Hospital rapid response team and patients with life-limiting illness: A multicentre retrospective cohort study

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Abstract

Background: Approximately one-third of rapid response team consultations involve issues of end-of-life care. We postulate a greater occurrence in patients with a life-limiting illness, in whom the opportunity for advance care planning and palliative care involvement should be offered.

Aims: We aim to review the characteristics and compare outcomes of rapid response team consultations on patients with and without a life-limiting illness.

Design/Setting: A 3-month retrospective cohort study of all rapid response team consultations was conducted. The sample population included all adult inpatients in a major teaching hospital network.

Results: We identified 351 patients — including 139 with a life-limiting illness — receiving a total of 456 rapid response team consultations. The median time from admission to the first rapid response team consultation was 3 days. Patients with a life-limiting illness had a significantly higher mortality rate (41.7% vs 13.2%), were older (72.6 vs 63.5 years), more likely to come from a residential aged-care facility (29.5% vs 4.1%) and had a shorter hospital stay (10 vs 13 days). Rapid response team consultations resulted in a change to more palliative goals of care in 28.5% of patients, of whom two-thirds had a life-limiting illness.

Conclusion: Patients with a life-limiting illness had worse outcomes post–rapid response team consultation. Our findings suggest that a routine clarification of goals of care for this cohort, within 3 days of hospital admission, may be advantageous. These discussions may provide clarity of purpose to treating teams, reduce the burden of unnecessary interventions and promote patient-centred care agreed upon in advance of any deterioration.

Keywords
Rapid response team, resuscitation orders, goals of care, end-of-life care, cardiac arrest, advance care planning

What is already known about the topic?

- One-third of rapid response team (RRT) consultations involve end-of-life care decision-making.
- This prevalence suggests a lack of proactive recognition of such patients and missed opportunities for facilitation of advance care planning and institution of limitation of medical treatment.

What this paper adds?

- Patients with an objectively defined life-limiting illness have worse outcomes after RRT consultations compared to their counterparts.

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Introduction

The rapid response teams (RRTs) are established in many hospitals worldwide to urgently respond to and improve outcomes in clinically deteriorating patients. However, increasingly these teams are involved in end-of-life care (EOLC) decision-making. This prevalence suggests a lack of proactive recognition of patients at risk of dying. Moreover, one may question whether the involvement of the RRT is an optimal and cost-effective way of managing dying patients in acute hospital.

EOLC issues are more common in patients who are older (>70 years) and have a higher burden of co-morbidities. We hypothesised that a substantial proportion of these patients also have a life-limiting illness (LLI). Ideally, these patients should have the opportunity for timely discussion of appropriate goals of care prior to any clinical deterioration and have their preferences clearly outlined in an easily accessible document (i.e. advance care plan (ACP) or directive). A do-not-resuscitate (DNR) or not-for-resuscitation (NFR) order is often an appropriate first step, but should be followed with further discussions on appropriate boundaries of care, and preferred place of care/death.

Our retrospective cohort study looked at the use of the Supportive and Palliative Care Indicators Tool (SPICT™) to define patients with a LLI. We characterised patients with LLI and compared the outcomes of RRT consultations in those with and without a LLI.

Methods

The study was approved by the Monash Health Human Research and Ethics Committee (Research Project Application No. 13053Q). The need for informed patient consent was waived.

A 3-month retrospective cohort study of RRT consultations between May and July 2011 was performed on adult inpatients within Monash Medical Centre Clayton, Dandenong Hospital and Jessie McPherson Private Hospital. These hospitals have an onsite access to intensive care unit (ICU). They have well-established RRT (medical emergency team (MET) and cardiac arrest team), ACP and palliative care teams. The MET consists of an ICU registrar, ICU nurse, medical registrar and medical resident. In addition to the MET, an anaesthetic registrar and a coronary care unit nurse also attend cardiac arrests. Appendix 1 details the activation criteria for the hospitals MET and cardiac arrest team.

