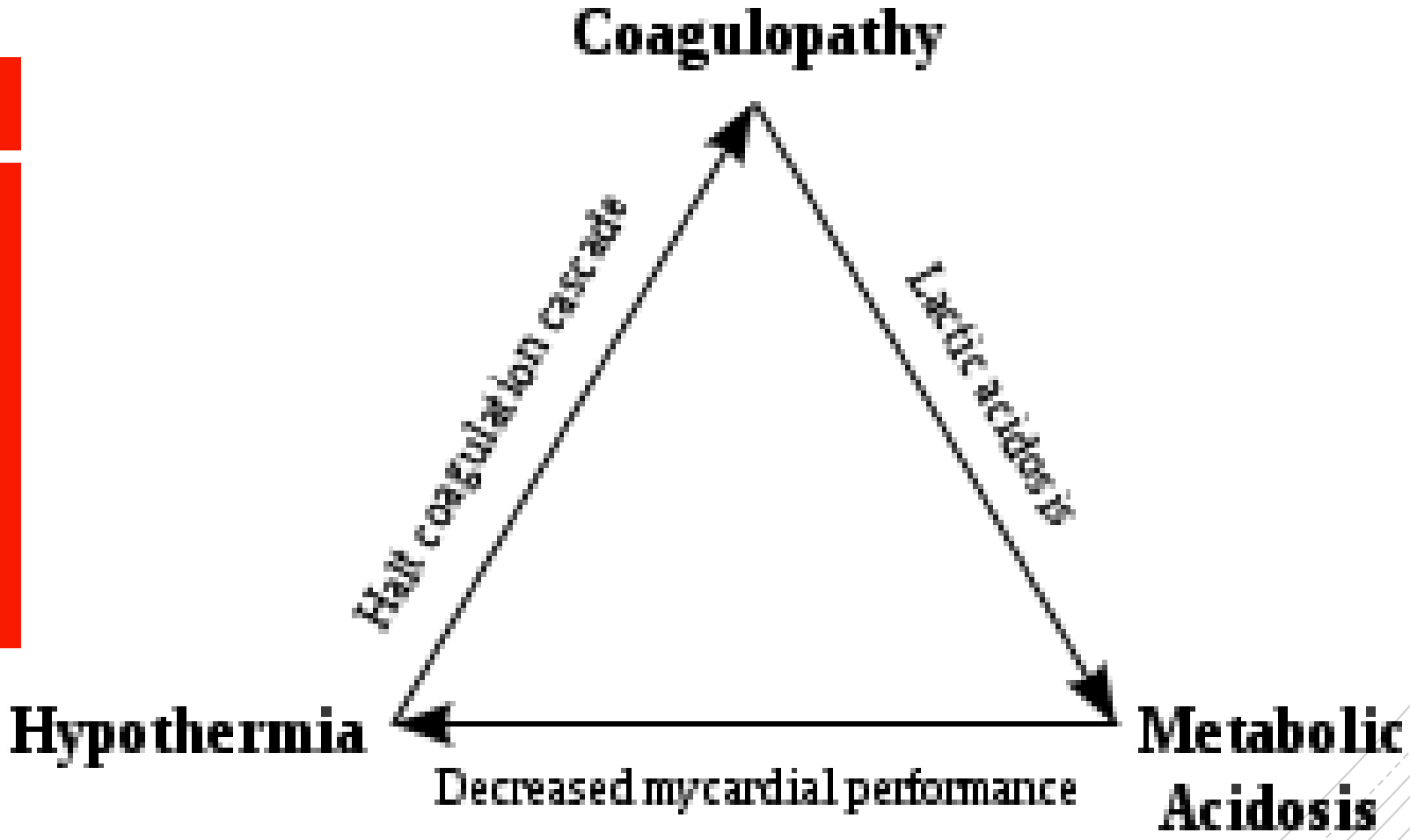
Massive Transfusion Protocol (MTP)

