The Emergency Medical Retrieval & Transfer Service Cymru (EMRTS Cymru)

Why should pre-hospital care be any different to in hospital care?

Dr R Thomas National Co-Director
Topics to be covered today

- New Model of Pre-Hospital Care
- How hospital care may benefit from Pre-hospital care...
Sub-specialty Training in Pre-hospital Emergency Medicine

A guide for trainees, trainers, local education providers, employers and deaneries
Sub-Specialty

Accredited by the Royal College of Anaesthesia and the College of Emergency Medicine

Approved by the GMC July 2011
Developed from BASICS

- Long established tradition of voluntary care by practitioners in the UK.
- This builds on the success of this and formalises this process.
Regional Networks for Major Trauma NHS Clinical Advisory Groups Report September 2010.

Recommendation.

“Enhanced Care Teams should be available 24/7 to provide care to the Major Trauma Patient”
(a) to meet existing demand for on-scene and in-transit medical support (sometimes referred to as pre-hospital ‘enhanced care’),\textsuperscript{5,6}

(b) to improve the quality and standards of pre-hospital critical care,\textsuperscript{7}

(c) to improve equity of access to on-scene and in-transit medical support,\textsuperscript{8}

(d) to improve governance of pre-hospital care and inter-hospital transfer services,\textsuperscript{9}

(e) to support the Care Quality Commission essential standards for quality and safety in pre-hospital care,\textsuperscript{10}

(f) to improve professional training and development of pre-hospital personnel,\textsuperscript{11}

(g) to provide a robust \textit{medical} incident response (MERIT)\textsuperscript{12} capability and,

(h) to provide \textit{medical} leadership for pre-hospital care services and providers.\textsuperscript{13}
Critical Care

- Refers to the organ or system support in the care of the severely ill patient.
- It is a clinical process rather than a physical space.
- 3 levels of care..Level 3 being ITU.
- In context of PHEM all 3 may be required depending on the needs of the patient.
- No different to a ITU outreach team...
Key Components of PHEM

(a) Good Medical Practice
(b) Working in emergency medical systems
(c) Providing pre-hospital emergency medical care
(d) Using pre-hospital equipment
(e) Supporting rescue and extrication
(f) Supporting safe patient transfer
(g) Supporting emergency preparedness and response
(h) Operational practice
(i) Team Resource Management
(j) Clinical Governance
Critical Care Capability

- Emergency Anaesthesia
- Chest Procedures
  - Thoracostomy
  - Resuscitative Thoracotomy
- Advanced analgesia
- Procedural Sedation
- Inotrope/ Vasopressor support
- Blood & blood products
- Advanced haemorrhage control
- GI haemorrhage control
- Advanced diagnostics
  - USS inc. Echo
  - Blood Gas
  - TEG
  - INR
  - Invasive monitoring
Set of training procedures for use in environments where human error can have devastating effects.

- Inter-personal Communication
- Leadership
- Decision Making
- Tempus Pro
- Hamilton T1
- Lucas 2
- Blood/ Products
  - PRBC’s, LyoPlas, Fibrinogen, PCC’s
- Blood Gas
- Ultrasound
- TEG 6S
# Check Lists

