



The use of Rotational Thromboelastometry in Traumatic Brain Injury

Miss Lola Kaukas

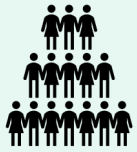
Research Officer

*The Royal Adelaide Hospital Department
of Neurosurgery in collaboration with
Trauma Service*

Traumatic Brain Injury (TBI)



A leading cause of hospitalisation, disability and death.¹



Affects 99.1 per 100,000 Australians annually.²



Total cost estimated to be around \$8 billion a year.³



The Royal Adelaide Hospital treats approximately 180 moderate-severe TBI patients per year

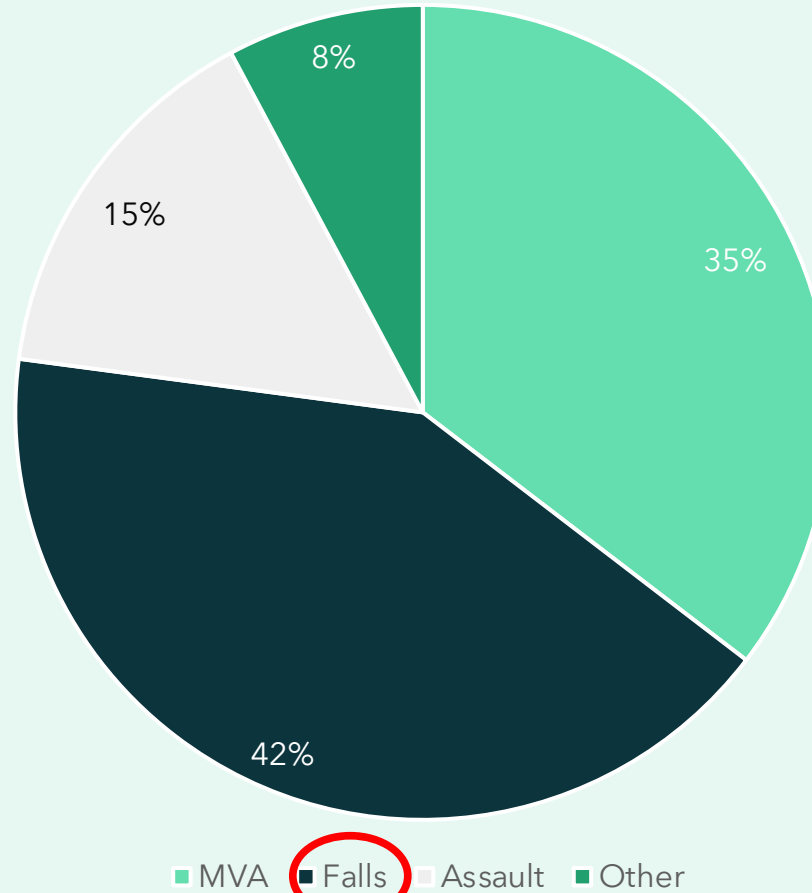
¹AIHW, 2008

²Gardener et al, 2015 *Mol Cell Neurosci*

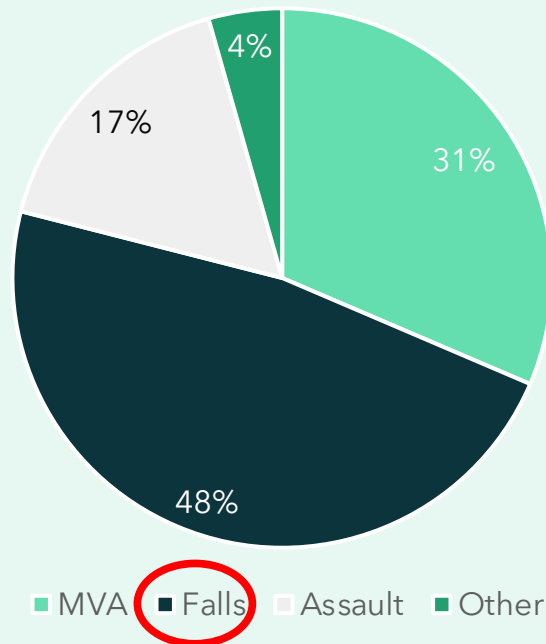
³The Victorian Neurotrauma Initiative, 2009

