

Implementing a Rapid Response System Toolkit

Safer Systems – Saving Lives
Implementing a Rapid Response System – Version 4

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14 Nov 2005	2	Andrew Clarke	Incorporates comments and feedback resulting from the orientation sessions.
14 Dec 2005	3	Andrew Clarke	Final version prior to implementation includes amendments from expert panel consultation.
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Foreword

Safer Systems – Saving Lives is a national collaborative initiated by the Australian Council for Safety and Quality in Health Care. The aim of the Safer Systems – Savings Lives project is to provide tangible evidence on the impact of six key interventions when applied consistently and comprehensively in Australian hospitals. The interventions are based on scientific evidence and known to improve patient care and prevent avoidable deaths. The six interventions are:

- Preventing ventilator-associated complications
- Preventing surgical site infection
- Preventing central venous catheter related-bloodstream infections
- Implementing a rapid response system
- Preventing adverse drug events
- Improving care for acute myocardial infarction.

The interventions are based on implementing a formalised process or applying a 'bundle' of care components. The care bundle builds on the concept that, whilst each component is of value, if all elements of the 'bundle' are used, the prevention factor is increased.

The Quality and Safety Branch of the Department of Human Services in Victoria will provide organisational lead and overarching project management for the SSSL project. Commencing in early 2006 the project will be implemented in hospitals across Australia. More information on the project and the interventions can be found on the Safer Systems – Saving Lives website at www.health.vic.gov.au/sssl

Safer Systems – Saving Lives project is based on the 100,000 Lives Campaign, an initiative by the Institute for Healthcare Improvement (IHI). The IHI care bundles and measures have been adapted to suit the Australian context with the assistance of expert panels. Through the implementation of the six interventions the 100K campaign aims to avoid 100,000 deaths by June 2006, and every year thereafter. More information on the institute and the 100K campaign can be found on the IHI website (<http://www.ihl.org>).

Introduction

What is a rapid response system?

A rapid response system (RRS) involves the utilisation of a variety of hospital resources, for the detection and treatment of patients in crisis, to prevent deterioration, morbidity or death.

What is the aim of implementing a RRS?

The aim of implementing a rapid response system is to reduce the number of unexpected in-patient deaths.

The case for implementing a RRS

Certain in-hospital deaths may be preventable¹. During the 1960s the concept of cardiac arrest teams was developed². Cardiac arrest teams rush to the patient's bedside to resuscitate patients who have experienced an arrest. Despite the availability of cardiac arrest teams and advances in cardiopulmonary resuscitation, the risk of death remains very high^{2,3}.

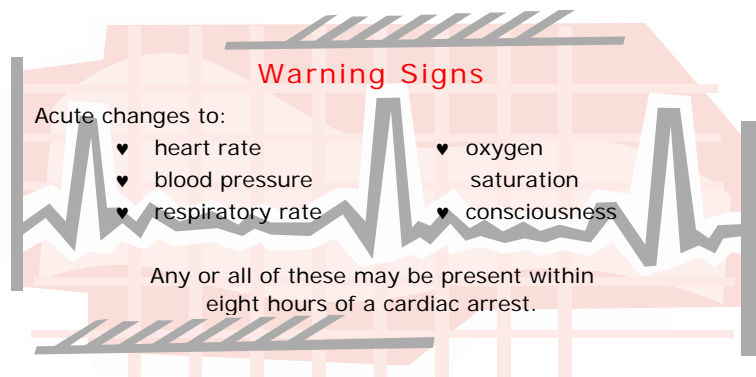


Figure one: Warning signs

Studies indicate that between 50 to 84 per cent of in-hospital cardiac arrests are preceded by physiological instability from one to six hours before a cardiac arrest⁴:

- 76 per cent of patients show evidence of respiratory deterioration for at least one hour prior to the arrest¹
- 66 per cent of patients show abnormal signs and symptoms within six hours of arrest and prior to notification to a clinician
- only 25 per cent of cases displaying symptoms are referred to a clinician³.

The poor survival rate for in-hospital cardiac arrest has led to the development of interventions that pre-empt deterioration and treat patients before they experience a cardiac arrest⁵.

In broad terms these models fall into two categories;

1. those that provide a 'ramp-up' service lead by nursing staff, for example, the Critical Care Outreach services (CCO) implemented in the United Kingdom⁶, or the Rapid Response Team (RRT) described by the Institute for Healthcare Improvement (IHI) for the 100,000 Lives Campaign⁷.
2. those that provide comprehensive response and treatment and are physician lead, for example, Medical Emergency Teams (MET)⁶.

The MET concept was trialed in Australia by the Liverpool hospital (NSW) in 1990 and later at the Austin & Repatriation Medical Centre (Vic) 1999-2001⁴. It has spread to a number of hospitals across Australia and has been enthusiastically adopted by hospitals in other countries. In June 2005 an International Conference on Medical Emergency Teams (ICMET) was held in Pittsburg (USA)⁶.

