“A disease called trauma”

Aetiology, approach, mechanisms & patterns of injury

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Aims

• Is trauma important?
• Why is prehospital care important?
• Why is mechanism of injury important?
• Why is patient handling important?
Basics – The numbers

- 5th commonest cause of death – WHO
- 5 million per year – WHO
- UK 17,000 deaths per year, 3% of all deaths
- ¾ million hospital admissions
- 5 million A&E attendances / yr
- UK 38 / 100,000 population trauma fatalities
- France 84 /100,000
- NZ 60/ 100,000
- USA 62 / 100,000
Basics - Who

- Disease of the young 15 – 45 yrs = 75% deaths
- Disease of males 70 / 30 split
- Deprivation in equalities
- Racial variation (guns) – Operation Trident
Sources of information on injury

- National Statistics Office
- Transport Office
- Trauma Audit Research Network (TARN)
- Local National Reports
- Epidemiological papers

Some are injury, some are death, some are major trauma
National Statistics Office - all injury

- Total deaths – 17,000 per year
- Mechanisms - RTA 3500 per year
- Age distribution - male 47 yrs, female 67yrs
- 60 per 10,000 pop lost work years
  - Circulatory disease 90 /10,000
  - Neoplasia 82 / 10,000
Road Accidents GB 2005

- Approx 290,000 killed / injured
- 250,000 slightly injured
- 34,000 seriously injured
- 3,500 killed (171 children)
Deaths by vehicle - GB 2005

- Car 1769
- Ped 672
- Motor bikes 569
- Goods 116
- Pedal cyclist 148
- Misc eg coach 11
## International comparisons of road deaths: number and rates for different road users: by selected countries: 2002

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<th>Number of road deaths</th>
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Table 50 - International comparisons: rates for different road users: EU Members: 2002

Road deaths per 100,000 Population

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Definition – “major trauma patient”

• Isn’t a nasty fracture in resus
• Isn’t a trauma calls / fast bleep to resus
• ? spleen in resus

Patient who has an Injury Severity Score of 16 or more

ISS >15 = Mortality of 10%
AAAM

- Association for Advancement of Automotive Medicine
- Group of engineers and clinicians
- Tool to rank and scale injuries
- Injury Committee
- Universally recognised and accepted tool
Abbreviated Injury Scale - AIS

1. Minor
2. Moderate
3. Serious
4. Severe
5. Critical
6. Incompatible with life

Combining scores from body areas → ISS
Cost to society

- £900,000 per death
  - Consistent within various government departments
- £2 billion per year (5% of NHS expenditure)
- £20 billion saving \(^1\).

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“Major trauma workload within an English health region”

- 1 year review in Yorkshire region
- All patients with an ISS > 15
- All A&E attendances
- Coroners books

Total ISS > 15 = 968
(† = Died)

† on scene 196
† Prehospital

† on arrival in A&E 141

Alive A&E 631

63 † A&E
9 † theatre
188 † ward

27% (260 / 968) † in hospital

35% (337 / 968)
† survived
Geographical Differences

- Norway
- Review of 130 deaths
- 80% patients died prehospital

30 – 80% of trauma deaths are prehospital
Case incidence of 27 / 100,000 population

Case incidence surviving to A&E 17.7 / 100,000

Incidence of 1 per 1000 new A&E attendances

Small department seeing 40,000 = 40 / year
Medium department 70,000 = 70 / year
Large department 100,000 = 100 / year
Pooled data


0.9 / 1000 A&E attendances
Case incidence

- Hospital 1 - 2 per week
- LAS crew 1 - 2 per year
Preventable Death

- Many countries have published consensus papers indicating preventable deaths
- Very few papers claim no preventable deaths!
- Range from 4 - 40%
Preventable Deaths?

  4%

  8%

  9%

  39%
“Why not just scoop and run?”

Stabilisation of the Critically Injured Patient: A failed concept  
Smith JP. J Trauma 1985
But even when you’re not trapped....

Scoop and run policies in urban environments will produce long delays to critical care
Prehospital Time

Origin of call to arrival at hospital
ISS > 15, Not trapped

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Golden Hour is virtually a prehospital event!
“You’re not going to survive a crash like that”

“It was so disorganised you couldn’t do anything”

“It was so noisy we couldn’t communicate”

“After all it was an emergency you can’t expect to get it right in those situations”

“You did your best!!!”
“All too complex”

“Can’t plan”

“too unpredictable”

“no point in practicing”
“The Truth”
70% of Entrapments

- Single vehicle
- On all 4 wheels
- Frontal impact
- 360 degrees access
- Male driver
- Footwell entrapment
Key to a good team performance is good individual performance
Delivery of clinical excellence

.................consistently
- 9 months
- Seconded from LAS
- Senior / experienced
- Competitive post
- Extended training

- 6 months
- Senior SpR, Consultant
- Competitive post
- RSI capable
- Extensive 1 month training
Department of A&E Medicine and Prehospital Care

Prehospital Care SOP – Intravenous Fluids and IV Access

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Aims

- Describe the indications for fluid infusion.
- Describe position and types of venous access.

