The Impact of Rapid Response Teams on Do Not Resuscitate Orders

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In search of a good death

Diagnosing dying is an important clinical skill p30
Diagnosing “Dying”

- Recognizing and correctly diagnosing medical emergencies is vital
- Providing prompt and competent treatment for such emergencies is vital
- The MET is an important approach to both
- However... the MET rapidly faces a new differential diagnosis: “life-threatening emergency” or “dying”? 
"I think we should call the doctor. This doesn't look good!"
The Difference Between MET and Cardiac Arrest Calls

- Cardiac arrest: no time
- Cardiac arrest: intervene first and ask questions later
- Cardiac arrest: pandemonium
- MET call: there is time
- MET call: ask questions first
- MET: thoughtful, planned approach
Protection from cardiac arrest teams!

Frances Polack 84 y.o. nurse

This is what you have to do if there is no MET system!!
DNAR Orders in Hospitals

- Typically not a systematic process
- Living wills and advanced directives often ignored during emergencies
- Uncertainty about meaning and legal status of advanced directives
- Could the person have foreseen “this” specific situation
- Patient unable to contribute opinion during cardiac arrest!!
MET and DNAR Orders: The Interaction

- Should staff call for the MET for patients with DNAR orders?
- Does introducing METs increase DNAR orders?
- Has the MET the authority to issue DNAR orders?
- If so, when? for whom? under what circumstances?
- How does the MET diagnose “dying”? 
Patients with pre-MET DNAR orders generated 10% of MET calls
The Case for MET calls in Patients with DNAR Orders

- DNAR order often complex (yes to treatment but no to intubation)
- DNAR patients may still respond to some simple measures (non-invasive ventilation, fluid therapy, diuretics)
- MET may facilitate judgement that patient is now dying and improve palliation
- MET call helps relative understand death may be imminent
An Illustration

- 71 y.o. man with severe pulmonary fibrosis on home oxygen. Admitted with chest infection. Previous DNAR order.
- Desaturation despite high-flow oxygen, RR >30, HR >120, conscious.
- MET call: conversation with patient, all family at bedside, conversation with family, conversation with doctors
An Illustration

- Patient and family understand intubation would be futile and confirm DNAR orders but support other treatments
- Patient assessed as fluid overloaded. Diuretic IV given. Dyspnea improved by low-dose morphine. NIV prn for comfort as requested
- Patients died peacefully 48 hours later
- Family grateful
MET calls which led to DNAR Orders

First 2 years of MET calls at Austin (1081 calls)

Patients with made DNAR after MET call: 5.5% of calls
Dying as a MET diagnosis-Case 567

- 87 y.o. previously well- Fell from ladder at home. Large subdural hematoma drained. Crush fracture of T5 (paraplegic)
- Now day 45 in hospital. Tracheostomy in situ. GCS never higher than 11 since admission. Paraplegic.
- MET call: high fever, desaturation on high flow oxygen, hypotensive, tachycardic
Dying as a MET diagnosis-Case 567

- CXR= RLL and RML pneumonia
- Pathophysiological Diagnosis: septic shock due to pneumonia
- Overriding major diagnosis: “Dying”
- Conversation with ward nurses at bedside: all relieved at correct over-riding MET diagnosis (finally!)
Dying as a MET diagnosis

- Conversation with Neurosurgical team: agree with MET diagnosis. Agree to MET contacting family and managing dying
- Family contacted - Situation explained
- Family relieved & come to hospital
- Morphine IV - Patient dies peacefully with family present 6 hours later - Family & Nurses grateful - Neurosurgeons grateful
At Austin, DNAR + acute emergency = dying……?

