Standardizing an approach to evaluate trauma resuscitation

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No other relevant financial relationships

OUTLINE

- About me *(& Canada eh*)
- Background on Adverse Events in Trauma
- The Safety Threats and Adverse events in Trauma (STAT) Taxonomy
- Future uses and plans


Manulife

GEOGRAPHY: THE LARGEST BARRIER

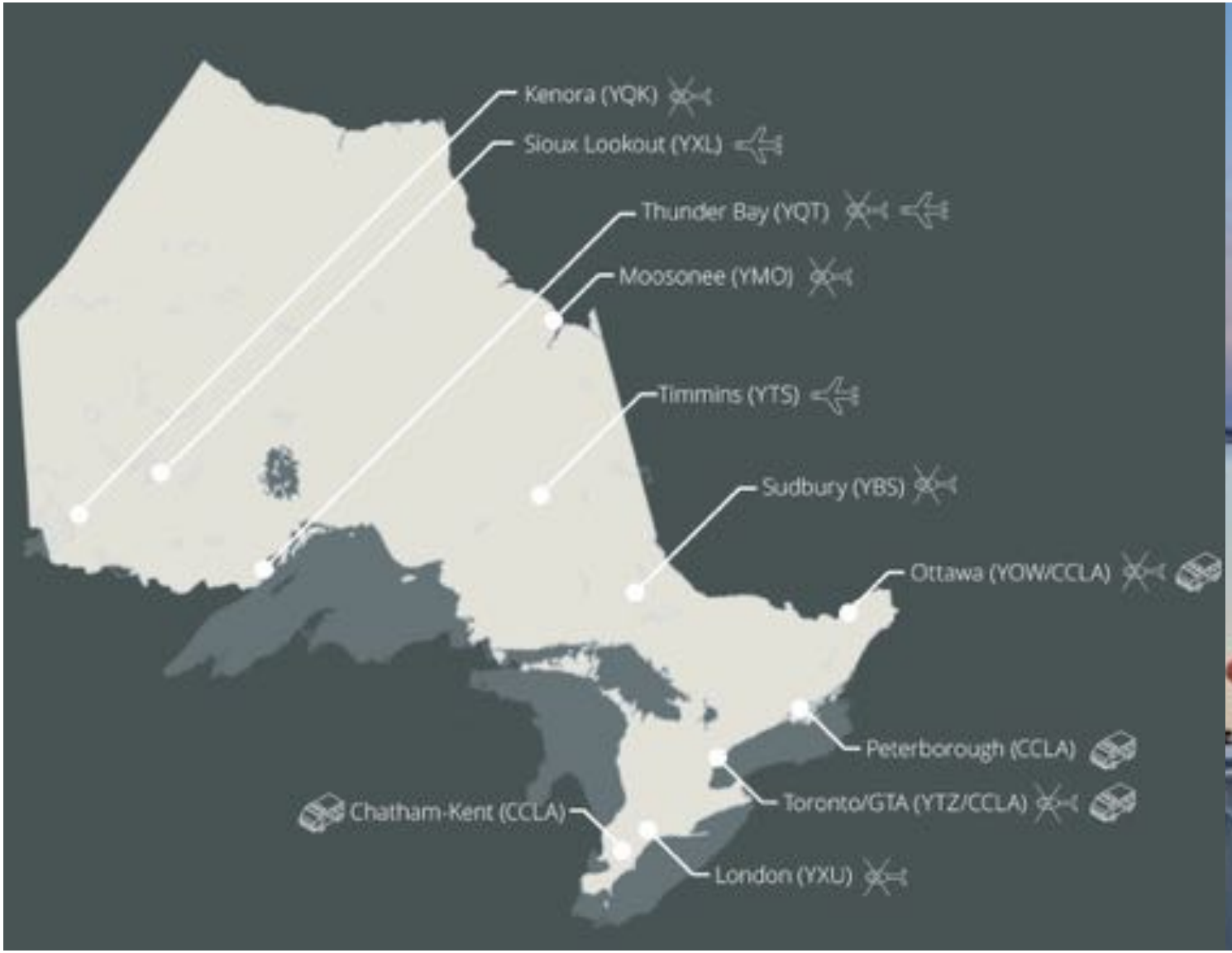
Canada:

- 3.86 million sq mi
- 37 million people

1 Hotel Dieu Grace Hospital, Windsor
2 London Health Sciences Centre
3 Hamilton Health Sciences
4 St. Michael's Hospital, Toronto
5 Sunnybrook & Women's College Hospital, Toronto
6 Kingston General Hospital
7 The Ottawa Hospital
8 Sudbury Regional Hospial
9 Thunder Bay Regional Hospital

