



Society of Rural Physicians of Canada  
Société de la Médecine Rurale du Canada

## Improving Rural Trauma Outcomes: Local Damage Control?


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**Enhanced Surgical Skills Program**  
Banff, January 2018

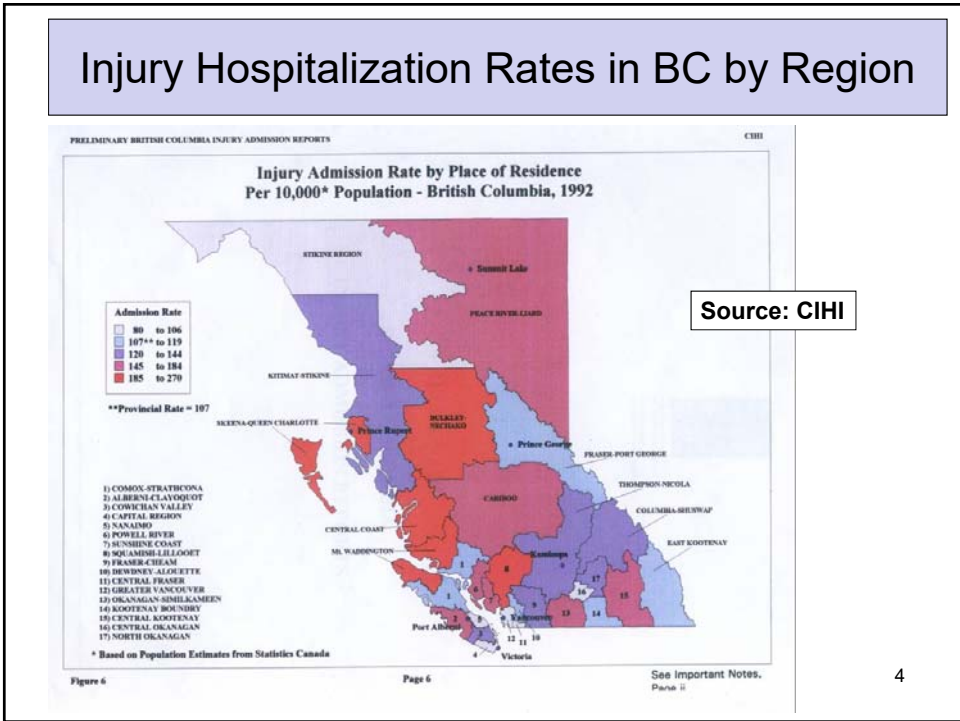
## Session Objectives

- Define problem of high injury mortality rates in rural jurisdictions.
- Define potential role of surgical first responders providing damage control interventions to reduce injury mortality.
- Define how trauma/surgical networks may assist local surgical programs.
- Define potential trauma training programs for ESS physicians.

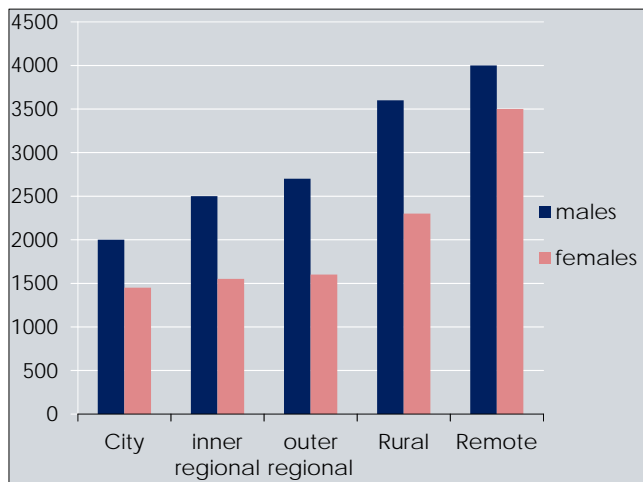
# Disclosures



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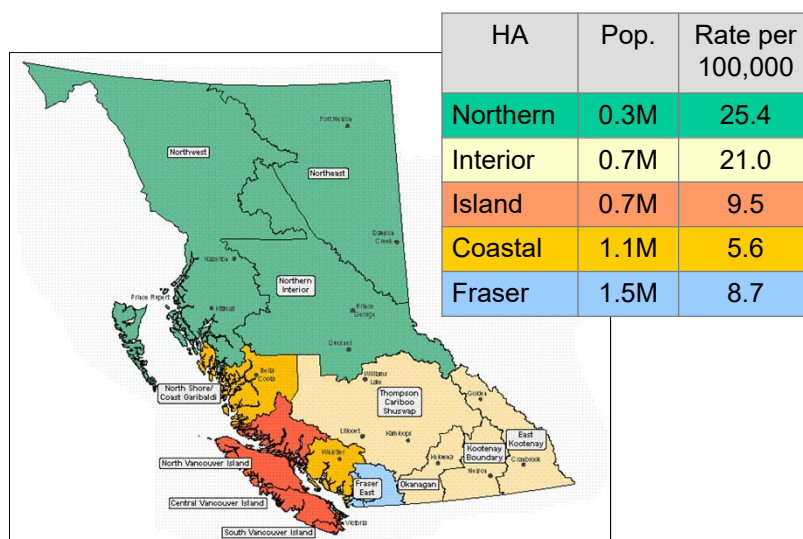
### Injury Hospitalization Rates in Australia



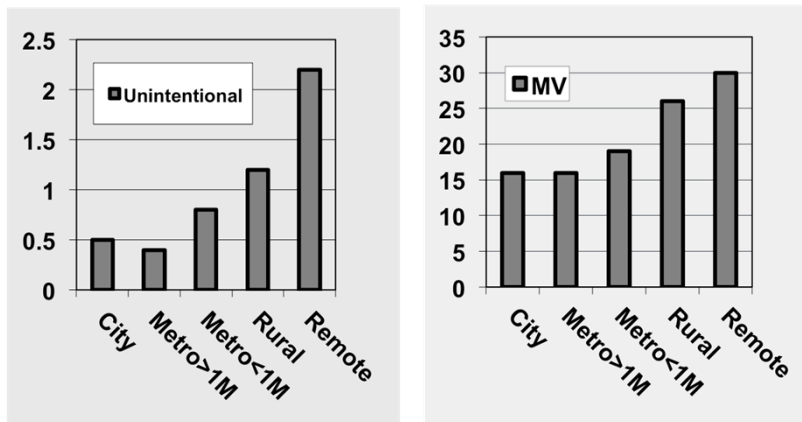
Source: AIHW (per 100,000)

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### Death rates due to MVC in BC



### Rural vs. Urban Injury Death Rates in US (per 100,000)



Rogers et al. J Trauma 1999 <sup>7</sup>

### Pre-hospital: Time to death following injury BC Coroner's Database (Hours)

Jurisdiction	p25	p50	p75
NHA-NW	0.2	1	6.7
FHA	0.9	6	66.8
VCHA	0.9	6	41.7
VIHA	1.1	7.7	78.6

NW prehospital times: 48% >1h, 21% > 2h, 13% > 3h

RR Death 7.0 for EHS response > 30 min<sup>2</sup>

Simons et al. J Trauma 2010; (2) Grossman et al J Trauma 1997

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### Pre-hospital: Place of Death for MVC (%)

Jurisdiction	Hospital	Road	Other
NHA-NW	20	77	3
FHA	41	55	4
IHA	28	63	9
VCHA	46	48	6
VIHA	36	56	8
BC	35	59	6

BC Coroner's Database, Simons 2010, Squire 2014

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### Problem: Urban-rural divide in injury risk and death

- Rural populations more likely to:
  - Be injured
  - Die from injury
  - Die before reaching definitive care
- Disparity:
  - Not subtle
  - Resistant to evolving trauma systems
- Failure of current trauma system design

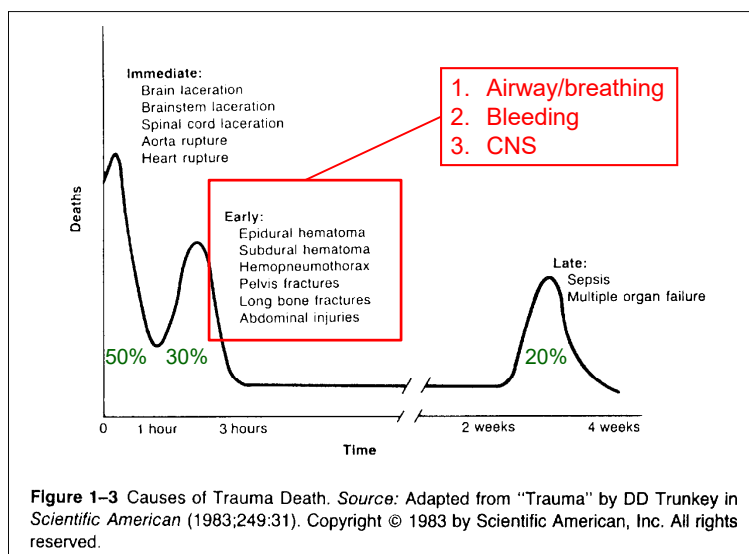
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## Solution: Reducing rural injury risk and death

- Prevention
- Improved pre-hospital services
  - Earlier discovery, rapid transport, better bleeding control & pre-hospital resuscitation
- Rapid evacuation to definitive care
- **Improved initial local stabilisation**
  - **Local damage control interventions?**
  - **Role for ESS physicians?**
- Fully networked rural-urban trauma system

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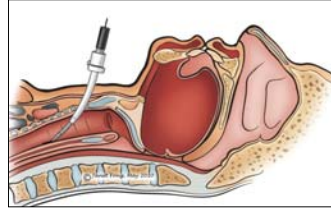
## Preventing Death Following Injury



## Airway

Array of new airway techniques available to secure airway.

Cricothyroidotomy – a ‘need-to-have’ skill as likely will be plan Z (after plans A, B, C, etc. have failed)



## Breathing

Standard set of interventions work for majority of thoracic trauma patients:

- Pain management.
- Needle/tube thoracostomy
- Additional chest tubes as needed
- Intubation
- Mechanical ventilation
- Open pneumothorax management



# Bleeding

A. Stopping the bleeding



B. Resuscitation of shock



## B. Resuscitation of Shock

### Damage Control Resuscitation (DCR)

- Transient responder? unable to stop bleeding?  
If so, **you are in DCR mode**: assume patient is coagulopathic, acidotic & at risk for hypothermia.

- Stop what bleeding you can
- Limit crystalloid
- Empiric use of blood products
- Keep warm
- TXA?, Fibrinogen concentrate?
- Permissive hypotension





## A. Stop the Bleeding Part 1 – The Easy (extremity)

- Close lacerations



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- Close lacerations
- Splint Fractures



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- Close lacerations
- Splint Fractures
- Wrap/pack pelvic #s



## A. Stop the Bleeding Part 1 – The Easy (extremity)

- Close lacerations
- Splint Fractures
- Wrap/pack pelvic #s
- Tourniquets



## A. Stop the Bleeding

### Part 1 – The Easy (extremity)

- In scope for most ED Physicians and GPs
- Covered in ATLS and STB courses

## A. Stop the Bleeding

### Part 2 – Harder (Junctional)

- Pressure dressing
- Hemostatic dressings
- Catheter tamponade

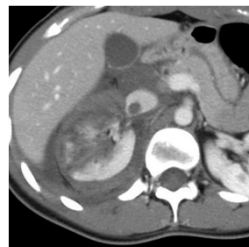
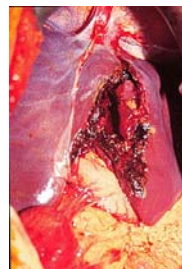


## A. Stop the Bleeding Part 2 – Harder (Junctional)

- Mostly in scope for ED Physicians and GPs
- Covered in ATLS and especially STB courses

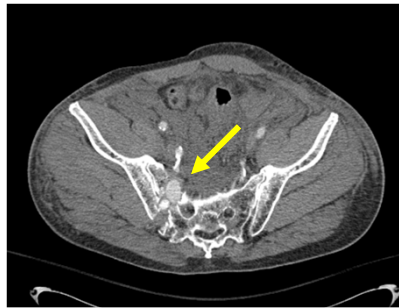
## A. Stop the Bleeding Part 3 – Hardest (cavitatory)

- Abdominal bleeding



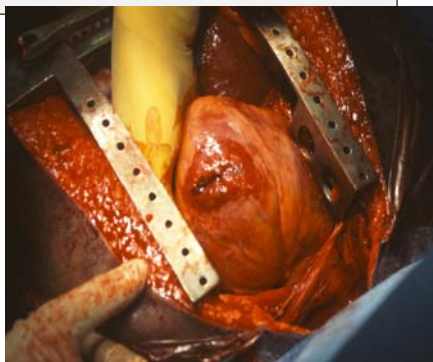
## A. Stop the Bleeding Part 3 – Hardest (cavitatory)

- Abdominal bleeding
- Pelvic bleeding



## A. Stop the Bleeding Part 3 – Hardest (cavitatory)

- Abdominal bleeding
- Pelvic bleeding
- Cardiac bleeding



## A. Stop the Bleeding

### Part 3 – Hardest *(cavitary)*

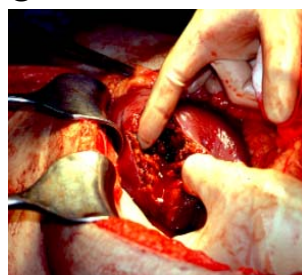
### Surgical Damage Control

- Beyond scope of most ED Physicians and GPs
- Requires:
  - Baseline surgical skill set (ESS?)
  - Additional operative trauma skills
  - Local surgical capability
  - Supportive surgical network
- Skills covered in DSTC course

## A. Stop the Bleeding

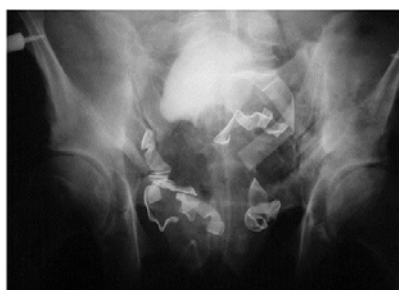
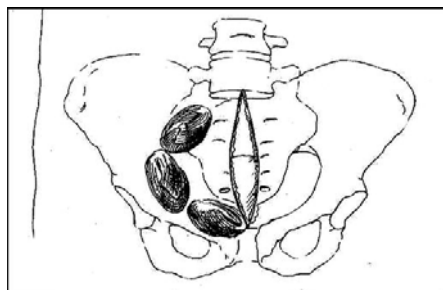
### Part 3 – Surgical Damage Control

- DC Trauma Laparotomy
  - Hemorrhage control
    - Packing,
    - Splenectomy, Nephrectomy
    - Mesenteric ligation
  - Contain contamination
  - Abbreviated closure



## A. Stopping the Bleeding Part 3 – Surgical Damage Control

- DC Trauma Laparotomy
- Pelvic packing



## A. Stopping the Bleeding Part 3 – Surgical Damage Control

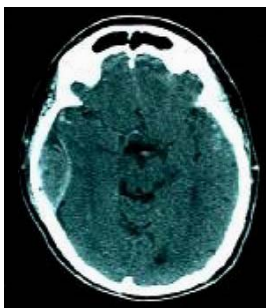
- Trauma Laparotomy
- Pelvic packing
- EDT vs. pericardiocentesis





## CNS: Intracranial bleeding

- Acute neurological deterioration with:
  - EDH
  - Acute SDH



### Burr holes/Craniotomy

- Specialist only ?
- Generalist surgeon ?
- FP-ESS ?

### Role of Telemedicine

- Surgical decision making
- Procedural mentor

## Surgical First Responder Trauma Tool Kit

### Procedures/Resus

Intubation  
 Cricothyroidotomy  
 Tube thoracostomy  
 IV/IO access  
 DCR  
 Pericardiocentesis  
 Splinting & wrapping #s  
 Wounds & tourniquets  
 Ultrasound

**ATLS** +/- **STB**

### Damage control surgery

Laparotomy  
   Packing liver  
   Splenectomy, Nephrectomy  
   Mesenteric ligation  
   Temporary closure  
 Pelvic packing  
 Resus. thoracotomy  
 Burr holes/craniotomy  
 Escharotomy fasciotomy

**ESS** +/- **Add on**



## Proposed Trauma Tool Box

### ESS Curriculum

1. Basic Operative Mgt <sup>(1-3)</sup>
2. Abdominal presentations <sup>(4-8)</sup>
  - Hernia, perianal, endo, appe
3. Pregnancy Mgt <sup>(9-10)</sup>
  - Operative VD, C section, etc.
4. Non abdominal <sup>(11-17)</sup>
  - Wnds, STSG, CTS, tendon, CS
5. Basic Principles <sup>(18-23)</sup>
  - Laparoscopy & endoscopy
  - Laparotomy <sup>(20)</sup>
  - Ultrasound <sup>(22)</sup>

**ESS**

### Trauma Tool Box

Laparotomy  
 Packing liver  
 Splenectomy, Nephrectomy  
 Mesenteric ligation  
 Temporary closure  
 Pelvic packing  
 Escharotomy, fasciotomy  
 Resus thoracotomy  
 Burr holes/craniotomy

**Add on**

## ESS Trauma Training Program

- Proof of concept – current pilot project
- Selection of candidates
- Prerequisite training/experience
- Practice environment
- Curriculum and program delivery
- Network development
- On site, real time support, tele-mentoring
- Evaluation and quality assurance

