Do crises criteria detect risk?

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The elements of a rapid response system

- A mechanism by which team responses are triggered;
- A team of clinicians that responds to an event;
- A governance/administrative structure responsible for team staffing, education, and implementation; and
- Quality improvement elements to evaluate the event and the effectiveness of the RRS to identify underlying quality of care issues, and promote hospital process improvement to prevent future events.

Different calling criteria (1)

Staff member is worried about the patient
- Airway
  - Noisy breathing / snoring
- Breathing
  - Acute change in respiratory rate to < 8 or > 30 breaths / min
- Acute change in pulse oximetry saturation to < 90% despite oxygen administration
- Circulation
  - Acute change in heart rate to < 40 or > 120 beats / min
  - Ischemic chest pain
  - Acute change in systolic blood pressure to < 90 mmHg
- Conscious state
  - Acute change in conscious state
  - Seizure

Different calling criteria (2)

- Airway
  - Respiratory distress
  - Threatened airway
- Breathing
  - Respiratory rate >30 / min
  - Respiratory rate <6 / min
  - SaO2 <90% on oxygen
- Circulation
  - Blood pressure <90 mm Hg despite treatment
- Neurology
  - Any unexplained decrease in consciousness
  - Agitation or delirium
- Other
  - Concern about patient
  - Uncontrollable pain
  - Failure to respond to treatment

Different calling criteria (3)

<table>
<thead>
<tr>
<th>Table 1: The set of MET activation criteria used during the METS study</th>
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<tbody>
<tr>
<td><strong>Airway</strong></td>
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<tr>
<td>Breathing</td>
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<tr>
<td>Respiratory rate</td>
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<tr>
<td>Circulation</td>
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<tr>
<td>Pulmonary: 140</td>
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<tr>
<td>Syncope/loss of consciousness</td>
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<tr>
<td>Neurology</td>
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<tr>
<td>Other</td>
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Testing the criteria, Subbe et al
Testing the criteria, Subbe et al

- Physiologic observations were evaluated using
- MET, medical emergency team call-out criteria
- MEWS, modified early warning score
- ASSIST, assessment score of sick-patient identification and step-up in treatment
- Inter-rater and intra-rater reliability were assessed

Testing the criteria, Subbe et al

- Reliability was a function of simplicity:
  - MET achieved a higher percentage of agreement than ASSIST, and ASSIST higher than MEWS
  - Intra-rater reliability was better than inter-rater reliability

Testing the criteria, Creitkos et al

- Cases = adverse events = unexpected cardiac arrests, unplanned ICU admissions and unexpected death (n=450)
- Matching controls (n=520)
- Journals of cases and controls were scrutinized, -24 hours
- Resp rate, heart rate, BP, GCS, seizures, threats to airway
- The MERIT MET-criteria:
  - Sensitivity 49.1%, specificity 93.7%, PPV 9.8%
- Modified MET-criteria (RR ≥28, HR ≥140, syst BP ≤85, decrease in GCS >2)
  - Sensitivity 59.6%, specificity 93.7%, PPV <16%

Testing the criteria, Creitkos et al

- The study shows that in combination, a high HR, low systolic BP, and a decrease in GCS score are specific predictors of cardiac arrest, unplanned ICU admission and unexpected death
- The MERIT MET-criteria had a low sensitivity and low positive predictive value for the adverse events (within 24h) studied
- After modification the best positive predictive value was 15.7%, with a sensitivity of 53.6%
- Even modified criteria will thus result in a high proportion of false positive calls (84%), and a number of patients at risk remain unidentified

Testing the criteria, the Karolinska study

- Prevalence and sensitivity of MET criteria in a Scandinavian University Hospital

www.metconference.com
Testing the criteria, the Karolinska study

-Bell M et al, Prevalence and sensitivity of MET-criteria in a Scandinavian University Hospital Resuscitation 2006;70:66-73

-The study took place at two separate occasions, December 10th 2003 and March 24th 2004

-With the help of 50 nursing students from the Red Cross Nursing School, we set out to record prevalent physiological data on all adult patients treated in the hospital, excluding the intensive care- and psychiatric wards

-1097 patients were treated at the wards during the two study periods

-81.6 % were included

-42 patients (4.5%) fulfilled the study criteria

Testing the criteria, the Karolinska study

The MET criteria

- Acute change in respiratory rate to <8 or >30 breaths/min
- Acute change in pulse oximetry saturation to < 90%, despite oxygen administration
- Acute change in heart rate to <40 or >130/min
- Acute change in systolic blood pressure to <90 mm Hg
- Acute change in conscious state as measured by a fall of GCS >2
- Staff member is worried about the patient

Study Criteria

- Respiratory rate of <8 or >30 breaths/min
- Heart rate of <40 or >130/min
- Pulse oximetry saturation of <90%
- Systolic blood pressure <90 mm Hg

Flow diagram describing the distribution of the cohort. 30-day mortality rates and CI in italics

The extended criteria

- Respiratory rate of <10 or >28 breaths/min
- Heart rate of <50 or >120/min
- Systolic blood pressure of <100 mm Hg

The restricted criteria

- Respiratory rate of <6 or >32 breaths/min
- Heart rate of <35 or >140/min
- Systolic blood pressure of <80 mm Hg

4.5% (40) of the scored patients fulfilled the study criteria

30-day mortality: 25% (CI 12.7-41.2)

The patients not fulfilling the study criteria

30-day mortality: 3.5% (CI 2.4-5)

Extended criteria resulted in 13.8 % of the cohort (123) fulfilling these criteria

30 day mortality: 14.6 % (CI 8.9-22.1)

Restricted criteria: 2.2 % (20) fulfilled these criteria

30 day mortality: 20 % (CI 5.7-43.7)
In conclusion

- Do crisis criteria detect patients at risk?
- Well, yes, but are our criteria good enough? Are they optimized?
- Trade-off: workload vs risk of missing patients?
- Trade-off: simplicity vs sensitivity?