Recognising and responding
to deteriorating ED patients

Professor Julie Considine
Deakin University – Eastern Health
Patient safety

Professional responsibility
• clinician vs systems approach

National imperative
• Standard 9 applies to all patients in acute healthcare facilities
• intent
  • ensure a patient’s deterioration is recognised promptly, & appropriate action is taken
• criteria
  • establishing recognition & response systems
  • recognising clinical deterioration & escalating care
  • responding to clinical deterioration
  • communicating with patients & carers
Challenges of ED care

Unique patient cohort
- undiagnosed, often non-specific presenting problems
- unknown to clinicians, span all age groups
- varying degrees of clinical urgency, illness / injury severity

Decision making environment
- time pressured, interruption driven, fragmented care
- overcrowded with unpredictable & uncontrolled workload
- high levels of uncertainty
- ↑ decision density & cognitive load
- transient medical & nursing staff

Error prone environment
- ↑ risk of unrecognised, unreported or under-treated deterioration
Lessons from other contexts ...  

Rapid response systems

• ↑ early recognition & appropriate response to clinical deterioration
• ↓ high mortality events: cardiac arrest / unplanned ICU
• ↓ mortality & morbidity

Fundamental principles

• any member of staff can activate the system
• system activation occurs when a patient fulfils or breaches pre-defined calling criteria, mostly on abnormal vital signs
  • provide objective criteria for indicating that a patient is deteriorating
• system activation is associated with an expected response
  • expertise in the assessment & management of critical illness are bought to the patient

(Jones et al. 2011)
What we know ...

Predictors of hospital admission

- SBP ≤100mmHg, HR ≥130, RR ≥30, T≥38.5, ↓ GCS on ED arrival
- ↑ EWS (HR, SBP, RR, T, AVPU) = ↑ risk of ICU/CCU admission

Predictors of in-hospital death

- SBP ≤100 or ≥200mmHg, RR ≥ 30, ↓ GCS on ED arrival
- EWS ≥ 4 = ↑ risk of in-hospital death
- pre-hospital & ED hypotension (SBP<100) in non-trauma patients
  - (Jones et al. 2004 Ann Emerg Med; Jones et al. 2006 Chest;
What we know ...

Predictors of unplanned ICU admission

- patients admitted via the ED
  - older age, male gender, higher acuity triage category, Hx co-morbid conditions
  - Dx groups: sepsis, ARF, lymphatic–hematopoietic tissue neoplasms, pneumonia, COPD, bowel obstruction
- factors evident on ED arrival
  - chief complaint of nausea, vomiting and diarrhea
  - HR or T abnormalities at triage
  - RR or HR abnormalities at first ED nursing assessment

(Frost et al. 2009 Resusc; Considine et al. 2009 J Adv Nurs)
What we know ...

Use of in-patient physiological scoring systems in ED

- comparison of triage information (Manchester Triage System) with
  - Modified Early Warning Score (MEWS)
  - Assessment Score for Sick Patient Identification & Step-Up in Treatment (ASSIST)
  - Medial Emergency Team (MET) criteria

- physiological scoring systems would have “identified only a small number of additional patients as critically ill and added little to the triage system currently in use”

  (Subbe et al. 2006, Emer Med J)

- application of MET criteria within <1 hour of ED care
  - highly predictive of in-hospital mortality in patients requiring ICU admission from ED

  (Etter et al. 2008 Crit Care Med)
What could be ....

ED based research
- predictors of deterioration
- use of MEWS in ED
- predictors of critical care admission

ED specific system for recognising & responding to deteriorating patients
- essential elements
  - definition of deterioration
  - escalation protocol
- other elements
  - decision support tools
  - quality assurance strategy
What could be ...

Standardised approaches improve patient safety

- RRS have improved outcomes in general ward patients
- ED triage - ATS
- evidence-based Mx of specific ED patients improves outcomes
  - stroke, trauma, ACS

Advantages of a systematic approach to deterioration

- consistent, evidence-based definition of clinical deterioration
- clear & consistent lines of reporting to senior decision makers
- prevents under treatment & reduces delays to intervention or specialist referral
How could an ED specific system look?

Single trigger definition of deterioration: adults

<table>
<thead>
<tr>
<th>Airway / Breathing</th>
<th>RR</th>
<th>SpO₂ &lt;90% (on mask O2 10 L/min)</th>
<th>Stridor</th>
<th>Upper airway obstruction</th>
<th>Threatened airway</th>
<th>ABG</th>
<th>pH &lt;7.20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• &lt;10 / min</td>
<td></td>
<td>• Stridor</td>
<td>• Upper airway obstruction</td>
<td>• Threatened airway</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• &gt;30 / min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Circulation</th>
<th>SBP</th>
<th>HR</th>
<th>Urine output</th>
<th>ABG</th>
<th>pH &lt;7.20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• &lt;90 mmHg</td>
<td>• &lt;50 / min</td>
<td>• &lt;20 mls / hr</td>
<td>• &lt;100 mls / 6 hrs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• &gt;200 mmHg</td>
<td>• &gt;120 / min</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability</th>
<th>• Sudden decrease in consciousness (fall in GCS &gt; 2)</th>
<th>• Repeated or prolonged seizures</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Worried? Patients who may not meet the above criteria but have a sudden deterioration in their medical condition, requiring urgent medical review (Northern Health)
How could an ED specific system look?
Single trigger definition of deterioration: paediatric