Causes of TBI

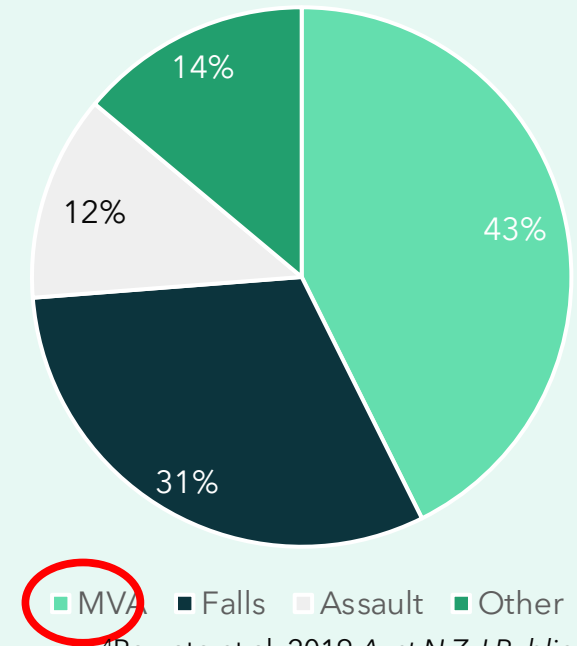
Causes of Moderate-Severe TBI⁴



Causes of Moderate TBI



Causes of Severe TBI



⁴Pozzato et al, 2019 Aust N Z J Public Health

A Complex Injury

Primary Injury



Occurs instantly from force



Secondary Injury



Develops over time

Cerebral swelling

Ischemia

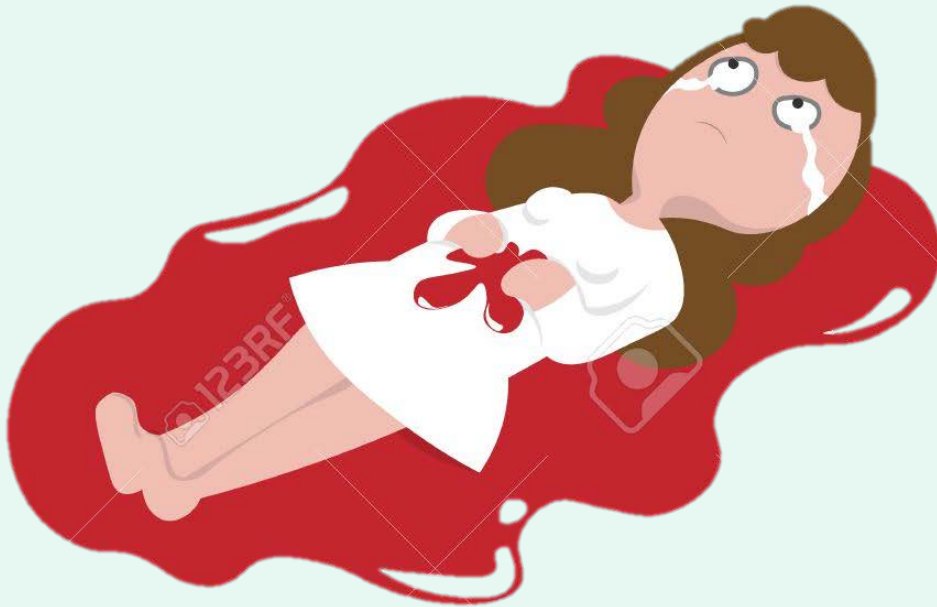
Hypoxia

Increased intracranial pressure

Progression over time =
therapeutic window

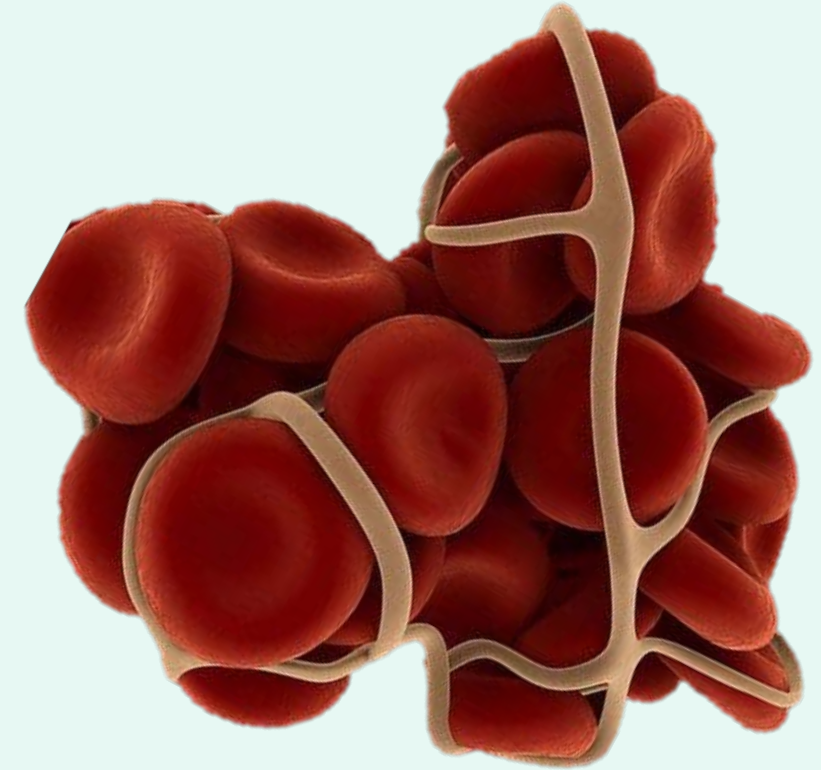
Exacerbated by
coagulopathy

Coagulopathy = impaired blood clot formation



Excessive bleeding

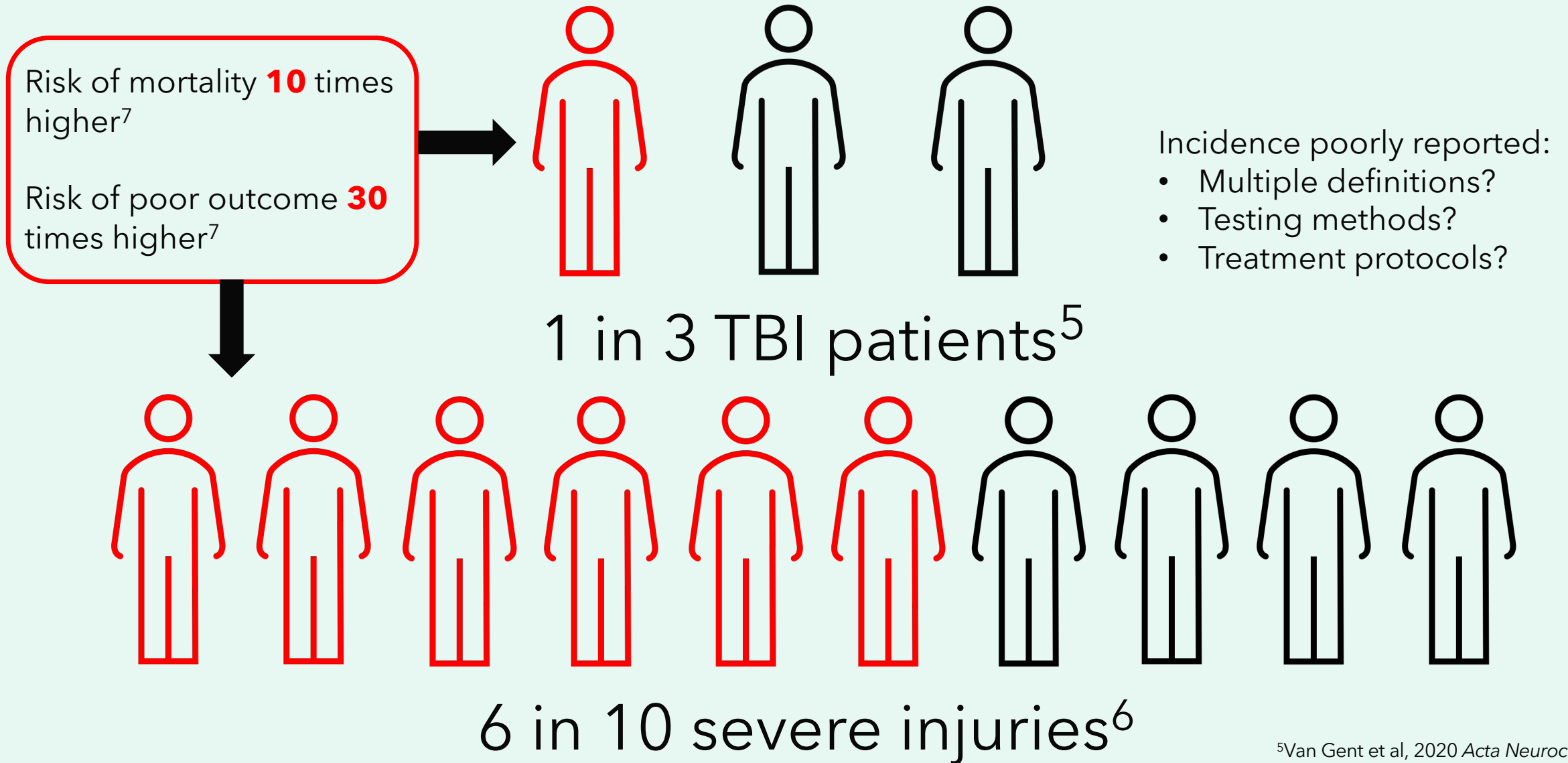