## Emergency Anaesthesia

### Standard Pre-RSI Checklist

<table>
<thead>
<tr>
<th>Standard Pre-RSI Checklist</th>
<th>Expected Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>START OF CHECKLIST</strong></td>
<td></td>
</tr>
<tr>
<td>Position optimal?</td>
<td>Check</td>
</tr>
<tr>
<td>MLS applied</td>
<td>Check</td>
</tr>
<tr>
<td>Cuff inflated or off</td>
<td>Check</td>
</tr>
<tr>
<td>External laryngeal manipulation or cricoid considered or marked</td>
<td>Check</td>
</tr>
<tr>
<td>GCS (motor score x)</td>
<td>[motor score x] check</td>
</tr>
<tr>
<td>Pupils are [x]</td>
<td>[pupils are [x] check</td>
</tr>
<tr>
<td>Limb movements are [x]</td>
<td>[Limb movements are [x] check</td>
</tr>
<tr>
<td>Nasal cannula in situ</td>
<td>Check</td>
</tr>
<tr>
<td>Oxygen cylinders x 2</td>
<td>Check</td>
</tr>
<tr>
<td>Cylinders set to 15 litres, connected and flowing</td>
<td>15, connected and flowing check</td>
</tr>
<tr>
<td>Pre-oxygenation complete and on-going</td>
<td>Check</td>
</tr>
<tr>
<td>3 Lead ECG [rhythm is: ]</td>
<td>[rate is: ] check</td>
</tr>
<tr>
<td>Safe probe</td>
<td>[sets are: ] check</td>
</tr>
<tr>
<td>BP cuff applied and recording 2 minutes</td>
<td>Check</td>
</tr>
<tr>
<td>End tidal CO2 attached</td>
<td>Check</td>
</tr>
<tr>
<td>Video laryngoscope plugged in and working</td>
<td>Blade Size [x] Check</td>
</tr>
<tr>
<td>Set to adult, paediatric, neonatal as required</td>
<td>set to [x] check</td>
</tr>
<tr>
<td>Section positioned and working</td>
<td>Check</td>
</tr>
<tr>
<td>Spares laryngoscope on and working</td>
<td>Check</td>
</tr>
<tr>
<td>Bougie size [x]</td>
<td>Size [x] check</td>
</tr>
<tr>
<td>Tube size [x]</td>
<td>Size [x] check</td>
</tr>
<tr>
<td>Syringe for airway</td>
<td>Check</td>
</tr>
<tr>
<td>Spare tube size [x]</td>
<td>Size [x] check</td>
</tr>
<tr>
<td>Catheter mount, HME filter, ET tube attached</td>
<td>Check</td>
</tr>
<tr>
<td>Supervision airway</td>
<td>Check</td>
</tr>
<tr>
<td>[Induction drugs and doses]</td>
<td>[Induction Drug and dose] Check</td>
</tr>
<tr>
<td>Rocuronium [xmg, ml]</td>
<td>Rocuronium [xmg, ml] Check</td>
</tr>
<tr>
<td>Maintenance and emergency drugs seen</td>
<td>Check</td>
</tr>
<tr>
<td>Fluid or blood connected and running</td>
<td>Check</td>
</tr>
<tr>
<td>Access for drugs is [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Second vascular access is [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Drug giver will be [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Inducer will be [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Inducer two will be [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Plan B will be [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Plan C will be [x]</td>
<td>Check</td>
</tr>
<tr>
<td>Thoracostomy Considered (left, right or bilateral)</td>
<td>[left, right or bilateral] Check</td>
</tr>
</tbody>
</table>

### Post RSI Checklist

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<tr>
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<tbody>
<tr>
<td><strong>START OF CHECKLIST</strong></td>
<td></td>
</tr>
<tr>
<td>End tidal trace and value</td>
<td>(Good) waveform, [x] KPA</td>
</tr>
<tr>
<td>Oxygen saturation</td>
<td>Sets are [x]</td>
</tr>
<tr>
<td>Breath Sounds</td>
<td>(Bilateral) check</td>
</tr>
<tr>
<td>ETT Length and secured</td>
<td>Secured, length is [x]</td>
</tr>
<tr>
<td>Thoracostomy(s) required</td>
<td>Check</td>
</tr>
<tr>
<td>Post-induction BP</td>
<td>BP is [x]/y mmHg</td>
</tr>
<tr>
<td>Access adequate and secured</td>
<td>[plan] check</td>
</tr>
<tr>
<td>Blood considered?</td>
<td>[plan] check</td>
</tr>
<tr>
<td>Vasopressor needed?</td>
<td>[plan] check</td>
</tr>
<tr>
<td>On-going anaesthetic plan is [x]</td>
<td>[plan] check</td>
</tr>
<tr>
<td>Temperature probe reading</td>
<td>[x]° degrees check</td>
</tr>
<tr>
<td>Spinal required are [x]</td>
<td>[plan] check</td>
</tr>
<tr>
<td>Patient packaging will be with [x]</td>
<td>[plan] check</td>
</tr>
</tbody>
</table>

### Pre-departure Medical Checklist

<table>
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Agreed standards for Medical, Operational and Equipment practice eg Anaesthesia and RSI.
Emergency Anaesthesia

Choice of drugs
The EMRTS will carry the following preshelled syringes or pre-drawn drugs for RSI and maintenance of anaesthesia. These will be prepared at the start of each shift and after each RSI. All drugs should be handled in accordance with drug SOPs.

- Ketamine 200mg (10mg/ml) X 2
- Fentanyl 50mg (50mcg/ml) X 2
- Rocuronium 100mg (10mg/ml) X 1
- Midazolam 5mg (1mg/ml) X 1
- Adrenaline 100mg (10mcg/ml) X 1

Other drugs for RSI carried but not pre-drawn will include propofol (100mg/ml), thiopentone (50mg powder vial), morphine (10mg/ml) and metaraminol (10mg/ml).