- 10% of patients who are “dying” generate MET calls
- 5.5% of patients are re-assessed as dying rather than acutely ill (e.g. “dying” is a common diagnosis after a MET call)
- 1/3 are >80 y.o. and 10% are >90 y.o.
- Is this just at our hospital?
## NFR Rates in M.E.R.I.T. trial

<table>
<thead>
<tr>
<th></th>
<th>Control Hospitals</th>
<th>MET Hospitals</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percent of patients with events made NFR at time of event – baseline:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calls only</td>
<td>3/63 (4.8)</td>
<td>1/54 (1.9)</td>
<td>0.38†</td>
</tr>
<tr>
<td>CA/Unplanned ICU/Death</td>
<td>34/956 (3.6)</td>
<td>14/1081 (1.3)</td>
<td>0.056†</td>
</tr>
<tr>
<td><strong>Percent of patients with events made NFR at time of event – study period:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calls only</td>
<td>6/197 (3.1)</td>
<td>106/1332 (8.0)</td>
<td>0.048†</td>
</tr>
<tr>
<td>CA/Unplanned ICU/Death</td>
<td>39/2422 (1.6)</td>
<td>54/2829 (1.9)</td>
<td>0.56†</td>
</tr>
<tr>
<td><strong>NFR made at time of event per 1000 admissions – baseline:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calls only</td>
<td>0.038</td>
<td>0.008</td>
<td>0.11*</td>
</tr>
<tr>
<td>CA/Unplanned ICU/Death</td>
<td>0.485</td>
<td>0.263</td>
<td>0.08*</td>
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<tr>
<td><strong>NFR made at time of event per 1000 admissions – study period:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calls only</td>
<td>0.041</td>
<td>0.398</td>
<td>0.002*</td>
</tr>
<tr>
<td>CA/Unplanned ICU/Death</td>
<td>0.273</td>
<td>0.294</td>
<td>0.71*</td>
</tr>
<tr>
<td><strong>All deaths with NFR per 1000 admissions – baseline:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.269</td>
<td>10.917</td>
<td>0.80*</td>
</tr>
<tr>
<td><strong>All deaths with NFR per 1000 admissions – study period:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.905</td>
<td>9.323</td>
<td>0.80*</td>
</tr>
</tbody>
</table>

Introducing the MET dramatically increases DNAR orders at the time of an emergency team call - It functions like an “acute DNAR team”!
The Medical Emergency Team System and Not-for-Resuscitation Orders: Results from the MERIT Study

Jack Chen*, Arthas Flabouris, Rinaldo Bellomo, Kenneth Hillman, Simon Finfer, The MERIT Study Investigators for the Simpson Centre and the ANZICS Clinical Trials Group

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Control hospitals</th>
<th>MET hospitals</th>
<th>Total</th>
<th>p-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Aggregated events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No NFR order</td>
<td>1034</td>
<td>39.48</td>
<td>2111</td>
<td>50.73</td>
</tr>
<tr>
<td>NFR order present before event</td>
<td>1540</td>
<td>58.80</td>
<td>1890</td>
<td>45.42</td>
</tr>
<tr>
<td>NFR issued at time of event</td>
<td>45</td>
<td>1.72</td>
<td>160</td>
<td>3.85</td>
</tr>
<tr>
<td>With the presence of an ET</td>
<td>34</td>
<td>1.30</td>
<td>141</td>
<td>3.39</td>
</tr>
<tr>
<td>Without the presence of an ET</td>
<td>11</td>
<td>0.42</td>
<td>19</td>
<td>0.46</td>
</tr>
<tr>
<td>Total</td>
<td>2619</td>
<td>100.00</td>
<td>4161</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Results: Information on NFR orders was available for 3650 patients who died, 1466 patients who had an unplanned ICU admission, 574 patients who suffered a cardiac arrest and 1529 patients who had a adverse event-free emergency team call. Close to 90% of deaths occurred in patients with a previously documented NFR order. Only approximately 4% of cardiac arrests had a previously documented NFR order. In patients with unplanned ICU admission, NFR orders were present in approximately 3% of cases. An NFR order was issued at the time of an "event" in 3.85% of cases in MET hospitals compared with 1.72% in control hospitals (OR = 2.29; 95% CI: 1.31–4.01; p = 0.005). This difference was mostly due to a greater proportion of patients being made NFR in MET hospitals at the time of a "adverse event-free" emergency team call (7.96% vs. 3.05%; OR = 2.75; 95% CI: 0.97–7.80; p = 0.048). The number of NFR orders issued at the time of a serious adverse event-free emergency team call was 10 times higher in MET hospitals (0.398 vs. 0.041 per 1000 admissions; weighted absolute risk difference: 0.49 (95% CI: 0.20–0.78; p = 0.002). Multivariate models could only account for less than 50% of the variance in the issuing of NFR orders.
The Medical Emergency Team Call: A Sentinel Event That Triggers Goals of Care Discussion

