Saving deteriorating patients

“Glad we MET”

Dr Daryl Jones
Overview

- Why is the MET needed
- What is a MET
- Aim of the MET
- MET success at the Austin
- MET and audit
- MET and education
- Conclusions
Why is the MET needed?

- Serious adverse events common in hospitalized patients
  - Australia\(^1\)
  - New Zealand \(^2\)
  - USA \(^3\)
  - Canada \(^4\)

Incidence adverse events = 3.7% to 16.6%
• Austin (surgery ≥ 48hr stay)
  – 1125 patients →
    • SAEs in 16.9%
    • 7.1% died.
  – Most common adverse events
    • emergency ICU admission
    • respiratory failure
    • readmission to ICU

Bellomo et al MJA 2002
Why is the MET needed cont….

- Hospital length of stay
  - No SAEs 18.4 days
  - With SAEs 38.5 days
- SAEs more common
  - after unscheduled surgery if both
  - patients > 75 years of age. = 20% die
Why is the MET needed cont…. 

- Serious adverse events are preceded by signs of instability in up to 80%
  
  - Schein et al. Chest 1990 USA
  - Buist et al. MJA 1999 Aus
  - Hodgets et al. Resuscitation 2002 UK
  - Nurmi et al. Act Anaes Scan 2005 Fin
  - Bell et al. Resuscitation 2006 Swe
Why is the MET needed cont....

- Early intervention in the course of deterioration improves outcome
  - AMI  GISSI  Am Heart J 1999
  - Sepsis  Rivers NEJM 2001
  - Trauma  Nardi  Min. Anest 2002
  - Embolic stroke  NINDS NEJM 1995
Why is the MET needed cont....

- Ward doctors and nurses may not have sufficient skill set to identify and treat critically ill patients on ward

  - McQuillan et al.  BMJ 1998  UK
  - Buist et al.  MJA 1999  Aus
  - Bell et al.  Resus 2006  Swe
Why is the MET needed cont....

• Review of ward patients by ICU staff who are skilled in advanced resuscitation may prevent adverse events including

  – Unplanned ICU admission
  – Cardiac arrests
  – Unexpected deaths
What is a MET?

- Example of a Rapid Response Team
- Similar in concept to cardiac arrest team
- Summoned when patient develops pre-defined signs of derangements other than cardiac arrest
At risk patient

Unwell patient

- Staff member worried about the patient
- HR < 40 or > 130 beats /min
- Systolic blood pressure < 90 mmHg
- Respiratory rate < 8 or > 30 breaths /min
- Pulse oximetry saturation < 90%
- Acute change in conscious state
- Urinary output < 50mL in 4 hours

MET call made

Respond blue call

- No palpable pulse
- No detectable blood pressure
- Unresponsive
- Not breathing

Basic life support commenced

Advanced life support commenced

Parent unit notified of MET call & outcome

Treated and remain on ward
Patient made not for resuscitation
Unplanned ICU admission
Patient dies
MET criteria are based on vital signs

**Criteria for initiation of a MET call**

- Staff member is worried about the patient
- Acute change in heart rate to < 40 or > 130 beats/min
- Acute change in systolic blood pressure to < 90 mmHg
- 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 conscious state
- Acute change in urine output to < 50 mL in 4 hours.
Aim of the MET

• take critical care expertise to the patient before, rather than after, multiple organ failure or cardiac arrest occurs.¹

¹ England and Bion 2008
MET success at the Austin

• Early studies
  – 4 months after MET introduced
  – ↓ surgical complications (> 2000 patients)
    • ↓ adverse events (57.8%)
    • ↓ emergency ICU admissions (44.4%)
    • ↓ deaths (36.6%)
    • ↓ hospital LOS 23.8 days to 19.8 days

Bellomo et al. CCM 2004
• Cardiac arrests and hospital mortality
  – † CAs (65%)
  – † deaths due to CA (56%)
  – † hospital deaths (26%)

Bellomo et al
MJA 2003
• Long term studies
  – Increased use of the MET
With ↑ MET calls there are ↓ arrests

Cardiac arrests / 1000 admissions

MET calls / 1000 admissions

-5 0 5 10 15 20 25 30 35

1 1.25 1.5 1.75 2 2.25 2.5 2.75 3 3.25

1999 2000 2001 2002 2003 2004

r² = 0.84
p = 0.01

Jones et al. CCF 2005
With ↑ MET calls there are ↓ surgical deaths

Jones et al. Resuscitation 2005
The MET and audit

- MET activation is not uniform
- Cardiac arrest detection is not uniform
- Cause of MET calls (deterioration)
- MET patients at ↑ risk of death
• MET activation is not uniform – few calls overnight
Is this important

Arrests highest when MET calls lowest

Arrests lower when MET calls highest

Jones et al. ICM 2006
• Cause of deterioration
  – 400 MET calls
    • hypoxia (41%)
    • hypotension (28%),
    • altered conscious state (23%)
    • tachycardia (19%),
    • increased respiratory rate (14%)
    • oliguria (8%).
  – Infection, pulmonary oedema, and arrhythmias caused ≅ 50% all MET calls

Jones et al. CCF 2006
MET patients are at ↑ risk of death

- Austin – “Repeat MET call study”
- 1664 patients & 2237 METs over 2 yrs
  - ¾ single MET review
  - ¼ multiple METs

(Dr Paolo Calzavacca)
• One MET call and not NFR →
  – mortality = 16.6%
• > one MET call and not NFR →
  – mortality = 34.1%
• Mortality of other patients
  – All ICU patients = 14%
  – All hospital patients < 4%
### Nurses' Attitudes to MET

**Table 1: Responses to "Survey of nurses attitudes to the MET"**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. MET calls reduce my skills in managing sick patients (n = 351)</td>
<td>51.0</td>
<td>43.6</td>
<td>3.4</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>17. MET calls teach me how to better manage sick patients in my ward (n = 350)</td>
<td>2.9</td>
<td>12.0</td>
<td>14.3</td>
<td>53.7</td>
<td>17.1</td>
</tr>
<tr>
<td>1. Patients in the hospital have complex medical problems (n = 347)</td>
<td>0.3</td>
<td>2.0</td>
<td>1.4</td>
<td>34.9</td>
<td>61.4</td>
</tr>
</tbody>
</table>

Jones et al. QSHC 2006
- Teaching staff how to manage a MET
  - A → G for managing MET

**An approach to managing a MET call**

**Ask and Assess**
- Ask the staff how you can help them
- Ask about the reason for the MET call
- Assess for the etiology of the deterioration

**Begin basic investigations and resuscitation therapy**

**Call for help / call consultant if needed**

**Discuss, Decide, and Document**
- Discuss MET with parent unit / consultant
- Discuss advanced care planning if appropriate
- Decide where the patient needs to be managed
- Document the MET and subsequent frequency of observations

**Explain the cause of the MET, the investigations required and subsequent management plan**

**Follow-up:** Which doctor to follow-up the patient? What are the criteria for doctor re-notification?

**Graciously thank the staff at the MET**

Jones et al. CCF 2006
• With MET
  – Education of max 20 staff per year

• Without MET
  – Educate > 250 more junior staff multiple times per year (rotate 2-4 times per yr)
Conclusions

• Patients in modern hospitals
  – Are sick with many co-morbidities
  – Suffer SAEs in up to 17%
• MET criteria identify at-risk group
• If well implemented and accepted MET can:
  – Reduce SAEs and cardiac arrests
  – Identify sick ward patient
  – Provide framework for education of ward and MET staff
  – Provide audit mechanism for subsequent QI initiatives