Clinician discretion is allowed as to the most appropriate drug selection for induction of anaesthesia in an individual patient. All drugs for induction, paralysis and maintenance of anaesthesia should be drawn up and labelled prior to the RSI being performed. Pre-Filled syringes speed up this process and reduce the chance of error as indicated above.

In the context of major trauma, ketamine is strongly recommended as the induction drug of choice at a dose of 1-2mg/kg, with or without the addition of fentanyl depending on the haemodynamic status of the patient. In patients with significant haemodynamic compromise the dose of ketamine will usually be 1mg/kg or less.

Rocuronium should always be closed at 1mg/kg. If in doubt it is better to oversedate rather than under-anaesthetise. EMRTS does not carry suxamethonium or sugammadex.

Post induction sedation and analgesia can be managed in one of three ways:
- Midazolam and fentanyl boluses
- Ketasone boluses
- Propofol via a syringe driver and fentanyl boluses for analgesia (required for all transfers). Ensure line is not occluded by BP cuff or bandages.

Rocuronium should be used for ongoing paralysis in all cases and this should be reviewed and regular intervals during transfer.

Pre-RCI Checklist
A standardised pre RCI check list has been developed, based on a challenge and response format. This check list has been developed for standard RSI and the core elements essential for immediate induction are included in a succinct but thorough checklist. Immediate induction is rarely required.

The kit bag should be laid out on the patient right for ready access by operator one and assistant, including easy access to suction and oxygen. The endotracheal intubation (EIT) and ventilation of tube (ETV) assistant (IF required) should be positioned to be effective without hindering the main core RSI team members. Monitoring should be at the patient level with an unobstructed eye line to operator one and assistant as it will be used for videoendoscopy. Sufficient oxygen should be available (± 2 cylinders) in addition to a working suction unit.

Monitoring
Full monitoring should be applied for every RSI. Monitoring will consist of 3 lead ECG, non-invasive BP, SaO2 and ETCO2 waveform capnography. Monitoring should be visible with an unobstructed eye line to operator one and assistant as it will be used for videoendoscopy. The BP cuff should be applied to the contralateral arm to the SaO2 probe and the trachea through which RCI drugs will be given. The RCI should be configured to automated mode and set to cycle every 2 minutes. For retrieval trolley it may be preferable to insert an arterial line prior to RCI.
Are we in a resource deficient environment any more?

Are our standards and practices any less than hospital care?
RECONFIGURATION OF ACUTE SERVICES ESPECIALLY IN S. WALES

CRITICALLY ILL & INJURED PATIENTS HAVING TO TRAVEL FURTHER TO ACCESS ROUTINE & SPECIALIST CARE

EMRTS underpins successful reconfiguration...

- Allow reconfiguration to proceed safely whilst improving quality of care of patients and outcomes
- Help improve public confidence in the reconfiguration process
- Reduce the number of secondary critical care transfers by at least 50%

INCREASED CRITICAL CARE TRANSFERS FROM PERIPHERAL TO SPECIALIST CENTRES
MAJOR TRAUMA
EMRTS UNDERPINS THE SUCCESS OF THE
CREATION OF WALES TRAUMA NETWORK

ENGLISH TRAUMA NETWORKS ALREADY ESTABLISHED

In 2010 NHS Clinical Advisory Group – Trauma Networks
“Pre-hospital enhanced care teams should be available 24/7 to provide care to the major trauma patients”

EMRTS predicted to produce 150 additional survivors from major trauma per year in Wales
A young economically active group contributing £10m to economic output
WHY WALES NEEDS THIS SERVICE?

MAJOR TRAUMA
Estimated 850 cases per year in Wales

Distribution of Major Trauma by Health Boards

Wide distribution poses a unique challenge which EMRTS will help overcome

MAJOR TRAUMA CENTRE
Pre-Hospital Enhanced Care Service
Mission Statement

“To provide advanced decision making & critical care for life or limb threatening emergencies that require transfer for time critical specialist treatment at an appropriate facility”
Services

- Pre-Hospital Critical Care
- Time Critical Adult Retrieval
- Paediatric.
- Neonatal.
- Major Incident Response
Critically ill or injured patient
Time critical and requires specialist intervention
High risk of deterioration?
Who can call?
- Emergency Departments
- ITU’s
Prevents depletion of local resources
Time Critical Paediatric Retrieval

- Common
- Aim to attend trauma cases pre-hospital
- E.g. Head injury - delayed primary from DGH’s
- Medical eg resp arrest, cardiac, sepsis, toxic,
Support to mid-wifery led units for unwell neonates
999 Response to the unit- enhancement of existing ambulance response.