When

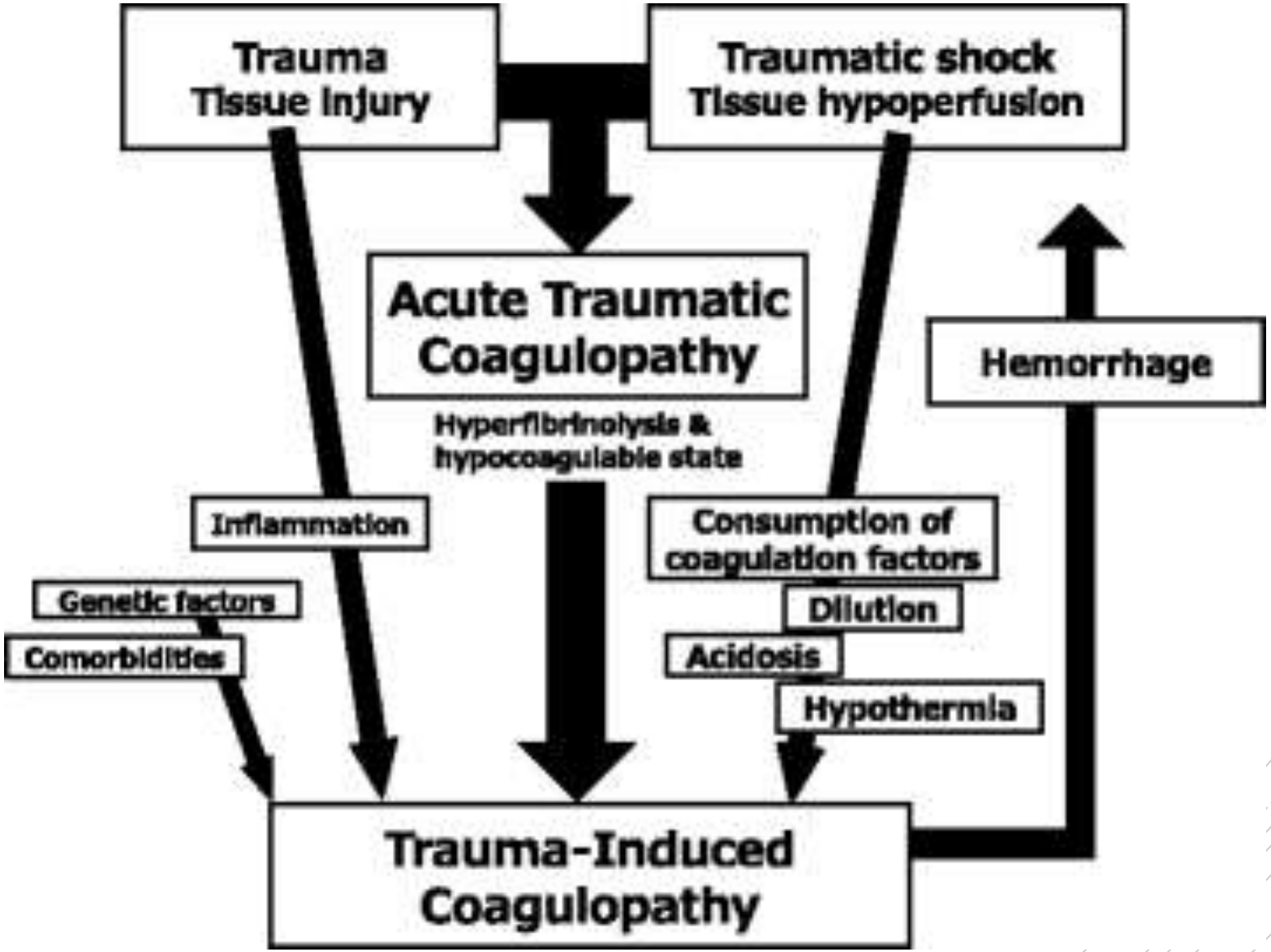
How

What

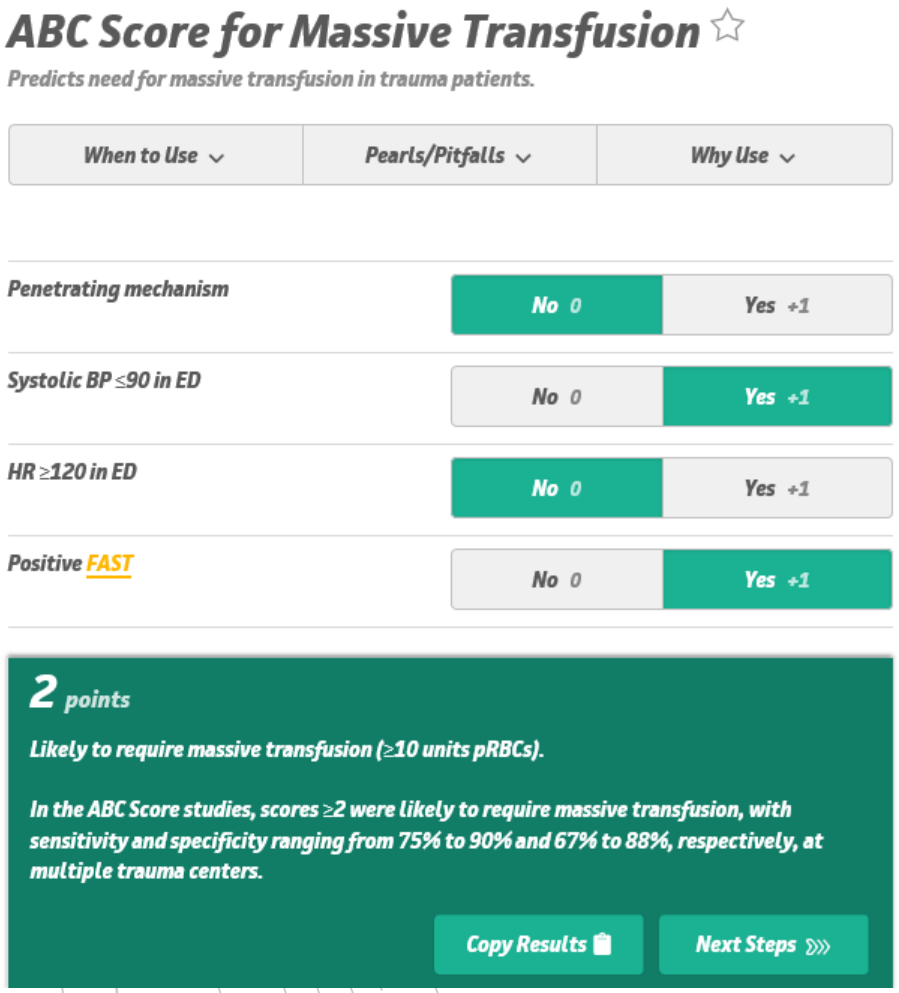
Trauma Bleeding causes the "Lethal Triad"



Coagulopathy



Talk on ATC https://smacc.net.au/2014/08/acute-coagulopathy-of-trauma-by-brohi/#:~:text=Karim%20Brohi%20highlights%20the%20pitfalls,of%20coagulopathy%20in%20severe%20trauma.



ABC score = When

- *Penetrating mechanism*
- *Systolic BP<90*
- *HR>120*
- *FAST +VE*

- *Score of 2 or more predictive*

Motameni AT, Hodge RA, McKinley WI, et al. The use of ABC score in activation of massive transfusion: The yin and the yang. J Trauma Acute Care Surg. 2018;85(2):298-302.

What = MTP

The most widely accepted definition of massive transfusion is the administration of ≥10 units of packed RBCs in the first 24 hours.