Robert L. Smith, MD\textsuperscript{1,2}; Vivian N. Hayashi, MD\textsuperscript{3,4}; Young Im Lee, MD\textsuperscript{1,2}; Leonila Navarro-Mariazeta, RN\textsuperscript{5}; Kevin Felner, MD\textsuperscript{1,2}

\textbf{Figure 1.} Monthly medical emergency team (MET) activations per 1,000 admissions, period June 2008 to September 2011. Positive slope; MET activation rate grew at an average annual rate of 0.3 per 1,000 admissions.
Figure 2. Flowchart of do-not-resuscitate (DNR) orders associated with medical emergency teams (METs), based on ward location after the MET call and timing of DNR orders relative to MET activation. Significantly more DNR orders were placed after the MET call in patients transferred to a critical care unit.
Figure 3. Monthly hospital mortality rate (hollow circles) and do not resuscitate (DNR)/death (full circles), 1998 through 2011. The thick continuous line represents the DNR/death trend and the dashed line represents the mortality rate trend, both fitted using lowess smoothing function (bandwidth = 0.3). Vertical band indicates medical emergency team (MET) run-in period. Asterisk represents a significant change in the DNR/death trend after the MET implementation ($p < 0.001$, interrupted autoregressive integrated moving average model).
The medical emergency team and end-of-life care: a pilot study

Crit Care Resusc 2007; 9: 151–156
Daryl A Jones, Tammy McIntyre, Ian Baldwin, Inga Mercer, Andrea Kattula and Rinaldo Bellomo

Figure 1. Flow diagram showing NFR designation and MET review characteristics of 105 patients who died in May 2005

105 patients died (80 medical, 25 surgical)

5 not designated NFR at time of death (all cardiac arrest: 3 asystolic, 2 EMD)

3 had MET criteria in previous 24 h

Admission MET Death
10.7 ± 9.8 8.8 ± 13.1

100 designated NFR at time of death

Admission NFR Death
8.1 ± 13.4 6.0 ± 8.8

35 had MET review
Mean LOS = 19.5 ± 18.4

Admission NFR Death
13.3 ± 16.1 6.3 ± 9.9

65 no MET review
Mean LOS = 11.2 ± 15.0

Admission NFR Death
5.3 ± 10.8 5.9 ± 8.3

Line diagrams show timelines in days (mean±SD) for not-for-resuscitation (NFR) documentation and medical emergency team (MET) review in relation to hospital admission and patient death. EMD = electromechanical dissociation. LOS = length of stay.
Objective: To investigate the role of medical emergency teams in end-of-life care planning.

Design: One month prospective audit of medical emergency team calls.

Setting: Seven university-affiliated hospitals in Australia, Canada, and Sweden.

Patients: Five hundred eighteen patients who received a medical emergency team call over 1 month.

Interventions: None.
Figure 1. Details of limitations of medical therapy (LOMT) in 518 patients reviewed by a medical emergency team (MET) in seven hospitals over a 1-month period. LOS, length of stay; IQR, interquartile range.
Enhanced End-of-life Care Associated with Deploying a Rapid Response Team: A Pilot Study

Rodrigo Vazquez, MD
Cristina Gheorghe, MD
Artur Grigoriyan, MD
Tatsiana Palvinskaya, MD
Yaw Amoateng-Adjepong, MD, PhD
Constantine A. Manthous, MD

Bridgeport Hospital and Yale University School of Medicine, Bridgeport, Connecticut.

The authors have no financial or intellectual conflicts of interest relevant to this research. The research was not supported by external funding.

HYPOTHESIS: Institution of a rapid response team (RRT) improves patients’ quality of death (QOD).