OR



Excessive clotting

Caused by:
Genetics
Acquired factors
Trauma

TBI & Coagulopathy



⁵Van Gent et al, 2020 *Acta Neurochir*

⁶Epstein et al, 2014 *Injury*

⁷Harhangi et al, 2008 *Acta Neurochir*

Detection of Coagulopathy



Standard Coagulation Tests (SCTs)

Transported to lab ~53 minutes⁸
Only analyse until clot breakdown



Rotational Thromboelastometry (ROTEM)

Point of care ~10 minutes⁸
Analyses clot firmness and breakdown

ROTEM in TBI

CRITICAL CARE

Prevalence and impact of abnormal ROTEM® assays in severe blunt trauma: results of the 'Diagnosis and Treatment of Trauma-Induced Coagulopathy (DIA-TRE-TIC) study'

H. Tauber¹, P. Innerhofer and M. Mittermayr¹

Original Article

Thromboelastometric (ROTEM) Findings in Patients Suffering from Isolated Severe Traumatic Brain Injury

Herbert Schöchl^{1,2}, Cristina Solomon^{2,3}, Stefan Traintinger², Ulrike Nienaber⁴, Tolnai⁵, Christian Windhofer⁵, Soheyl Bahrami¹, and Wolfgang Voelckel²

Implementation of Thromboelastometry for Coagulation Management in Isolated Traumatic Brain Injury Patients Undergoing Craniotomy

¹ Marius Rimaitis
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² Department of Neurosurgery, Lithuanian University of Health Sciences, Kaunas, Lithuania