<table>
<thead>
<tr>
<th>Airway/Breathing</th>
<th>• Airway threat</th>
<th>• Hypoxaemia SpO2 &lt;90% (on O2)</th>
<th>Tachypnoea</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Term - 3 mths</td>
<td></td>
<td></td>
<td>&gt;60</td>
</tr>
<tr>
<td>• 4-12 mths</td>
<td></td>
<td></td>
<td>&gt;50</td>
</tr>
<tr>
<td>• 1-4 yrs</td>
<td></td>
<td></td>
<td>&gt;40</td>
</tr>
<tr>
<td>• 5-12 yrs</td>
<td></td>
<td></td>
<td>&gt;30</td>
</tr>
<tr>
<td>• 12 yrs+</td>
<td></td>
<td></td>
<td>&gt;30</td>
</tr>
<tr>
<td>Circulation</td>
<td>Bradycardia</td>
<td>Tachycardia</td>
<td>Hypotension</td>
</tr>
<tr>
<td>• Term - 3 mths</td>
<td>&lt;100</td>
<td>&gt;180</td>
<td>&lt;50</td>
</tr>
<tr>
<td>• 4-12 mths</td>
<td>&lt;100</td>
<td>&gt;180</td>
<td>&lt;60</td>
</tr>
<tr>
<td>• 1-4 yrs</td>
<td>&lt;90</td>
<td>&gt;160</td>
<td>&lt;70</td>
</tr>
<tr>
<td>• 5-12 yrs</td>
<td>&lt;80</td>
<td>&gt;140</td>
<td>&lt;80</td>
</tr>
<tr>
<td>• 12 yrs+</td>
<td>&lt;60</td>
<td>&gt;130</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Disability</td>
<td>• Acute change in neurological status</td>
<td>• Convulsion</td>
<td></td>
</tr>
</tbody>
</table>

Worried?  Staff member or parent worried about patient's clinical state.

(RCH, 2012)
How could an ED specific system look?

Early Warning Scores

- Patient at Risk scores (PARS)
- Modified Early Warning Scores (MEWS)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR / min</td>
<td>&lt;9</td>
<td>9-14</td>
<td>15-20</td>
<td>21-29</td>
<td>≥ 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR / min</td>
<td>&lt;40</td>
<td>41-50</td>
<td>51-100</td>
<td>101-110</td>
<td>111-129</td>
<td>≥130</td>
<td></td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>&lt;70</td>
<td>71-80</td>
<td>81-100</td>
<td>101-199</td>
<td>≥200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T °</td>
<td>&lt;35</td>
<td>35-38.4</td>
<td>≥38.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVPU</td>
<td>Alert</td>
<td>Voice</td>
<td>Pain</td>
<td>Unresponsive</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A MEWS score of >5 is associated with increased risk of death, admission to intensive care or high-dependency unit in acute medical admissions

(Subbe et al. 2001 Q J Med)
How could an ED specific system look?

Escalation protocol

- who can escalate care?
  - any clinician?
  - need to orientate all new clinicians to ED RRS
- lines of reporting?
  - senior staff: RN in-charge, Emergency Physician, senior medical officer
  - multidisciplinary approach?
- expected response?
  - expected time to assessment, intervention, referral?
- goals of care?
  - permissive abnormalities? when to reactivate?
How could an ED specific system look?

Decision support tools

- posters
- observation chart design
  - human factors, visual cues
- alerts in IT systems
How would we know if it works?

Quality assurance

- clinician feedback
- activations
  - log book
  - electronic tracking
- missed activations
  - clinical audit
  - point prevalence methodology

<table>
<thead>
<tr>
<th>Date:</th>
<th>Total patients:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time:</td>
<td>Reported instability:</td>
</tr>
<tr>
<td>Day of week:</td>
<td>Unreported instability:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No instability</th>
<th>Reported instability</th>
<th>Unreported instability</th>
<th>UR</th>
<th>Age</th>
<th>Staff level</th>
<th>Abnormality</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

I think that

- there are features of ED care may increase the risk of unrecognised & unreported deterioration
- inpatient models may not fit the ED
  - definition of deterioration
  - care escalation response
- a systematic, ED led approach to recognising & responding to deteriorating patients is logical & builds on
  - other ED patient safety systems: triage, systematic care teams
  - improved outcomes in ward patients
  - emerging evidence that mortality in ED patients can be predicted
Comments? Questions?

julie.considine@deakin.edu.au

References: