RAPID RESPONSE SYSTEM: THE AFFERENT ARM

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A Common Theme....
- The Efferent arm is Effective
- The Afferent arm is NOT Effective
- The Afferent arm Failed in MERIT
- The more sophisticated Afferent arm

RRS: The Afferent Arm
- Case Detection
- Efferent Arm Trigger

AFFERENT ARM: CASE DETECTION AIM
- PREVENT CARDIAC ARREST
- PREVENT OR FACILITATE ICU/HDU UTILIZATION
- PREVENTABLE DEATHS
- “DNR” IMPLEMENTATION
- CLINICAL SERVICE
- MINIMAL FALSE +VE RATE

CASE DETECTION
- OBJECTIVE CRITERIA
- BEDSIDE OBSERVATIONS (Resps, Heart rate, BP, Sats, Urine output, Neuro obs, temp, stridor)
- Simple cut point obs vs Scoring System
- Subjective criteria “Worried”
Michael Buist, MD - June 27, 2006

RAPID RESPONSE SYSTEM:
THE AFFERENT ARM

MET CRITERIA

**ACUTE CHANGES IN**

<table>
<thead>
<tr>
<th>PHYSIOLOGY</th>
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<tbody>
<tr>
<td>AIRWAY</td>
</tr>
<tr>
<td>Respiratory Obstruction</td>
</tr>
<tr>
<td>BREATHEING</td>
</tr>
<tr>
<td>Respiratory Rate &gt;30 bpm</td>
</tr>
<tr>
<td>Oxygen Saturation &lt;90%</td>
</tr>
<tr>
<td>CIRCULATION</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt;90</td>
</tr>
<tr>
<td>Pulse Rate &gt;100</td>
</tr>
<tr>
<td>NEUROLOGY</td>
</tr>
<tr>
<td>Any unexplained decrease in level of consciousness</td>
</tr>
<tr>
<td>Repeated or prolonged nausea</td>
</tr>
<tr>
<td>OTHER</td>
</tr>
<tr>
<td>Convulsions about patient</td>
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<tr>
<td>Uncontrolled pain</td>
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</tbody>
</table>

**Modified Early Warning System**

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<thead>
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</thead>
<tbody>
<tr>
<td>SBP</td>
<td>&lt;70</td>
<td>71-80</td>
<td>81-100</td>
<td>101-199</td>
<td>&gt;200</td>
</tr>
<tr>
<td>HR</td>
<td>&lt;40</td>
<td>41-50</td>
<td>51-100</td>
<td>101-110</td>
<td>111-129</td>
</tr>
<tr>
<td>RR</td>
<td>&lt;9</td>
<td>9-14</td>
<td>15-20</td>
<td>21-29</td>
<td>&gt;30</td>
</tr>
<tr>
<td>Temp</td>
<td>&lt;35</td>
<td>35-38.4</td>
<td>&gt;38.5</td>
<td></td>
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</tr>
</tbody>
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MEWS > 5 = increased risk of death & critical care admission

**Case Detection: Issues**

- Validation of Criteria
- Sensitivity vs Specificity of criteria
- Cut point vs score
- Objective vs Subjective
- Face Validity
- Patient population
- Reliability of observations taken
- Are the observations taken

**Incidence of Abnormal Observations (n = 1471)**

(Buist et al Resus 2004)

**Event Outcome at the Time of Event (n = 1471)**

(Buist et al Resus 2004)

Deaths amongst patients with blood pressure <90 mm Hg versus duration of blood pressure <90 mm Hg
INDEPENDENT PREDICTORS OF MORTALITY AT HOSPITAL DISCHARGE (Buist et al, Resus 2004)

- Observation/Event
  - RR < 6/min
  - RR > 30/min
  - LOC
  - SaO2 < 90%
  - BP < 90 mmHg

<table>
<thead>
<tr>
<th>Observation/Event</th>
<th>Odds Ratio (95% CI)</th>
</tr>
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<tbody>
<tr>
<td>RR &lt; 6/min</td>
<td>12.3 (2.2-69.6)</td>
</tr>
<tr>
<td>RR &gt; 30/min</td>
<td>6.5 (3.6-11.8)</td>
</tr>
<tr>
<td>LOC</td>
<td>6.6 (3.1-13.9)</td>
</tr>
<tr>
<td>SaO2 &lt; 90%</td>
<td>6.2 (2.5-14.8)</td>
</tr>
<tr>
<td>BP &lt; 90 mmHg</td>
<td>2.6 (1.7-3.9)</td>
</tr>
<tr>
<td></td>
<td>2.5 (4.6-7.4)</td>
</tr>
</tbody>
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Prevalence of MET-criteria in a Swedish University Hospital

Bell, Konrad et al, in press

- Among 895 patients in a single hospital on two different days
  - 4.5% met MET criteria!
  - Mortality increased

CASE DETECTION: Future Directions

- Dr M Cretikos
- Dr B Cuthbertson
- Real time modeling of bedside data captured electronically

TRIGGER ISSUES:

- Trigger of Care vs Continuum of Care
- Who pulls the trigger
- What is the trigger
- Cognition/ Telephone/ Action
- Inefficient 16

PACE- Pre Arrest Criteria for Escalation study.

- 3 tier response to abnormal bedside obs
- “Parent” team registrar, ICU team (senior fellow) & cardiac arrest team
- 170 events (ICU admit, non DNR deaths & cardiac arrests) over 3 months (16/01/05)
- “Significant” delays
- Nurses not requesting medical assistance
- Medical delays in getting “higher order” care.

Piza M & Mudaliar Y, unpublished 2005
FREQUENCY OF MEDICAL OFFICER REVIEWS

<table>
<thead>
<tr>
<th>CLINICAL FUTILE CYCLES</th>
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<tbody>
<tr>
<td>- PATIENT — BEDSIDE NURSE</td>
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<tr>
<td>- BEDSIDE NURSE — INTERN/JMO</td>
</tr>
<tr>
<td>- INTERN/JMO — PATIENT REVIEW</td>
</tr>
<tr>
<td>- PATIENT MANAGEMENT / CONSULT REGISTRAR</td>
</tr>
<tr>
<td>- REGISTRAR REVIEW (ED, OT, OP)</td>
</tr>
<tr>
<td>- PATIENT MANAGEMENT</td>
</tr>
<tr>
<td>- TREATMENT</td>
</tr>
<tr>
<td>- INVESTIGATION (&quot;DOUGHNUT OF DEATH&quot;)</td>
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<tr>
<td>- INFORM CONSULTANT</td>
</tr>
<tr>
<td>- REVIEW PATIENT PROGRESS</td>
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CLINICAL FUTILE CYCLES

- SPECIALIST CONSULTANT REVIEW
- SUBSPECIALITY REFERRAL AT REGISTRAR LEVEL
- FURTHER PATIENT REVIEW
  - TREATMENT
  - INVESTIGATION
  - DISCUSSION WITH CONSULTANT
- DIFFERENT TEAMS OF ONCALL DOCTORS

CRITICAL EVENTS AND ALL HOSPITAL ADMISSIONS

- 122 critical events
- 56 ICU admissions
- 29 < 1-hour instability: 19 Died
- 61 ICU: 23 Died
- 32 arrests: 24 Died
- 93 > 1 hour instability: 47 Died
- 24 arrests: 19 Died
- 24 arrests: 24 Died
- 47 Died
- 24 Died
- 19 Died
- 24 Died
- 5 ICU: 0 Died
- 61 ICU: 23 Died

TIME CONSUMPTION (6.5 hours, range 0-432)

DIAGNOSIS ORIENTATED MANAGEMENT

- TIMELY RESPONSE OF ALL STAFF IN A WELL COORDINATED SEQUENCE
- CORRECT DIAGNOSIS
- CORRECT ASSESSMENT OF SEVERITY COMMUNICATED
- APPROPRIATE ACTIONS TAKEN
FINDINGS
1. 26% of episodes were not reviewed by the primary medical team within 1 hour of the acute observation
2. Nursing staff did not activate PACE call options in 17% episodes
3. Vital signs not monitored with sufficient frequency
4. Delays in performing essential surgery / other complex interventions eg dialysis / chest drainage

WHY WOULDN’T YOU CALL THE MET? Nurses...
- Survey of 351 ward nurses, Austin hospital, Melb
- Likert scale 17 questions about MET
- 91% - MET prevented cardiac arrests
- 97% - MET helped manage unwell patients
- However... 72% when presented with a patient who fulfilled MET criteria would still call the "parent" clinical team first.

Jones D et al, unpublished 2005
Nurses & MET calls

AFFERENT ARM

- Poor sensitivity and specificity of current case detection tools
- The Trigger is dependent on a human pulling it....

Jones D et al, unpublished 2005