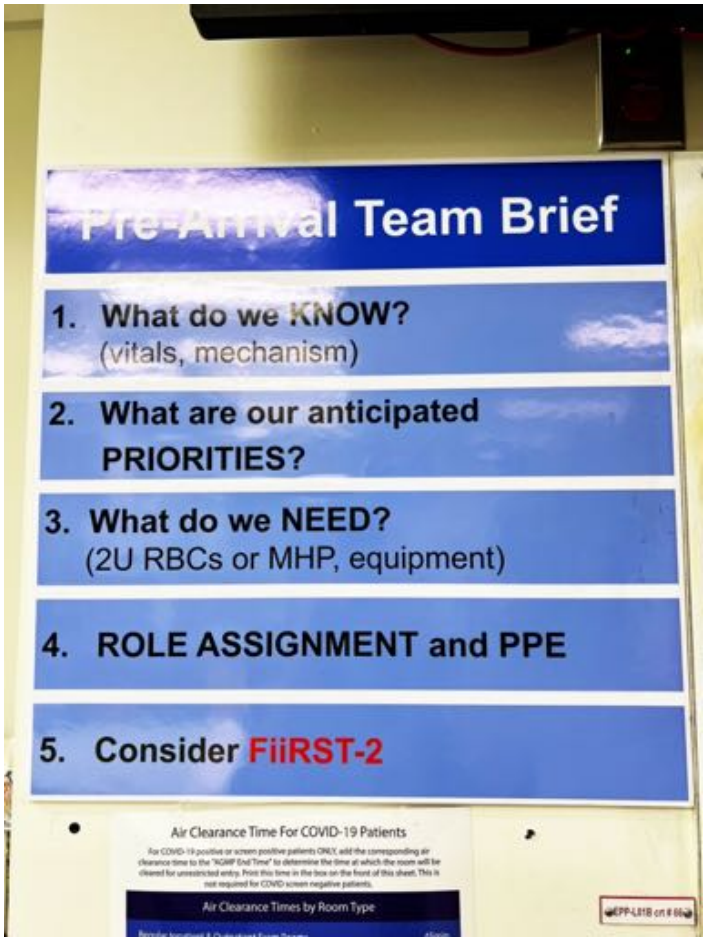
In Ontario:

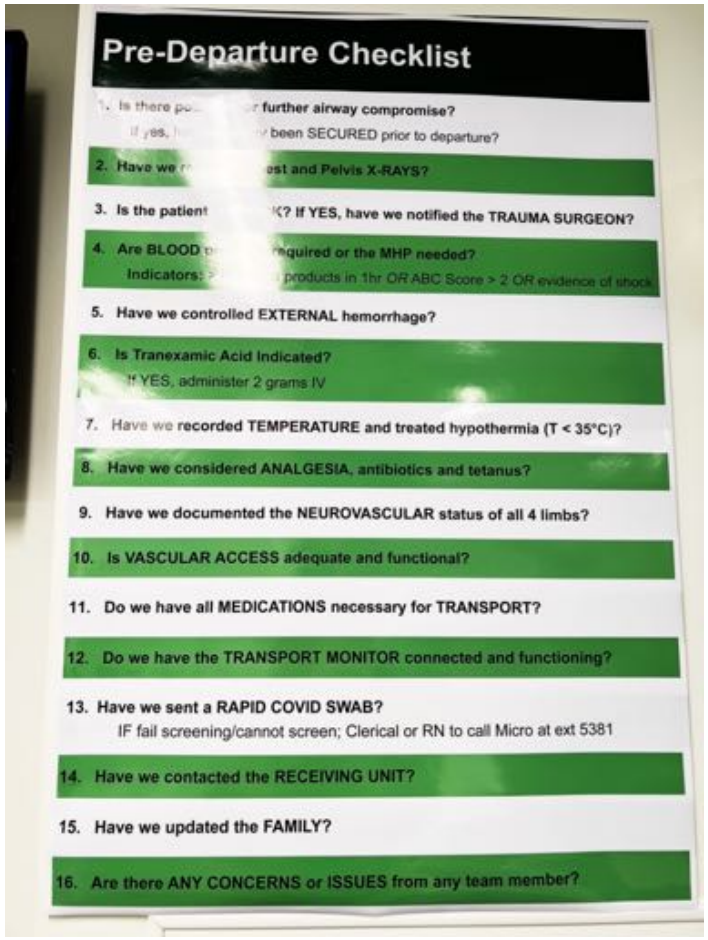
- 14.5 million people over 415,000 sq mi (**1.5x Texas)**
- 40% of patients do not have access to a trauma centre within 60 minutes by land
- 15% were not within 60 minutes by air transport