- All NLS trained
- Intubation/ LMA
- UVC
- CPAP
- Warming in dedicated incubator
- Therapeutic hypothermia
- IV antibiotics
Baby Pod

Fig 4b/c: Final position of Babypod and bridge on scoop (with baby).
Major Incident Response

- Strategic medical advisor role 24/7
- Medical advisor and casualty clearing role
Who?
- Consultants from Critical care background

How?
- Road – Specially converted Audi Q7 fleet
- Air- Wales Air Ambulance Charity Helicopters

From?
- Welshpool
- Swansea
- M4 corridor for car
Coverage

- 95% of population within 20min
- Current 08:00 – 20:00 Air + Road
- Future expansion planned
- Caernarfon
- 24/7 Air + Road
  - 10 HLS across Wales
  - 27 HLS’ s funded for future
- Tempus Pro
- Hamilton T1
- Lucas 2
- Blood/Products
  - PRBC’s, LyoPlas, Fibrinogen, PCC’s
- Blood Gas
- Ultrasound
- TEG 6S soon!
Clinical Governance Days

- Functions as a M+M meeting
- All departures from SOP are discussed
- Clinical Key Performance Indicators Dash Board
- RSI data presentation
- Complaints and Compliments
- Teaching & Training
GOVERNANCE

- External expert advisory group
- Intense training programme and supervision period prior to clinical practice
- All cases peer-reviewed
- Designed for life critical care transfer guidelines

RESEARCH

- Collaboration
  - Swansea University
  - Monash University
  - TARN
  - ICNARC
Data Collection
Principles of Prudent Healthcare

1. Equity based care, treating greatest need first
2. Do no harm
3. Do the minimum appropriate to achieve the desired outcomes
4. Choose the most Prudent Care, openly together with the patient
5. Consistently apply evidence based medicine in practice
6. Co-Create health with the public, patients & partners
The Outcome Measures Hierarchy: Dimensions

**Tier 1**
- **Health Status Achieved or Retained**
  - **Survival**
    - Mortality
  - **Degree of health/recovery**
    - Achieved clinical status
    - Achieved functional status

**Tier 2**
- **Process of Recovery**
  - **Time to recovery and return to normal activities**
    - Time to care completion and recovery
    - Care-related pain/discomfort
    - Complications
    - Reintervention/Readmission

**Tier 3**
- **Sustainability of health/recovery and nature of recurrences**
  - Long-term clinical status
  - Long-term functional status
  - Long-term consequences of therapy (e.g., care-induced illnesses)
Objective: To describe the burden of road transport–related serious injury in Victoria, Australia, over a 10-year period, after the introduction of an integrated trauma system.

Background: Road traffic injury is a leading cause of death and disability worldwide. Efforts to improve care of the injured are important for reducing burden, but the impact of trauma care systems on burden and cost of road traffic injury has not been evaluated.

Methods: All road transport–related deaths and major trauma (injury severity score >12) cases were extracted from population-based coroner and trauma registry data sets for July 2001 to June 2011. Modeling was used to assess changes in population incidence rates and odds of in-hospital mortality. Disability-adjusted life years, combining years of life lost and years lived with major trauma cases increased, whereas disability burden per case declined. Increased survival does not necessarily result in an overall increase in nonfatal injury burden.

Keywords: burden of injury, costs, disability-adjusted life years, outcomes, trauma

(R Ann Surg 2014;00:1–8)

Road traffic crashes claimed the lives of 1.3 million people globally, and accounted for 34% of all years lived with disability (YLDs) attributed to injury, in 2010.1,2 Over the last 40 years or so, there has been a substantial reduction in road traffic fatality rates in high-income countries, including dramatic improvements in Australia.
Service Evaluation

- Physiological, EPR, Operational data
- Structured patient follow up at 6 + 12 months
  - Mortality, Functional outcome scores
- Swansea University SAIL
- Trauma Audit Research Network (TARN)
- Intensive Care National Audit & Research Centre (ICNARC)
Over 90 stakeholders are involved with the service.

Measurable benefits include:

- Access to specialist care not available at patients nearest acute hospital
- Timeliness of access to specialist care for all patient groups
- Enhanced perception of equity by health care professionals, Health Board representatives and patient representatives
Our Bigger Vision

- Increased consultant appointments especially in emergency medicine, anaesthesia, crit care
- Increased educational interventions to doctors/paramedics/nurse practitioners/midwives
Call the EMRTS Cymru (Air Support Desk) for consultant advice and retrieval

All calls medically interrogated

0300 123 2301 (08:00 – 20:00)

Advice +/- emergency response by land or air
  - WAST Control room
  - Dedicated dispatcher and CCP
  - Access to TOP COVER Consultant via conference call