Critical bleeding: major surgical, traumatic, obstetric or gastrointestinal haemorrhage WITH:

1. Actual or predicted 4U PRBC transfused in < 1 hour

OR

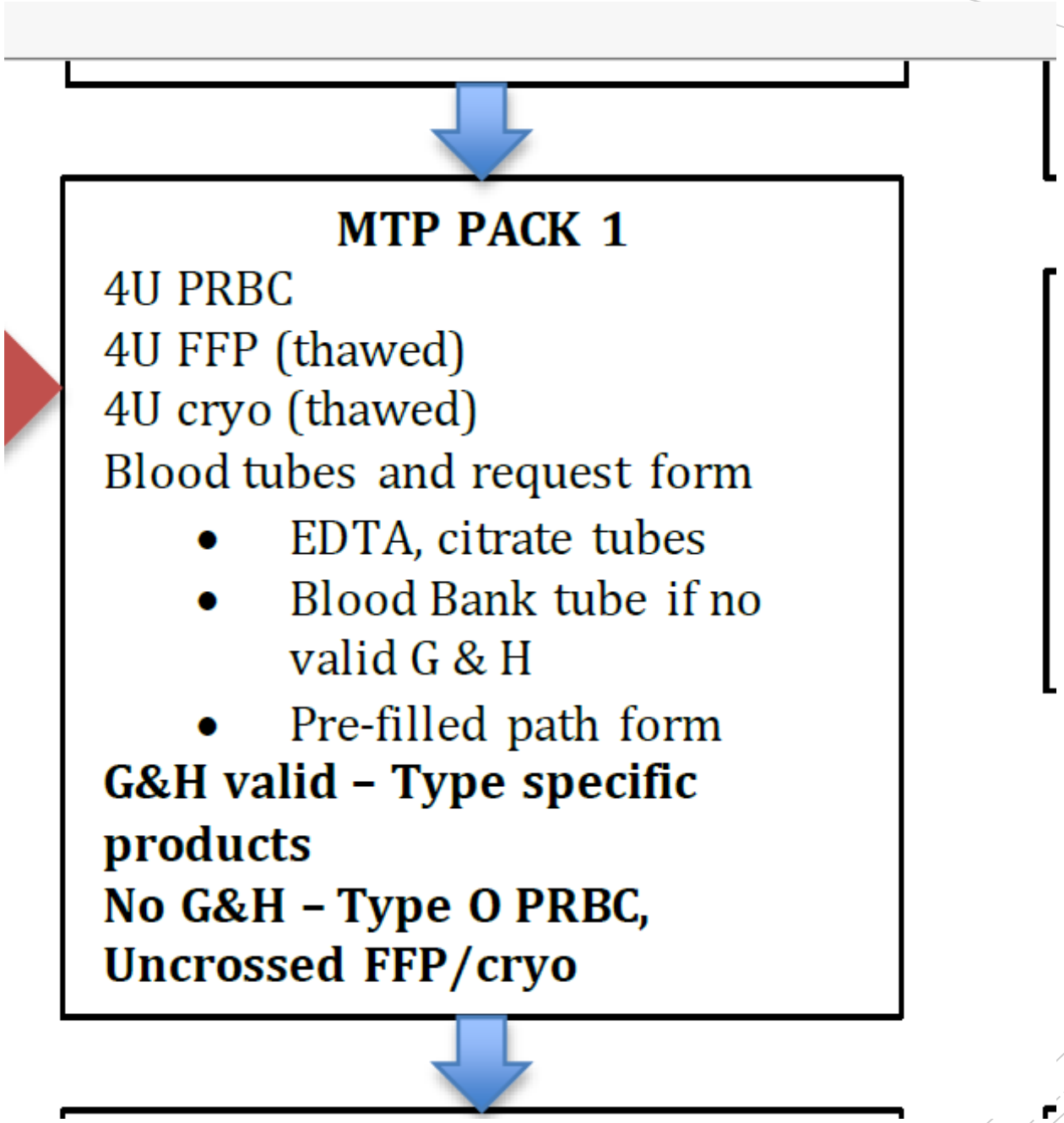
2. Blood loss > 1000ml/hr

MTP

- MTP contents
  - Institution-specific, but often are 1:1:1 or 1:1:2 for fresh frozen plasma, platelets, and packed red blood cells
  - New things (FC)

Holcomb JB, Tilley BC, Baraniuk S, et al. 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. JAMA. 2015;313