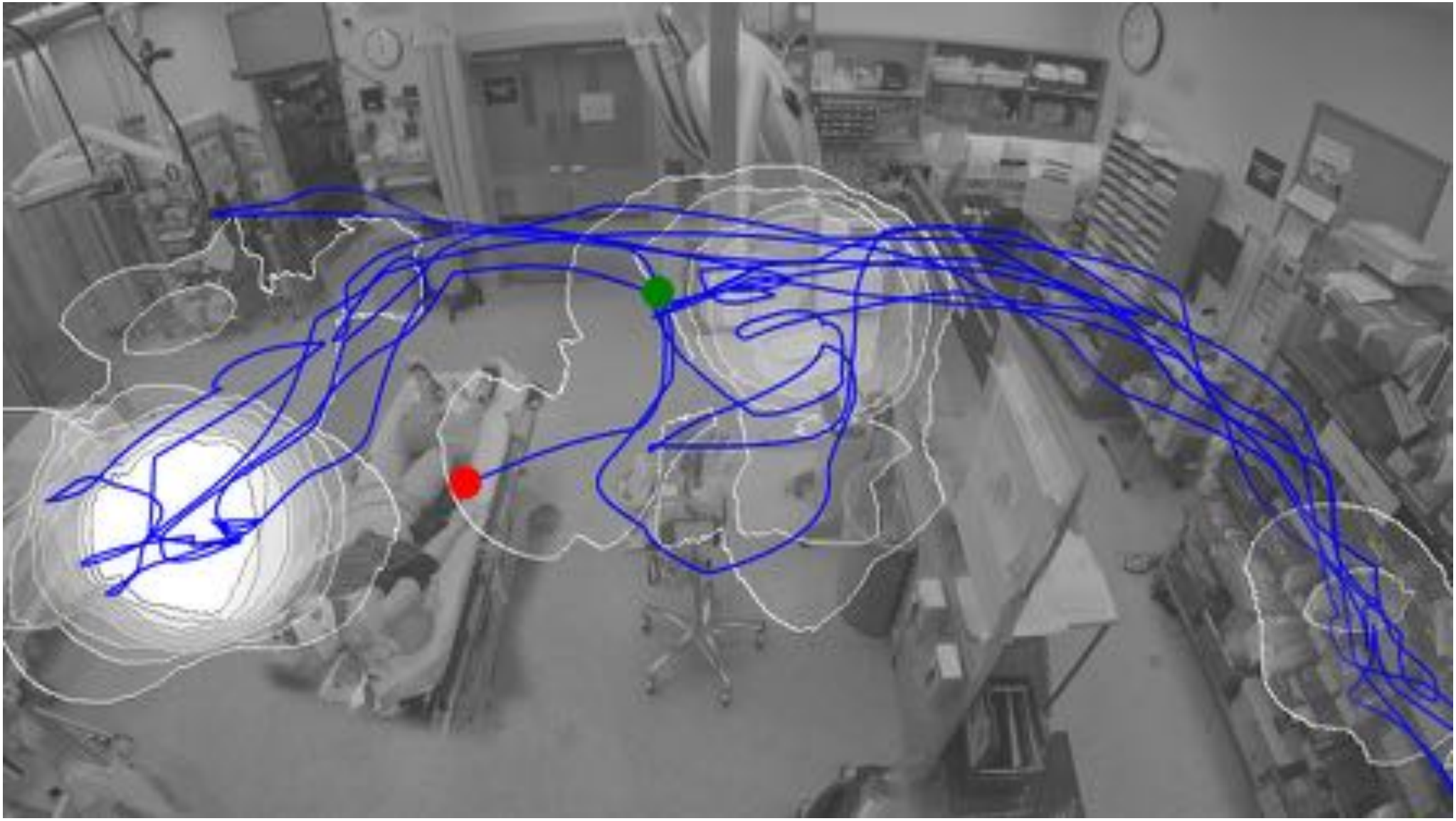

Kenora (YQK)
Sioux Lookout (YXL)
Thunder Bay (YQT)
Moosonee (YMO)
Timmins (YTS)
Sudbury (YBS)
Ottawa (YOW/CCLA)
Peterborough (CCLA)
Toronto/GTA (YTZ/CCLA)
Chatham-Kent (CCLA)
London (YXU)

BACKGROUND:
ADVERSE EVENTS IN TRAUMA

- AEs are common (~6 per fatal trauma case)
- Initial resuscitation where most AEs occur
- Result in patient harm
- No standard taxonomy of definition of AE in trauma