SETTING: A 425-bed community teaching hospital.

PATIENTS: All medical-surgical patients whose end-of-life care was initiated on the hospital wards during the 8 months before (pre-RRT) and after (post-RRT) actuation.

STUDY DESIGN: Retrospective cohort study.

METHODS: Medical records of all patients were reviewed using a uniform data abstraction tool. Demographic information, diagnoses, physiologic and laboratory data, and outcomes were recorded.
### TABLE 2. End-of-Life Care Outcomes

#### a. Prior to RRT vs. During RRT Deployment

<table>
<thead>
<tr>
<th></th>
<th>Pre-RRT (n = 197)</th>
<th>Post-RRT (n = 197)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort care only</td>
<td>90 (46%)</td>
<td>133 (68%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Pain score (0-10)</td>
<td>3.7 ± 3.3</td>
<td>3.0 ± 3.5</td>
<td>0.045</td>
</tr>
<tr>
<td>Opioids administered</td>
<td>84 (43%)</td>
<td>134 (68%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Subjective suffering</td>
<td>122 (62%)</td>
<td>52 (26%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Family present</td>
<td>115 (58%)</td>
<td>120 (61%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Chaplain present</td>
<td>119 (60%)</td>
<td>142 (72%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

#### b. During RRT Deployment: Those Dying with RRT Assessment vs. Those Dying Without

<table>
<thead>
<tr>
<th></th>
<th>Post-RRT RRT Care (n = 61)</th>
<th>Post-RRT No RRT Care (n = 136)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort care only</td>
<td>46 (75%)</td>
<td>87 (64%)</td>
<td>0.1</td>
</tr>
<tr>
<td>Pain score (0-10)</td>
<td>3.0 ± 3.5</td>
<td>3.0 ± 3.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Opioids administered</td>
<td>42 (69%)</td>
<td>92 (67%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Subjective suffering</td>
<td>18 (29%)</td>
<td>34 (25%)</td>
<td>0.9</td>
</tr>
<tr>
<td>Family present</td>
<td>43 (71%)</td>
<td>77 (57%)</td>
<td>0.06</td>
</tr>
<tr>
<td>Chaplain present</td>
<td>49 (80%)</td>
<td>93 (68%)</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

#### c. Comparing Before and During RRT Deployment: Those Dying Without RRT Assessment

<table>
<thead>
<tr>
<th></th>
<th>Pre-RRT (n = 197)</th>
<th>Post-RRT No RRT Care (n = 136)</th>
<th>P Value</th>
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<tr>
<td>Comfort care (only)</td>
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<td>Subjective suffering</td>
<td>122 (62%)</td>
<td>34 (25%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Family present</td>
<td>115 (58%)</td>
<td>77 (56.6%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Chaplain present</td>
<td>119 (60%)</td>
<td>74 (54.4%)</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Clinical paper

Features and outcome of patients receiving multiple Medical Emergency Team reviews

Paolo Calzavacca\textsuperscript{a, b, x}, Elisa Licari\textsuperscript{a, b}, Augustine Tee\textsuperscript{a, b}, Inga Mercer\textsuperscript{a, b}, Michael Haase\textsuperscript{a, b, c}, Anja Haase-Fielitz\textsuperscript{a, b, c}, Daryl Jones\textsuperscript{a, b}, Geoff Gutteridge\textsuperscript{a, b}, Rinaldo Bellomo\textsuperscript{a, b}