Background

Every effort should be made to minimise blood loss, maximise clot formation and minimise clot disruption. It is therefore essential to consider handling and splintage and their effects on natural tamponade as a fundamental part of “volume resuscitation”. All fractured limbs should be drawn out to length and splinted. Reducing the limb’s circumference will close down the soft tissues on bleeding fractures and minimise the space into which bleeding can take place. Similarly judicious handling will minimise clot disruption in the chest wall, peritoneum and pelvis. Appropriate cutting of clothes and “skin to scoop” packaging are essential elements of this care. Pressure should be used to limit visible bleeding.

- This operational guideline is to be read in conjunction with the packaging, monitoring and splintage guidelines.
- Intravenous fluid administration is not routine and should only follow specific indications.
- 0.9% Sodium Chloride is the fluid of choice for HEMS.

Application

All HEMS Doctors
All HEMS Paramedics

Policy

In the multiply injured patient demonstrating shock every effort should be made to exclude a ventilatory cause for the clinical picture. Thereafter every effort should be made to maximise natural tamponade and as a “last resort” fluid transfusion should be considered.

1. Fracture Reduction / Splintage
   - Fractured femur – draw out to length and splint with Sagar splint.
   - Fractured pelvis – reduce to anatomical position and apply pelvic splint.
   - Unstable pelvis and femur – reduce and splint with MAST suit.
   - Fractured tib/fib – draw out to length and splint either with Sagar or vacuum splint.
   - Fractured humerus – draw out to length and splint with a vacuum splint.

2. Bleeding Wounds
   Should be compressed and “interim” suture considered.

3. Penetrating Wounds to Limbs
   If simple compression fails to control blood loss the aneroid sphygmomanometer with the thigh cuff should be used as a simple tourniquet.

4. Use of IV Fluids
   When splintage has been maximised then fluids should be administered with the following indications:

   - **Blunt Injury**
     - Head Injury
     - Systolic blood pressure < 100mmHg
     - Non head injury

   - **Penetrating Injury**
     - Boluses of 250mls to achieve verbal contact which is taken to indicate CNS perfusion adequacy. In pt where this end point is not possible SBP of 80mmHg is used.

   Where patients demonstrate signs of haemodynamic compromise, the receiving Emergency Department should be so informed during the “Blue Call”, and a
Prediction of serious injury

- Fall of > 6m
- Pedestrian or cyclist hit by car
- RTA - death of occupant
- RTA – ejection from vehicle
- Intrusion into passenger space
- Vehicle roll-over
- Major vehicle deformity
- Extrication > 20 minutes
- Penetrating injury to head / torso
HEMS immediate dispatch

- Fall of > 2 floors
- RTA - death of occupant
- RTA – ejection from vehicle
- Amputation above wrist or ankle
- One-Under
- Person trapped under vehicle

- Crew request
Scenario

- Elderly pt crossing road
- Hit by a car
- GCS 9
- Hemodynamically stable
- Wheeze to R lat chest
- RSI
- Arrests in aircraft
How do you establish Mechanism?

- **PREHOSPITAL**
  - Assess patient and scene
  - Decide to RSI
  - Establish MOI
  - Reassess

- **IN HOSPITAL**
  - Listen to handover
  - Read LAS form
  - Ask questions
  - Document carefully
Glass
Unstable vehicle
Sharps
Fuel
Fire risk / electricity
Airbags
Debris
Unstable vehicle
Sharps
Chemicals
Other vehicles
Glass
Other vehicles
Pattern Recognition

- Fall from height
- Sporting injuries
  - Rugby scrum
  - Footballer’s knee
  - Swimming pool
- Paediatric trauma
Mechanisms of pelvic injuries

A  Type B1.1

B  B1.2

B  B1.3

B  B2.1 (ipsilateral)

B  B2.1 (locked symphysis)

B  B2.1 (tilt)

C  Type B2.2

D  Type C
Fall from Height

- **INJURY PATTERN**
- Calcaneum # - bilateral
- Tibial plateau #
- Pelvic # (acetab, pubic rami, vertical shear)
- Spine # (lumber, thoracic, cervical)
- BOS #
Moving patient like this is associated with a fall in BP
In resus - characteristic times when BP fell

packaging for scanner

spinal examination

log rolling
ATLS “springing” of the pelvis

Produced falls in BP
“Not an issue - just top them up with some gelo” !??
Moving patients was not good.
Whole blood clotting time?

10 minutes
Case study
150 degrees of motion
Net effect

Movement at Sacro iliac joint

Dislodgement of clot
Loss of tamponade

Tongue & secretions fall back & block airway

Fall in blood pressure
On Spinal Board

150°

RSI

90°

90°

Total = 330°

At hospital

On Spinal Board

90°

90°

Grand total = 510°
Airway adjuncts
Suction
Reservoir mask

Roll onto half a scoop blade when ready to RSI
Total = 160°
“Therapeutic handling & packaging”

Board and early roll 510 degrees

Scoop and delayed roll 160 degrees

70% reduction in movement
Summary

- Injury is common
- Major trauma is rare
- Significant number of patients die in prehospital phase (30%)
- Golden hour is prehospital event even when patient is not trapped
- Mechanism is predictive of injury
- Therapeutic handling saves lives
3rd London Trauma Conference
November 12-14th 2008
www.londontraumaconference.com