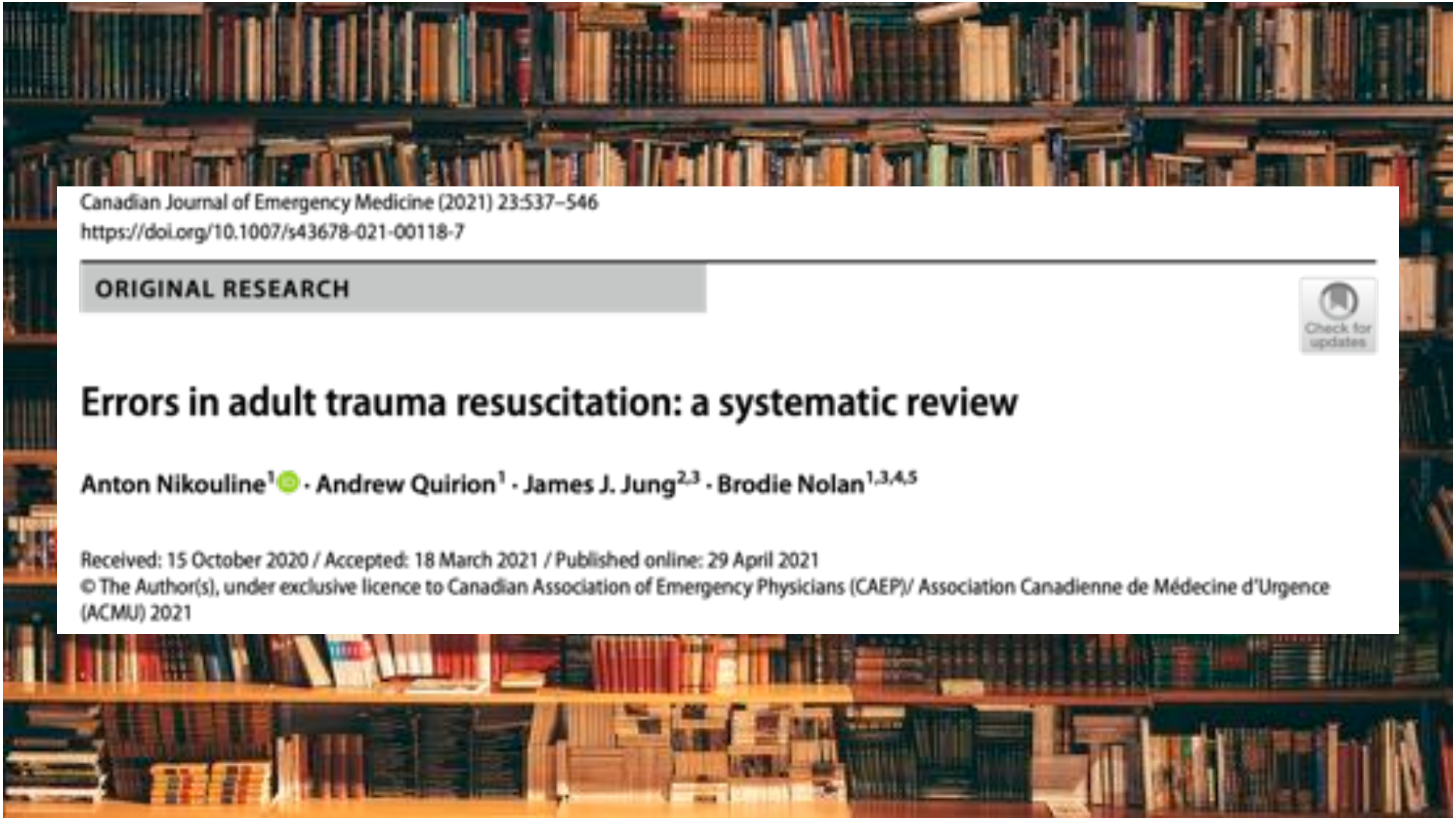

Pre-Arrival Team Brief
1. What do we KNOW?
(vitals, mechanism)
2. What are our anticipated PRIORITIES?
3. What do we NEED?
(2U RBCs or MHP, equipment)
4. ROLE ASSIGNMENT and PPE
5. Consider FiiRST-2
Air Clearance Time For COVID-19 Patients
Air Clearance Times by Room Type


Pre-Departure Checklist
further airway compromise?
been SECURED prior to departure?
est and Pelvis X-RAYS?
K? If YES, have we notified the TRAUMA SURGEON?
required or the MHP needed?
products in 1hr OR ABC Score > 2 OR evidence of shock
5. Have we controlled EXTERNAL hemorrhage?
6. Is Tranexamic Acid Indicated?
If YES, administer 2 grams IV
7. Have we recorded TEMPERATURE and treated hypothermia (T < 35°C)?
8. Have we considered ANALGESIA, antibiotics and tetanus?
9. Have we documented the NEUROVASCULAR status of all 4 limbs?
10. Is VASCULAR ACCESS adequate and functional?
11. Do we have all MEDICATIONS necessary for TRANSPORT?
12. Do we have the TRANSPORT MONITOR connected and functioning?
13. Have we sent a RAPID COVID SWAB?
IF fail screening/cannot screen; Clerical or RN to call Micro at ext 5381
14. Have we contacted the RECEIVING UNIT?
15. Have we updated the FAMILY?
16. Are there ANY CONCERNS or ISSUES from any team member?




CHEST TUBE
ART LINE AND VASC ACCESS
NO PARKING
FOLEY BUNDLES X 4
D
C
B
A

The Safety Threats and Adverse Events in Trauma (STAT) Taxonomy



Canadian Journal of Emergency Medicine (2021) 23:537–546
https://doi.org/10.1007/s43678-021-00118-7

