Recognising & responding to deterioration

Simple, yet surprisingly complex

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School of Health and Social Care, Bournemouth University

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<table>
<thead>
<tr>
<th>Avoidable cardiac arrest</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>156</td>
<td>37.8</td>
</tr>
<tr>
<td>No</td>
<td>257</td>
<td>62.2</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>413</td>
<td></td>
</tr>
<tr>
<td>Insufficient data to assess</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>526</td>
<td></td>
</tr>
</tbody>
</table>
Chain of prevention

- Education
- Monitoring
- Recognition
- Call for help
- Response
Staff caring for acutely ill adult patients in any acute hospital setting should:

- possess competencies in monitoring, recording and interpretation of vital signs
- be equipped to recognise deteriorating health and respond effectively to acutely ill patients, appropriate to the level of care they are providing.
- be provided with education and training to permit the development of such competencies and the competencies should be assessed
Education: critical mass of trained staff?

- % staff trained

Number of events per month vs. Month of study graph showing a trend increase in events per month with a corresponding decrease in % staff trained.
“...It may be that they...[basic grade doctors]...are being asked to assess and provide initial treatment for patients when they do not have the competency to do so. This raises the issue of training, to ensure that doctors are suitably skilled for the tasks they are required to undertake, and suitably supervised, to ensure that delivery of tasks is adequate, that staff are supported and that patient safety is maintained...”
GMC’s expectations of medical graduates

- Lists 16 outcomes that medical students must achieve by the time they graduate

“Immediate care in medical emergencies”
1. Assess and recognise the severity of a clinical presentation and a need for immediate emergency care.
2. Diagnose and manage acute medical emergencies.
3. Provide basic first aid.
4. Provide immediate life support.
5. Provide cardio-pulmonary resuscitation or direct other team members to carry out resuscitation.

To ensure the future safety and care of patients, students who do not meet the outcomes set out in Tomorrow’s Doctors or are otherwise not fit to practise must not be allowed to graduate with a medical degree.
Location pre-arrest

- Location:
  - Medical Ward: 97 (57%)
  - Surgical Ward: 45 (32%)
  - Other: 110 (56%)

- Number of patients by duration of hospital stay:
  - <1 day: 32%
  - 1-2 days: 20%
  - 3-4 days: 18%
  - 5-6 days: 16%
  - >7 days: 32%

- Table:
<table>
<thead>
<tr>
<th>Location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 3 care</td>
<td>3</td>
</tr>
<tr>
<td>Level 2 care</td>
<td>13</td>
</tr>
<tr>
<td>Coronary care unit</td>
<td>8</td>
</tr>
<tr>
<td>Surgical ward</td>
<td>2</td>
</tr>
<tr>
<td>Medical ward</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal</td>
<td>43</td>
</tr>
<tr>
<td>Not answered</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
</tr>
</tbody>
</table>

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NCEPOD. Time to Intervene? 2012
In most cases no monitoring plan was noted.

No observation frequency stated in 20-40% of cases, depending on the parameter considered.
Pattern of observations throughout 24 hour period

Excludes patient’s vital signs first observation set

observations

hour of day

EWS >=3  EWS 0-2

n = 20681

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Portsmouth Hospitals NHS Trust unpublished data
Nurse and machine measured breathing rates

- BT16 measured breathing rate per minute
- Nurse measured breathing rate per minute

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Kellett et al. Resuscitation 2011;82:1381-1386
# Early warning scores and escalation protocols

## Policy (structure) vs Use (process)

### Early warning system was used

<table>
<thead>
<tr>
<th>Yes</th>
<th>376</th>
<th>98.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>4</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Subtotal: 380

Not Answered: 3

Total: 383

### Early warning system linked to escalation protocols

<table>
<thead>
<tr>
<th>Yes</th>
<th>365</th>
<th>97.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>8</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Subtotal: 373

Not answered: 3

Total: 376

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Early Warning Scores: comparison of performance

Mortality as outcome

AUROC

- 12 hours
- 24 hours
- 48 hours
- 72 hours
- 96 hours
- 120 hours

35585 patient episodes
198755 vital signs datasets

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Prytherch et al. Resuscitation 2010; 81: 932–937
Percentage of observations at, or above, a given EWS score

- ViEWS
- Allen\textsuperscript{10}
- Subbe MEWS with age\textsuperscript{11}

Percentage of those observations which were followed by death within 24 hours at, or above, a given EWS score

ViEWS = 5

n = 198,755

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Prytherch et al. Resuscitation 2010; 81: 932–937
### Why no response?

#### Warning signs were apparent

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>344</td>
<td>74.5</td>
</tr>
<tr>
<td>No</td>
<td>118</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>462</td>
<td></td>
</tr>
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</table>

**Total** 526

#### The signs were:

<table>
<thead>
<tr>
<th>The signs were:</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognised</td>
<td>152</td>
<td>64.1</td>
</tr>
<tr>
<td>Acted on adequately</td>
<td>104</td>
<td>43.9</td>
</tr>
<tr>
<td>Communicated to appropriate senior doctors</td>
<td>106</td>
<td>44.7</td>
</tr>
</tbody>
</table>

#### Instructions recorded

<table>
<thead>
<tr>
<th>Instructions recorded</th>
<th>n</th>
<th>%</th>
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<tbody>
<tr>
<td>Yes</td>
<td>85</td>
<td>21.0</td>
</tr>
<tr>
<td>No</td>
<td>320</td>
<td>79.0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>405</td>
<td></td>
</tr>
<tr>
<td>Insufficient data to assess</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>526</td>
<td></td>
</tr>
</tbody>
</table>

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NCEPOD. Time to Intervene? 2012
<table>
<thead>
<tr>
<th>Statement</th>
<th>agreed or strongly agreed (%)</th>
<th>Jones 2006</th>
<th>Bagshaw 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would call a MET on a patient I am worried about even if their vital signs are normal</td>
<td>56</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>If my patient fulfils the listed MET criteria but does not look unwell I would not make a MET call</td>
<td>16</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>When one of my patients is sick I call the covering doctor before calling a MET</td>
<td>72</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>If I cannot contact the covering doctor about my sick patient I call a MET</td>
<td>81</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>I am reluctant to call a MET on my patients because I will be criticised if they are not that unwell</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
“You are expected to make certain decisions by yourself at a certain stage of training and that you are really inconveniencing someone else by asking them, that would be used to judge your level of competence I guess”

“it’s not so hard to ask anything if the staff is standing right there, but if it is 1.30 in the morning and your resident is asleep . . . I think that has a big impact”

“You get a vibe from your staff very quickly on when or when you shouldn’t ask for help. And some staff are very open and up-front: ‘call me for anything’—very approachable. And some staff you get the impression that if you call them in the middle of the night it’s going to be a huge deal and they’ll be talking in the morning and be sort of like ‘I can’t believe him. He called in the middle of the night’ . . .”

“I want to look like I'm independent and I can handle questions on my own and I don’t need to go to the attending for every little thing unless it's big. . . [because] you want to impress and you want to have good things said about you at the end of your rotations”
FY1 & FY2 doctor
Specialist Registrar
ICU team
Medical Emergency Teams
Critical Care Outreach Teams
Patient at Risk Teams
Critical Care Liaison Service
Nurse Emergency Team
Intensive Care Liaison Nurse
Rationale for early response: delays in MET calls

- 59/200 MET calls were delayed
- In-hospital mortality: 37% with delayed calls; 22% of those without delay (p=0.025).

Panel: MET calling criteria
- **Airway**
  - If threatened
- **Breathing**
  - All respiratory arrests
  - Respiratory rate < 15 breaths per min
  - Respiratory rate > 30 breaths per min
- **Circulation**
  - All cardiac arrests
  - Pulse rate < 40 beats per min
  - Pulse rate > 140 beats per min
  - Systolic blood pressure < 90 mm Hg
- **Neurology**
  - Sudden fall in level of consciousness (fall in Glasgow coma scale of >2 points)
  - Repeated or extended seizures
- **Other**
  - Any patient you are seriously worried about that does not fit the above criteria

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Downey et al. CCM 2008; 477-481
recognising and responding to patient deterioration are complex issues influenced by:

- education
- frequency of observations
- completeness of observation sets
- knowledge of meaning of abnormal values
- design of vital signs charts
- the impact of EWS sensitivity & specificity
- human factors
- decisions to call for assistance
- nature of the response
- timing of response

there remains much room for improvement