MTP Pack


MTP PACK 1
4U PRBC
4U FFP (thawed)
4U cryo (thawed)
Blood tubes and request form
EDTA, citrate tubes
Blood Bank tube if no valid G & H
Pre-filled path form
G&H valid – Type specific products
No G&H – Type O PRBC, Uncrossed FFP/cryo

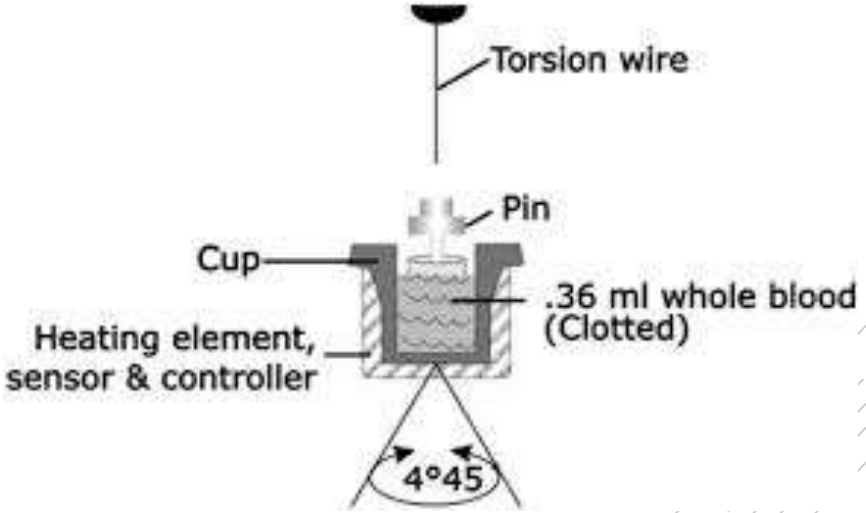
Summary - MTP

- Assessment (out)
- Blood (in)
- Complications (L. Triad)
- Drugs (Tranexamic Acid)

TEG and ROTEM – New Coagulation Tests

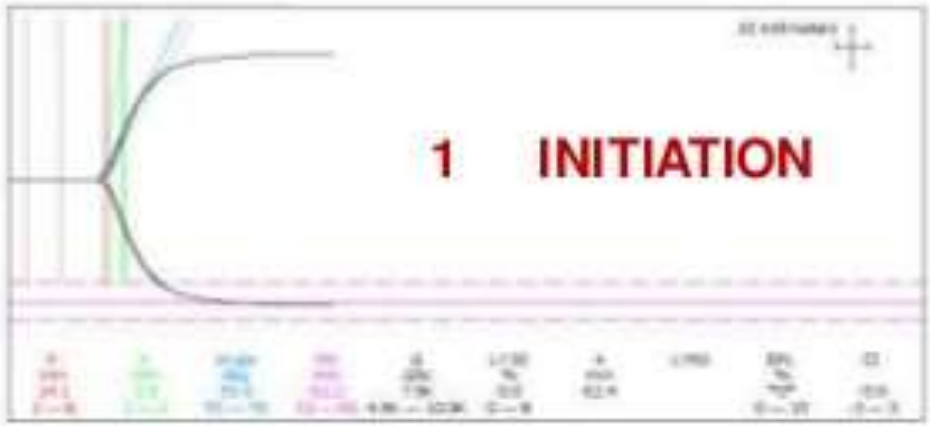
- Premise dates to 1970s
  - Essentially:
    - A cup containing whole blood sample oscillates through a shallow angle
    - A pin on a torsion wire is suspended in the blood.
    - As the viscoelastic strength of the clot increases more rotation is transmitted to the torsion wire and is detected by an electromagnetic transducer

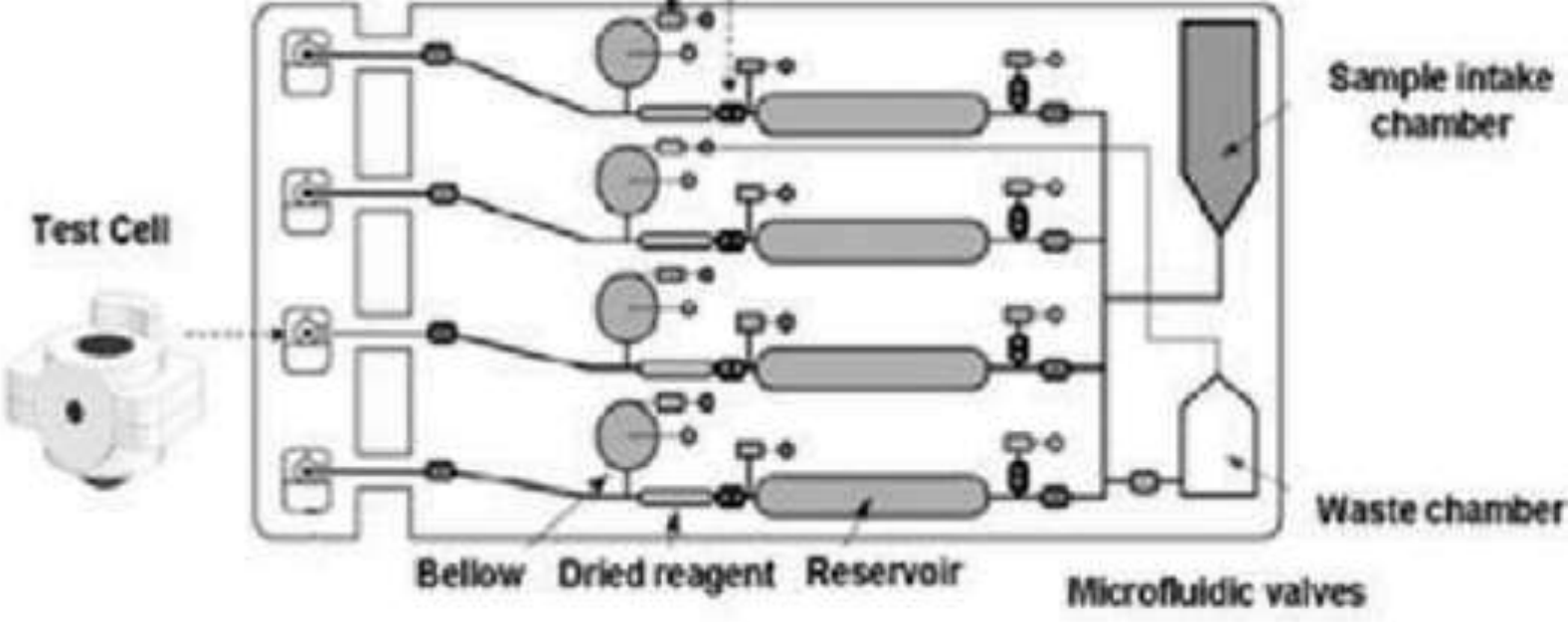
- Types of TEG
  - *TEG6s*
  - *ROTEM*
  - *Theatre TEG*



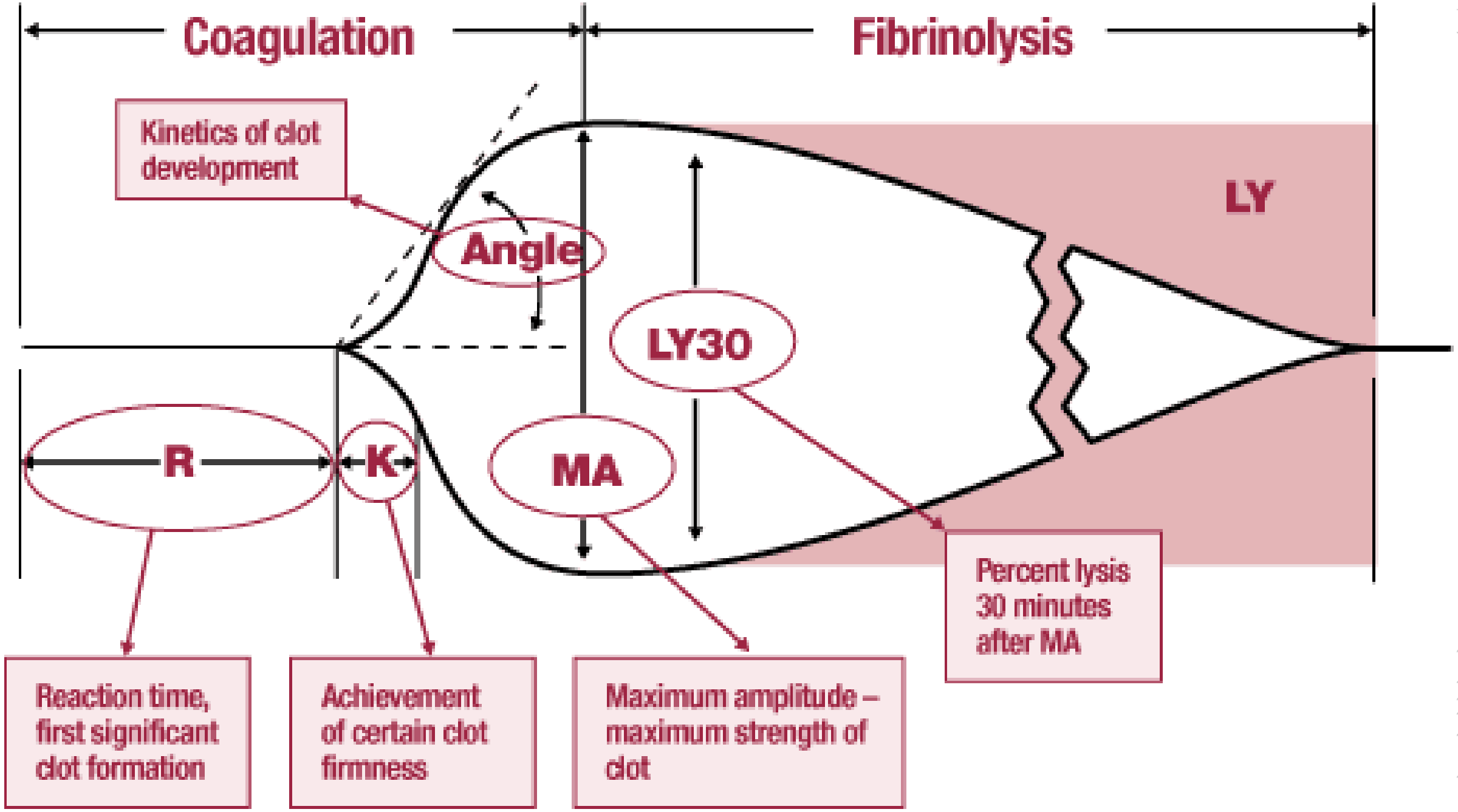
TEG® Core Assessment

1. INITIATION
2. STRENGTH
3. STABILITY





- The Westmead machine runs four tests:
  - Kaolin TEG (R, K, Angle, MA)
  - Kaolin TEG with Heparinase to neutralize heparin (RH)
  - Functional Fibrinogen Maximum Amplitude (FFMA)
  - Rapid TEG (MA-RT)


Coagulation
Fibrinolysis
Kinetics of clot development
Angle
LY
LY30
R
K
MA
Percent lysis 30 minutes after MA
Reaction time, first significant clot formation
Achievement of certain clot firmness
Maximum amplitude – maximum strength of clot

Normal

R;K;MA;Angle = Normal

Anticoagulants/hemophilia

Factor Deficiency

R;K = Prolonged;

MA;Angle = Decreased

Platelet Blockers

Thrombocytopenia/
Thrombocytopathy

R ~ Normal; K = Prolonged;

MA = Decreased

Fibrinolysis (UK, SK, or t-PA)

Presence of t-PA

R ~ Normal;

MA = Continuous decrease

LY30 > 7.5%; WBCLI30 < 97.5%;

Ly60 > 15.0%; WBCLI60 < 85%

Source https://litfl.com/thromboelastogram-teg