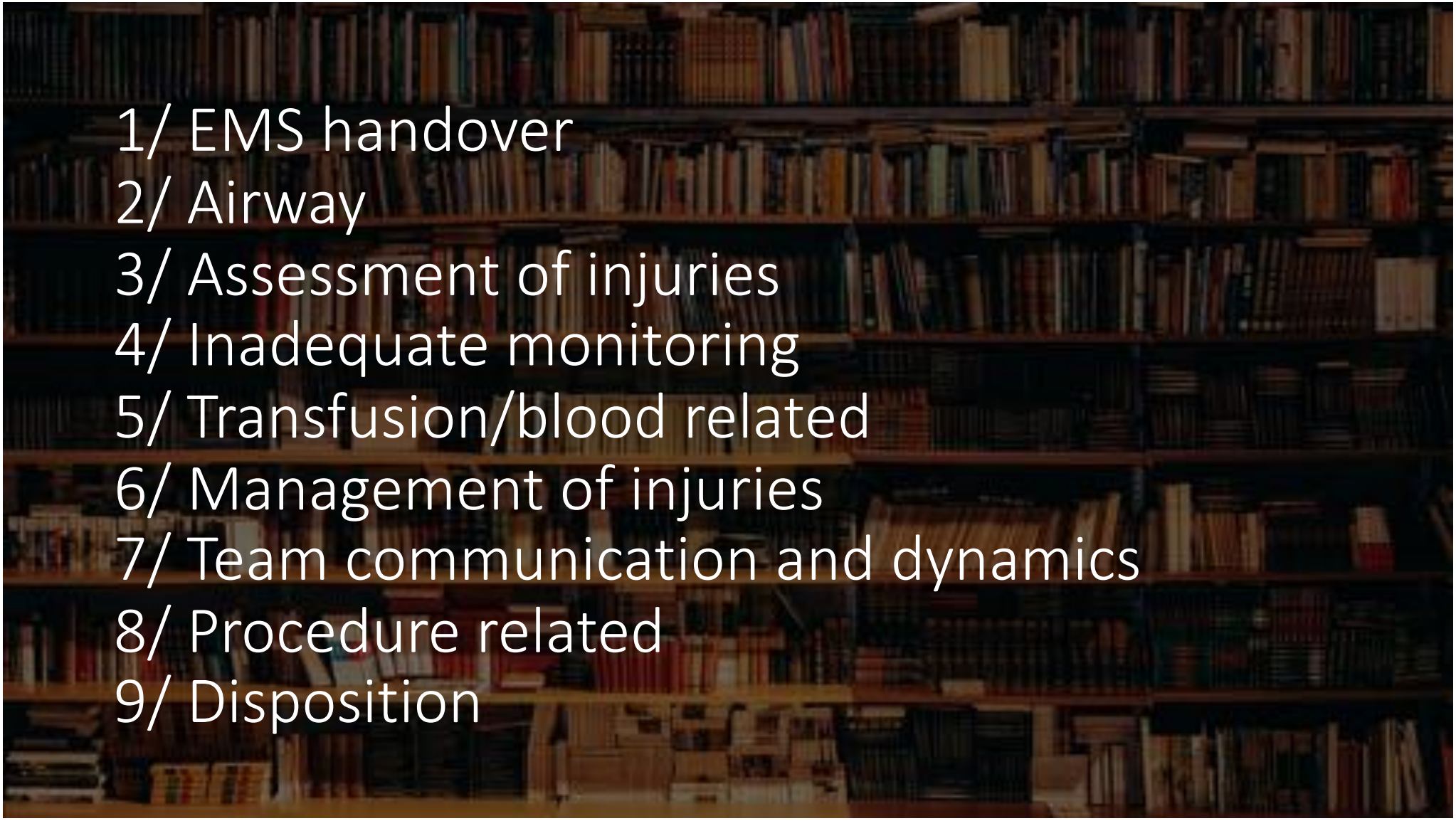
ORIGINAL RESEARCH

Errors in adult trauma resuscitation: a systematic review

Anton Nikouline[1] · Andrew Quirion[1] · James J. Jung[2,3] · Brodie Nolan[1,3,4,5]

Received: 15 October 2020 / Accepted: 18 March 2021 / Published online: 29 April 2021


26 Studies included
Total of 363 errors identified
Categorized into a final list of 39 unique AEs


1/ EMS handover
2/ Airway
3/ Assessment of injuries
4/ Inadequate monitoring
5/ Transfusion/blood related
6/ Management of injuries
7/ Team communication and dynamics
8/ Procedure related
9/ Disposition

Nolan B, *et al*. *Trauma Surg Acute Care Open* 2021;**6**:e000805. doi:10.1136/tsaco-2021-000805

Open access **Original research**

Trauma Surgery & Acute Care Open

Defining adverse events during trauma resuscitation: a modified RAND Delphi study

Brodie Nolan ,[1,2] Andrew Petrosoniak,[1,2] Christopher M Hicks,[1,2] Michael W Cripps,[3] Ryan P Dumas[4]

Table 1 Demographic characteristics of participants

Profession	**n (%)**
Trauma surgeon	11 (50.0)
Emergency medicine physician	5 (22.8)
Nurse	4 (18.2)
Anesthesiologist	1 (4.5)
Respiratory therapist	1 (4.5)
Years in practice, mean (SD)	8.2 (6.6)
Country of practice	**n (%)**
Canada	15 (68.2)
USA	7 (31.8)

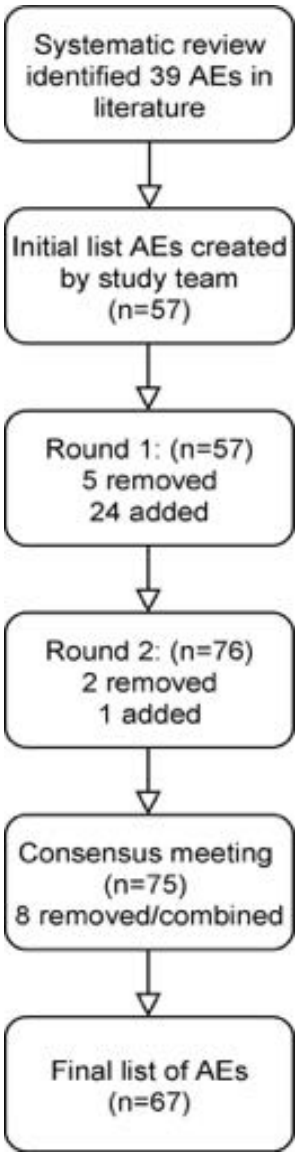


Table 2 Final taxonomy of adverse events that occur during acute trauma resuscitation

Airway and breathing
- Failure to identify need for supplemental oxygen.
- Unanticipated loss of airway.
- Unintentional delay in intubation (>5 min).
- Unsuccessful intubation attempt.
- Malpositioned endotracheal tube.
- Aspiration event.
- Ventilator malfunction.
- Failure to identify need for chest tube.
- Failure to perform surgical airway when indicated.
- Administration of paralytics prior to all teams ready.
- Failure to discuss, anticipate, or treat hemodynamic instability prior to intubation.