Original Article

Protocolised thromboelastometric-guided haemostatic management in patients with traumatic brain injury: a pilot study

J. Gratz,¹ H. Güting,² S. Thorn,³ A. Brazinova,⁴ K. Görlinger,^{5,6} N. Schäfer,² H. Schöchl,^{7,8} S. Stanworth⁹ and M. Maegele^{10,11}

Lacking research of ROTEM in TBI BUT:

- Equal sensitivity for accurately detecting coagulopathy⁹
- Differences in results of survivors vs non-survivors of isolated TBI⁹
- ROTEM guided care protocol reduced likelihood of progressive bleeding and neurosurgical re-intervention¹⁰

⁹Schöchl et al, 2011 *J Neurotrauma*

¹⁰Rimaitis et al, 2020 *Med Sci Monit*

"The Use of Rotational Thromboelastometry (ROTEM) in Moderate to Severe Traumatic Brain Injury"



What are our aims?

1. Determine the **incidence of coagulopathy** within patients with **moderate to severe TBI** via use of **SCTs** and **ROTEM**
2. Compare **detection rate** of coagulopathy between testing methods
3. Describe patient and clinical characteristics to **identify potential risk factors** that may contribute to development of coagulopathy

How will we achieve this?

- Two 4mL blood samples from an existing venous line
- Patient data



Pre-hospital



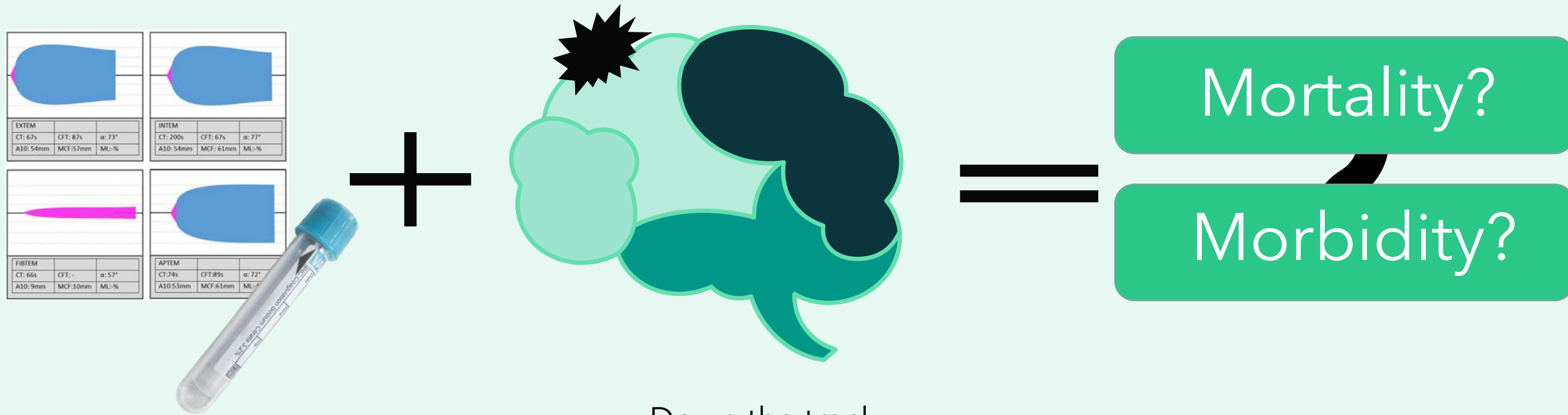
In hospital



Discharge



What significance does this hold?



Facilitate personalised care to rectify coagulopathy
 Development of ROTEM-guided treatment protocols
 Targeted use of ROTEM within Australia

To achieve improved outcomes for TBI populations

Acknowledgements



Dr. Adam Wells | Department of Neurosurgery

Assoc. Prof. Dan Ellis | RAH Trauma Service

Mrs. Stephanie O'Connell | Critical Care Service