\textsuperscript{a} Department of Intensive Care, Austin Hospital, Melbourne, Australia
\textsuperscript{b} Department of Medicine, Austin Hospital, Melbourne, Australia
\textsuperscript{x} Department of Nephrology and Intensive Care, Charité University Hospital, Berlin, Germany
Fig. 1. Flow diagram showing proportions and outcomes of patients subject to single vs. multiple MET reviews. The data in the bottom most squares indicate mortality at hospital discharge for each of the patient subsets. ICU admit: patients admitted to ICU following the MET review; NFR: not for resuscitation.
<table>
<thead>
<tr>
<th>Table 1</th>
<th>Epidemiological and outcome characteristics of the MET review population.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
</tr>
<tr>
<td>Number of patients</td>
<td>1664</td>
</tr>
<tr>
<td>Age*</td>
<td>69.8 (74) ± 16.8</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>921/1664 (55.3%)</td>
</tr>
<tr>
<td>Surgical</td>
<td>765/1664 (46.0%)</td>
</tr>
<tr>
<td>Office hours calls</td>
<td>564/1664 (33.9%)</td>
</tr>
<tr>
<td>NFR before call</td>
<td>377/1664 (22.7%)</td>
</tr>
<tr>
<td>NFR after call</td>
<td>141/1664 (8.5%)</td>
</tr>
<tr>
<td>NFR overall</td>
<td>518/1664 (31.1%)</td>
</tr>
<tr>
<td>Unplanned ICU admission</td>
<td>267/1664 (16%)</td>
</tr>
<tr>
<td>Hospital LOS*</td>
<td>23 (15) ± 34.4</td>
</tr>
<tr>
<td>Hospital mortality overall</td>
<td>571/1664 (34.3%)</td>
</tr>
<tr>
<td>Hospital mortality (No NFR patients)</td>
<td>238/1146 (20.8%)</td>
</tr>
<tr>
<td>Hospital mortality (NFR patients)</td>
<td>333/518 (64.3%)</td>
</tr>
</tbody>
</table>
DNAR Orders in Australian Hospitals

- They are issued for 1/100 patients overall
- However, when there is an emergency they are rarely issued at that time
- Once the MET system is introduced, the number of DNAR orders made at the time of an emergency call increases dramatically
- Although the overall DNAR rate is unchanged, this system change matters
Does the MET have the authority to diagnose “dying” and to issue DNAR orders?

- Diagnosing dying is often only finally made when the MET arrives.
- The MET has the authority to issue DNAR orders in our hospital.
- This is time-consuming.
- It can only be done after family (and occasionally patient), nurses and doctors agree.
Diagnosing dying

- The diagnosis of dying is medical
- The diagnosis of dying is moral
- The diagnosis of dying is social
- The diagnosis of dying is political

We need more overt discussion and research on the diagnosis of dying in hospitals
The Treatment of Dying

- Seek agreement on diagnosis
- Document agreement on diagnosis
- Document discussion with appropriate parties
- Issue DNAR order
- Develop appropriate palliative care plan
- Prescribe medications for palliation
When? For whom? Under what Circumstances?

- Consider dying as the diagnosis in MET call patients if:
  - Multiple recent admissions
  - Poor quality of life
  - Home oxygen
  - Elderly with chronic diseases
  - Metastatic cancer
  - Lethal disease with limited known treatment options
How Does The MET Diagnose “Dying”?

- History
- Physical Examination
- Laboratory tests
- Investigations
- Discussion with patient, family, nurses, doctors

Diagnosing dying is an important and under-emphasized clinical skill!
The C’s of Diagnosis Dying

- Competence
- Care
- Compassion
- Communication
- Collegiality
The MET as a quality assurance tool: the window on dying

- The MET shows the deficiencies in the management of dying in hospital
- Preventive management is best
- Doctors do not like/are not comfortable with talking about dying
- A specific team needs to be developed
- A new program “Respecting Patient Choices” introduced at Austin
Respecting Patient Choices

- Team of trained nurses
- Identification of high risk patients (oncology, end stage COPD, dialysis etc.)
- Contact and discussion with patient/family when patient is well
- Spreading to nursing homes to prevent hospital admissions for “dying”
- Spreading across the nation
Effect in nursing homes

- Pilot study
- Increase in “living will” from 40% to 95%
- Decrease in nursing home patients dying in hospital from 40% to 10%
- Decrease in hospital days before death
- If extended to nation, estimated savings of 960,000 bed days
METs, DNAR and Dying

- METs have a profound impact on DNAR orders and dying in hospitals.
- They dramatically increase DNAR orders during emergencies.
- They improve the process of dying.
- They identify new needs for better preventive approaches.
- In hospitals, METs might just improve the dying as much as the living!!