Circulation
- Failure to obtain peripheral or central venous access within 5 min of first attempt.
- Failure to draw bloodwork within 10 min of arrival.
- Delay of >10 min to blood product administration (once blood is called for).
- Delay to administration of blood products to set up rapid infuser.
- Greater than 1 L crystalloid bolus given in presumed hemorrhagic shock.
- Failure to administer blood products or initiate vasopressors with ongoing shock (SBP <90).
- Failure to activate massive transfusion protocol (if more than 2 units of blood products required).
- Failure to control ongoing external bleeding.
- Failure to identify/treat worsening hemodynamics or level of consciousness.
- Failure to administer TXA in presumed hemorrhagic shock and injury <3 hours.
- Failure to give platelets or fresh frozen plasma if >6 units of blood product given in trauma bay (ie, only pRBC given).
- Primary resuscitative line is subdiaphragmatic (ie, femoral line, tibial IO) in patients with positive FAST or open book pelvis

EMS handover
- Failure or delay to activate trauma team.
- Inaccurate or incomplete medical history report.
- Team member(s) absent for EMS handover.
- Patient assessment begins before EMS handover in stable patients.

Management of injuries
- Medication error.
- Failure to treat hypothermia.
- Failure to apply or incorrect application of pelvic binder in the setting of open book pelvic fracture.
- Failure to offer effective analgesia/sedation to patients.
- Failure to reduce fracture/dislocation in setting of pulseless limb.
- Failure to provide patients with unique hospital ID or bracelet within 5 min of arrival.
- Failure to administer hypertonic saline or mannitol in setting or presumed head injury with lateralizing signs or unilateral pupil deficit.

Assessment of injuries
- Failure to maintain cervical spine precautions (if indicated).
- Failure to get X-rays before departure from trauma bay (if indicated).
- Failure to complete primary survey before departure from trauma bay.
- X-ray misinterpreted.
- FAST misinterpreted.
- Incomplete exposure of patients.
- Failure to calculate GCS.
- Failure to measure temperature.
- Failure to assess circulation and function in injured limbs.

Disposition
- Delay more than 15 min waiting for CT.
- Delay more than 15 min waiting for OR (if emergent OR).
- Transfer to CT scan with hemodynamically unstable patients.

Procedure related
- Technical errors.
- Equipment failure/missing.
- Failure to perform an indicated resuscitative procedure.
- Iatrogenic injury during procedure.
- Knowledge deficits concerning equipment location.
- Performing FAST examination interferes with ability to obtain initial intravenous access.
- Bodily fluid exposure or needlestick injury to healthcare team member.

Team communications and dynamics
- Unclear responsibility and roles.
- Patient care activities delayed or not completed due to task overload/competing priorities.
- Team member unavailable.
- Concurrent conversations preventing team leader communication.
- Ineffective team leadership/unclear authority of team leader.
- Failure to use closed-loop communication.
- Clinical team members distracted by non-clinical-related tasks (ie, answering phone).
- Inadequate personal protective equipment.
- Trauma team leader leaves position to participate in patient care without delegating interim leader.

Patient monitoring and access
- Inadequate monitoring (ie, loss of telemetry, pulse oximetry for >3 min).
- Failure of patient-monitoring equipment (ie, patient monitor, $EtCO_2$, temperature probe).
- Oxygen supply runs out.
- Loss of all central/intravenous access.
- Delay in assessment or treatment due to agitated or combative patients.