Patients were identified through the RiskMan database. The database is a mandatory repository for data of all RRT activities within the hospitals. The medical records for all identified patients were analysed by two study authors (M.S. or A.V.), excluding those that could not be correlated. To ensure consistency and robust data collection, the medical records of all patients with multiple RRT consultations were also independently reviewed by both of the aforementioned study authors. Any disagreement was resolved after discussion with a third investigator (M.F. or L.W.).

Data collection

De-identified data on patient demographics (age, gender and pre-admission place of care) and admission details (admitting unit, length of stay and separation outcome) were recorded. Patients with a LLI were identified through the use of evidence-based clinical indicators of advanced conditions and multi-morbidity – SPICT, September 2012 (Appendix 2). Patients were defined to have a LLI based on information available at admission. Where specific parameters of SPICT were not recorded, they were assumed to be absent.

Details of RRT consultation: date and time (after-hours is defined as outside Monday–Friday 0800–1700) and post-incident outcome (death, ICU transfer, emergency surgery/interventional procedure or ward management) were recorded. For all patients, the presence of a documented limitation of medical treatment (LOMT) or NFR order was collected. The timing of the creation of the order (pre- or post-RRT consultation) was also noted, as was any hospital palliative care team involvement.

Data analysis

We present descriptive data comparing the cohort of patients with and without a LLI, as well as the characteristics of those patients who died compared with those who survived to discharge. Parametric data were presented as means with standard deviation (SD), non-parametric data as medians with inter-quartile ranges (IQRs) and categorical variables as raw numbers and percentages (%).

Results

From the RiskMan database, 396 patients were identified between May and July 2011. A total of 45 patients were
excluded with reasons outlined in Figure 1. We analysed 351 patients and 456 RRT consultations. Approximately 1 in 5 patients \( (n=78) \) had multiple RRT consultations (between 2 and 6 per admission); 34 (43.6%) of these patients had a LLI.

**Patient characteristics**

Of the 351 patients who had one or more RRT consultations, 139 (39.6%) patients had a LLI with 95/139 (68.3%) having non-malignant disease (Table 1). The patients with LLI were older (72.6 vs 63.5 years), more likely to come from a residential aged-care facility (29.5% vs 4.1%) and had a shorter hospital stay (10 vs 13 days).

A LOMT was present in 90/139 (64.7%) patients with LLI, 70 of whom had a LOMT instituted post-incident. Prior to RRT consultations, only 3.6% of patients with a LLI were known to the hospital palliative care team – this increased to 28.1% post-incident. There was no significant difference in the number of RRT consultations per patient, between those with and without a LLI.

The mortality rate of all patients who had one or more RRT consultations during the 3-month period was 24.5%. Mortality rates in patients with a LLI and those without were 41.7% and 13.2%, respectively. Of those who survived to discharge, patients with LLI were more likely to be discharged to a residential aged-care facility (37% vs 7.1%).

**Critical incident characteristics**

The majority of RRT consultations were MET calls (84%) (Table 2). More than half of all RRT consultations occurred after-hours, with a slightly higher proportion observed in patients with a LLI. Post-incident care was also more conservative for patients with a LLI, with a greater change to more palliative goals of care (42.8% vs 12.8%). The median number of days before the first RRT consultation was 3 days, and ICU admissions were equally common, irrespective of a LLI.

**Death and discharge characteristics**

Patients who died during their admission received more RRT consultations than those who survived to discharge (1.46 vs 1.24) (Table 3). The median time to the first RRT consultation was significantly longer in those patients who died (6 vs 2 days). The last RRT consultation occurred within 48 h of death in the majority of patients (58.1%).

There was notable increase in palliative care referrals following the last RRT activation prior to death and this commonly occurred on the same or the following day. Patients who died were more likely to be male, older and more likely to be admitted from a residential aged-care facility. There was a trend towards shorter hospital admission for those who died (10 vs 12 days).

Our observations revealed relatively low frequency of NFR order or other LOMT record prior to the last RRT consultation before death (43% and 5.8%, respectively). Only two patients were commenced on the hospital EOLC pathway following their RRT consultations.

**Discussion**

**Summary of study findings**

This retrospective cohort study aimed to review the characteristics and compare outcomes of RRT consultations on patients with and without a LLI. We found a significant proportion of RRT consultations to involve patients with a LLI \( (n=184, 40\%) \). These patients were older, more likely to have come from a residential aged-care facility, more likely to have a pre-existing LOMT and had a shorter admission and higher mortality rate.

We also found the time to the first RRT consultation, rate of RRT consultations and ICU admissions to be equivalent irrespective of the presence of a LLI. Despite the presence of a LLI, only a small proportion of patients had been referred to the hospital palliative care team prior to the RRT consultation.

**Study strength and limitations**

To our knowledge, our study is the first multicentre study to attempt to directly compare the outcomes of RRT consultations for patients with and without a LLI. This study looked at a large number of RRT consultations over a 3-month period and included three different hospitals with a broad range of patients and care settings (including public and private, teaching and research hospital, and patients with malignant and non-malignant diagnoses). The hospital mortality post-RRT consultations was consistent with that reported in other similar studies.\(^{9,10,17,18}\)

We found a median time of 3 days from admission to the first RRT consultation, a finding consistent with the literature.\(^{5,19}\) Similar to the finding of The Medical Emergency Team End-of -life Care Investigators,\(^{19}\) we report a higher mortality with RRT consultations a week into the admission. This potentially signifies a difficulty in diagnosing dying or the lack of clarity in the documentation of goals of care and appropriate limitation of treatment by the parent medical team.\(^{14}\)

Our data confirm that the RRTs have a significant role in EOLC, through prompting review of deteriorating patients’ goals of care and instituting NFR and/or LOMT. The RRTs probably prevent unnecessary suffering, distress and pain through the prompt provision of EOLC where this has not been delivered by the parent medical unit. Quality EOLC involves more than the withholding of resuscitation or other invasive treatments.\(^{11}\) Although we observed an increase in palliative care team involvement following RRT consultations, most of these patients were
referral late as the majority of deaths occurred within 2 days of the last RRT consultation.\textsuperscript{5,11,13}

Diagnosing dying is a challenge of modern medicine, filled with uncertainty and the risk of a self-fulfilling prophecy effect.\textsuperscript{14} One can therefore understand the hesitancy of many clinicians in making the diagnosis. Physiological derangements activating RRT criteria may be a way of identifying dying patients.\textsuperscript{20} Two single-centre studies reported improvement of EOLC in ward patients following the introduction of RRT.\textsuperscript{13,21} Unfortunately,
this finding has not been reproducible in other parts of the world.²²

Relying on the RRTs to diagnose dying and deliver EOLC in acute hospitals is filled with inherent difficulties.¹⁴ During RRT activation (particularly those occurring after-hours), the team is time-pressured to make a decision about the appropriateness of medical intervention, often with limited knowledge of the patient’s circumstances. These patients are more likely not to have the capacity to express their values and wishes. Futile and inappropriate interventions at the end of life result in increased suffering and stress for patients, their families and carers; moral distress for clinicians involved; and have significant cost implications for society.⁵,²³ When goals of care are unclear, it is also more likely that a patient’s psychosocial and spiritual needs are neglected, and symptoms are not optimally managed at the end of life.²³

Many intensivists urge for a more proactive approach addressing EOLC issues earlier and more openly after admission.¹²,¹⁴,²⁴ This will hopefully reduce the EOLC workload expected from the RRTs.⁶

### Table 2. Critical incident characteristics.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total N = 456</th>
<th>LLI N = 184</th>
<th>No. LLI N = 272</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH incidents, N (%)</td>
<td>273 (59.9)</td>
<td>113 (61.4)</td>
<td>160 (58.8)</td>
</tr>
<tr>
<td>Incident types, N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MET</td>
<td>382 (83.8)</td>
<td>159 (86.4)</td>
<td>223 (82)</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>74 (16.2)</td>
<td>25 (13.6)</td>
<td>49 (18.1)</td>
</tr>
<tr>
<td>Days to first incident, median (IQR)</td>
<td>3 (1–8)</td>
<td>3 (1–8)</td>
<td>3 (1–8)</td>
</tr>
<tr>
<td>Patient post-incident care, N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency surgery/procedure</td>
<td>17 (3.7)</td>
<td>2 (1.1)</td>
<td>15 (5.5)</td>
</tr>
<tr>
<td>ICU</td>
<td>99 (21.7)</td>
<td>37 (20.1)</td>
<td>62 (22.8)</td>
</tr>
<tr>
<td>Ward</td>
<td>322 (70.5)</td>
<td>134 (72.8)</td>
<td>188 (69.1)</td>
</tr>
<tr>
<td>Death declared during incident</td>
<td>18 (3.9)</td>
<td>11 (6)</td>
<td>7 (2.6)</td>
</tr>
<tr>
<td>Incidents arising in GOC change (excluding deaths), N (%)</td>
<td>108 (24.7)</td>
<td>74 (42.8)</td>
<td>34 (12.8)</td>
</tr>
</tbody>
</table>

LLI: patients with a life-limiting illness; AH: after-hours (outside Monday–Friday 0800–1700); MET: medical emergency team; ICU: intensive care unit; GOC: goals of care; N: number of cases; IQR: inter-quartile range. (%): refers to proportion of cases within each column.

### Table 3. Death and discharge characteristics.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total N = 351</th>
<th>Deaths N = 86</th>
<th>Alive at discharge N = 265</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of incidents</td>
<td>456</td>
<td>127</td>
<td>329</td>
</tr>
<tr>
<td>No. of incidents per patient</td>
<td>1.30</td>
<td>1.46</td>
<td>1.24</td>
</tr>
<tr>
<td>AH last incident, N (%)</td>
<td>206 (58.7)</td>
<td>50 (58.1)</td>
<td>156 (58.9)</td>
</tr>
<tr>
<td>Death as incident outcome, N (%)</td>
<td>18 (5.1)</td>
<td>18 (20.9)</td>
<td>NA</td>
</tr>
<tr>
<td>Age in years, mean (SD)</td>
<td>67.1 (18.4)</td>
<td>75.5 (12.7)</td>
<td>64.4 (19.2)</td>
</tr>
<tr>
<td>Male, N (%)</td>
<td>187 (53)</td>
<td>51 (59.3)</td>
<td>136 (51.3)</td>
</tr>
<tr>
<td>Admission source, N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>290 (82.6)</td>
<td>65 (75.6)</td>
<td>225 (84.9)</td>
</tr>
<tr>
<td>RACF</td>
<td>50 (14.3)</td>
<td>16 (18.6)</td>
<td>34 (12.8)</td>
</tr>
<tr>
<td>Hospital transfer</td>
<td>11 (3.1)</td>
<td>5 (5.8)</td>
<td>6 (2.3)</td>
</tr>
<tr>
<td>Known to palliative care, N (%)</td>
<td>46 (13.1)</td>
<td>25 (29.1)</td>
<td>21 (7.9)</td>
</tr>
<tr>
<td>Pre-last incident, N (%)</td>
<td>7 (15.2)</td>
<td>3 (12)</td>
<td>4 (19)</td>
</tr>
<tr>
<td>LOMT present prior to last incident</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFR, N (%)</td>
<td>60 (17.1)</td>
<td>37 (43.0)</td>
<td>23 (8.7)</td>
</tr>
<tr>
<td>NF-MET, N (%)</td>
<td>5 (1.4)</td>
<td>5 (5.8)</td>
<td>0</td>
</tr>
<tr>
<td>Total LOS, median days (IQR)</td>
<td>12 (6–22)</td>
<td>10 (4–18)</td>
<td>12 (7–22)</td>
</tr>
<tr>
<td>Admission to first incident, median days (IQR)</td>
<td>3 (1–8)</td>
<td>6 (1–13)</td>
<td>2 (1–7)</td>
</tr>
<tr>
<td>Last incident to discharge/death, median days (IQR)</td>
<td>6 (3–13)</td>
<td>2 (0–5)</td>
<td>8 (5–15)</td>
</tr>
<tr>
<td>Palliative care referral to death, median days (IQR)</td>
<td>NA</td>
<td>1 (0–3)</td>
<td>NA</td>
</tr>
</tbody>
</table>

AH: after-hours (outside Monday–Friday 0800–1700); RACF: residential aged-care facility (includes high- and low-level care facilities); LOS: hospital length of stay; LOMT: limitation of medical therapy; NFR: not for resuscitation; NF-MET: not for medical emergency team; N: number of cases; SD: standard deviation; IQR: inter-quartile range; NA, not applicable. (%): refers to proportion of cases within each column.
This was a retrospective study, relying solely on existing clinical documentation. The true prevalence of LLI may have been underestimated. In this study, we did not document physiological parameters prompting RRT consultations or the causes of deteriorations. We therefore cannot comment on the appropriateness of RRT activation nor exclude the possibility that late activation of RRT in patients with LLI may account for the higher mortality observed.

Finally, given the study authors were not blinded to the admission outcomes, there may be a risk of observer bias. We attempted to minimise this risk by using an established tool to diagnose LLI and by having two investigators independently review the record of all patients with multiple RRT consultations (>20% of the total cohort), with a third investigator resolving any discrepancy in the data interpretation.

Implications for clinicians and policy makers
To deliver safe and high-quality EOLC in acute hospitals, clinicians need to be proactive in recognising patients who may be approaching the end of life. Conversations about their goals of care should ideally occur prior to any clinical deterioration, to allow adequate time for meaningful discussion of patient preferences, ACP and to avoid futile or unwanted medical interventions.

Patients with a LLI have a different prognostic outlook compared to those without a LLI. Ideally, goals of care and ACP conversations should occur within the first 3 days of an acute admission, if not earlier.

Tools that define LLIs (such as SPICT) may be used to guide clinicians to objectively identify patients at risk and prompt such discussions. Clinicians should aim to clearly document agreed goals of care and any LOMT in an easily identifiable record. This record should ideally be easily accessible and reviewed for appropriateness in any subsequent admissions.

Where goals of care are unclear or LOMT is not present prior to RRT consultation, the RRT members should take the opportunity to prompt the facilitation of ACP and establish appropriate goals of care in consultation with the patient (if able), carer and primary medical team. If we were to rely on the RRTs for the delivery of EOLC, it is important that the RRT members have sufficient training in the area.2

Conclusion
Patients with a LLI, who had one or more RRT consultation(s) during their admission, had a higher mortality rate than their counterparts. This risk of poor outcome should be routinely discussed with all such patients within 3 days of hospital admission to allow shared decision-making, establish appropriate limitations of medical treatment and clarify goals of care. We encourage prospective interventional studies to validate these findings.

Acknowledgements
We thank Dr Kirsty Boyd and Professor Scott Murray in allowing the use of the September 2012 version of SPICT™ for this study, the Monash Health Deteriorating Patient Risk Management Committee for access to the RiskMan database and Ms Kim Flynn for her assistance in retrieving medical histories.

Declaration of conflicting interests
The authors declare no competing interests.

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References


Appendix 1. Medical emergency team call and cardiac arrest criteria.

MET call criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Threatened airway</td>
</tr>
<tr>
<td>B</td>
<td>Respiratory rate &lt;6 or &gt;30/min and/or oxygen saturation &lt;90% on oxygen</td>
</tr>
<tr>
<td>C</td>
<td>Systolic BP &lt;90 mmHg and/or heart rate &lt;40 or &gt;130/min</td>
</tr>
<tr>
<td>D</td>
<td>Fall in GCS &gt; 2 points and/or repeated or prolonged seizures</td>
</tr>
<tr>
<td>O</td>
<td>Other concern about patient</td>
</tr>
</tbody>
</table>

Cardiac arrest criteria

- Cardio-respiratory arrest or any extreme clinical emergency requiring urgent medical assistance

MET: medical emergency team; BP: blood pressure; GCS: Glasgow Coma Scale.

Appendix 2

Supportive and Palliative Care Indicators Tool (SPICT™)

The latest version of SPICT tool can be downloaded free upon registration at www.spict.org.uk