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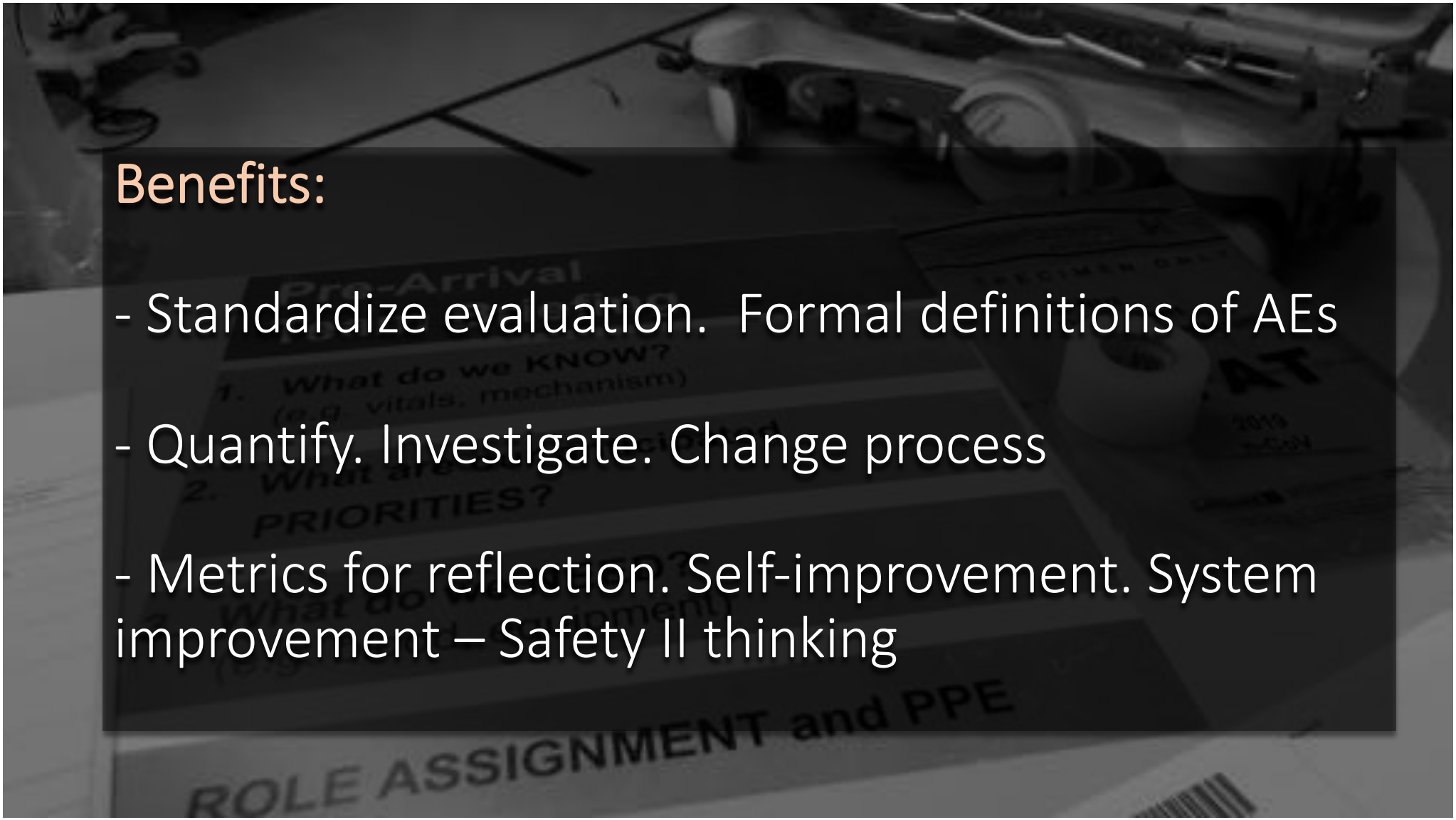
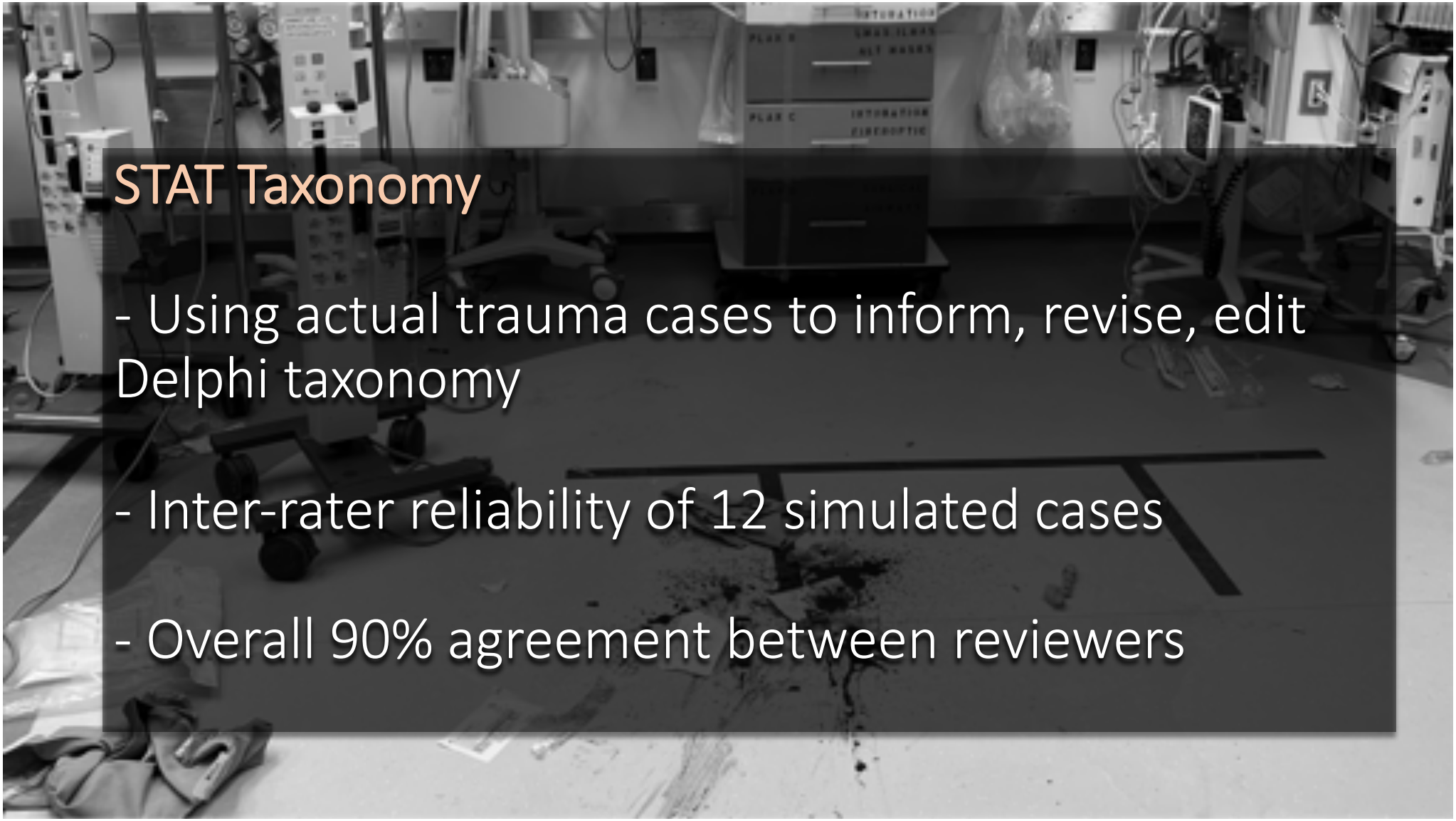


Benefits:

- Standardize evaluation. Formal definitions of AEs

- Quantify. Investigate. Change process

- Metrics for reflection. Self-improvement. System improvement – Safety II thinking



STAT Taxonomy

- Using actual trauma cases to inform, revise, edit Delphi taxonomy

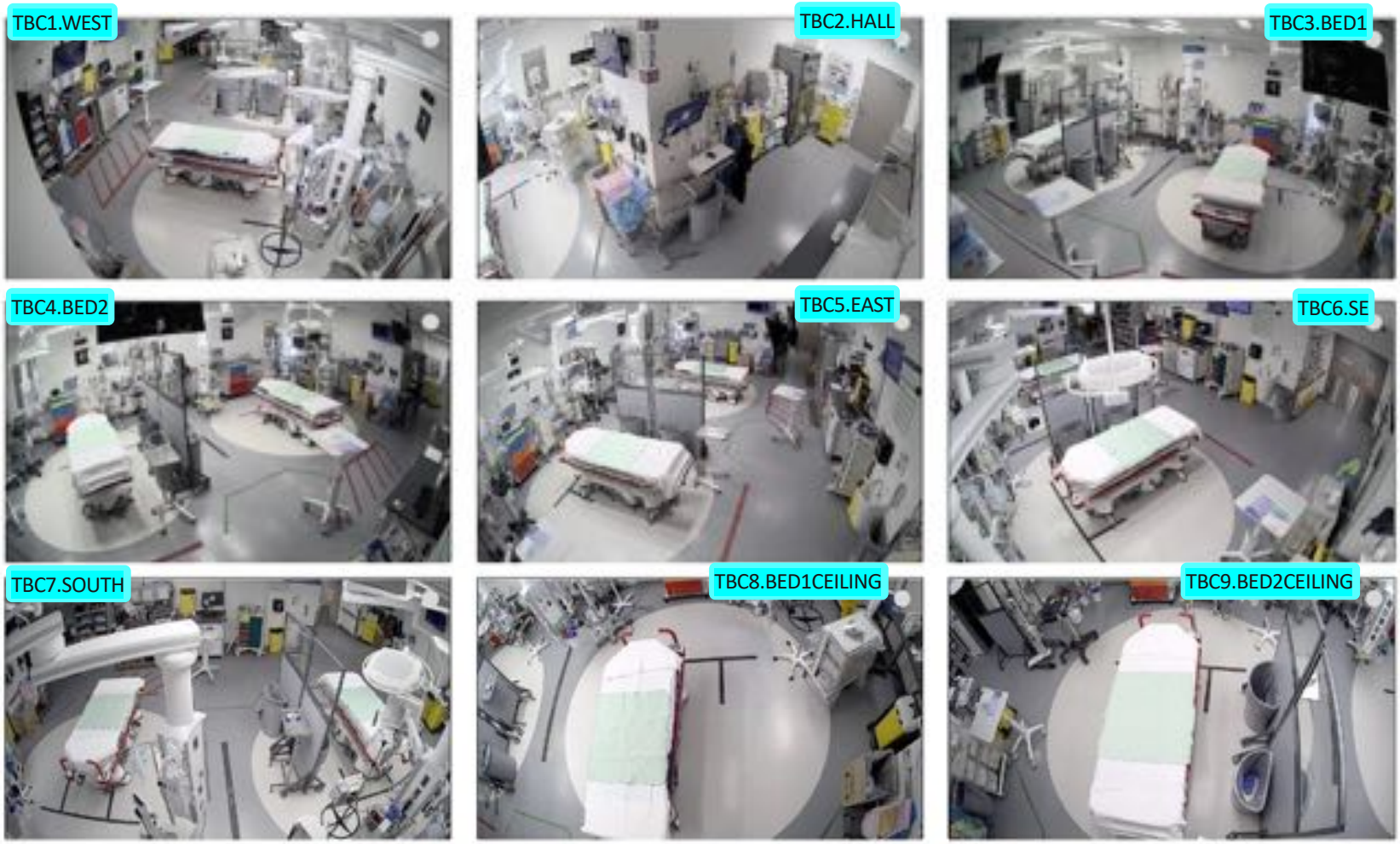
- Inter-rater reliability of 12 simulated cases

- Overall 90% agreement between reviewers

FUTURE USES

The STAT Taxonomy

- ☑ Piloting testing via in situ-simulation – [manuscript]
- ☑ Measure inter-rater reliability in recorded trauma resuscitations (collaboration with Parkland UTSouthwestern)
- ☑ Larger prospective observational study


TBC1.WEST
TBC2.HALL
TBC3.BED1
TBC4.BED2
TBC5.EAST
TBC6.SE
TBC7.SOUTH
TBC8.BED1CEILING
TBC9.BED2CEILING


THANK YOU
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