Also in June 2005, the *Lancet* reported on a cluster-randomised controlled trial involving 23 Australian hospitals, designed to test the hypothesis that the MET system would reduce the number of cardiac arrests, unplanned ICU admissions and deaths (the MERIT study)⁸.

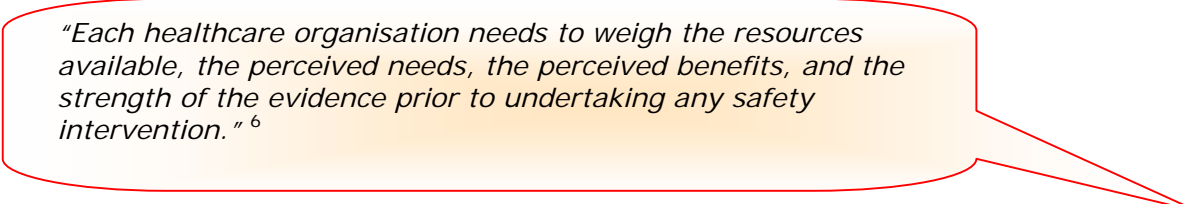
The current situation

Though the results of the MERIT study have been used by the Institute for Healthcare Improvement (IHI) to inform the implementation of Rapid Response Teams as part of the 100,000 Lives Campaign⁹, the results have further polarised an already lively debate about MET.

The results of the MERIT study failed to reach statistical significance⁸. The MERIT report concludes that: "The MET system greatly increases emergency team calling, but does not substantially affect the incidence of cardiac arrest, unplanned ICU admissions, or unexpected death"⁸.

Traditionally METs comprise medical officers and nurses from the ICU leaving that environment to respond to concerns about patients in other units and wards. This characteristic of METs results in an increase in the workload of ICU staff¹⁰. It is understandable that if the workload of ICU staff is increased by response to MET calls, and there is no consequent reduction in unplanned ICU admissions as demonstrated by MERIT, then organisations may be reluctant implement MET.

The SSSL project accepts the view of ICMET that:



*"Each healthcare organisation needs to weigh the resources available, the perceived needs, the perceived benefits, and the strength of the evidence prior to undertaking any safety intervention."*⁶

Organisations do not all have the same resources to commit to new systems. Organisations may not perceive the same benefits flowing from the implementation of CCO or RRT or MET. Organisations do experience the need, and have a moral obligation, to prevent unexpected death occurring in their facilities. The SSSL project recommends organisations tailor a Rapid Response System that best fits their current capacity to prevent unexpected in-hospital deaths, and develop a long-term plan for prioritising resources and reviewing the model most effective for them.

Potential impact of implementing a RRS

A RRS strategy can assist in reducing the incidence of in-hospital cardiac arrests and death following cardiac arrest, and overall in-hospital mortality¹¹.

The introduction of a RRS strategy in its various forms CCO teams¹¹, RRT¹² and MET^{1,2,3,4}, has been directly attributable to improved patient outcomes.

The CCO teams in the UK have reported lower in-hospital mortality and decreased readmissions to ICU¹¹. RRS teams implemented as part of the IHI 100,000 lives campaign have seen a decrease in the number of cardiac arrests¹². MET teams in Australia have reported fewer admissions to ICU¹, fewer cardiac arrests², reduced incidence of and reduced mortality from decreased morbidity and mortality for postoperative patients⁴

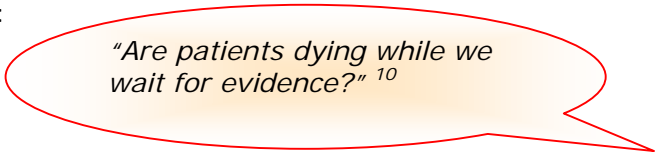
Fairly recent work by Sir Brian Jarman, Emeritus Professor of Primary Health Care at Imperial College School of Medicine (London, UK), indicates that variability exists in hospital mortality rates. Even when multiple risk factors and community factors are taken into consideration, there is no clear explanation for differences from hospital to hospital. In recent years, work has been carried out to understand the causes of the problem and to develop potential improvement strategies. The conclusions from this work are that three main systemic issues contribute to the problem:

- failure to recognise deteriorating patient condition
- failures in planning (including assessments, treatments and goals)
- failure to communicate (for example, patient-to-staff, staff-to-staff, staff-to-clinician)

These fundamental problems often lead to a failure to rescue.

While the debate continues about whether to implement or not implement MET, now is the time to plan, communicate and recognise the patient whose condition is deteriorating in time to implement safer systems that save lives.

Kerridge and Saul (2003) ask a salient question:



"Are patients dying while we wait for evidence?"¹⁰

While now is a good time to implement a RRS, further research into preventing unexpected death is also needed, as the MERIT investigators have acknowledged⁸.

The components of care

The SSSL project recognises that organisations seek to respond in different ways to the issue of patient crisis depending on interpretation of available evidence, availability of organisational resources and the prevailing organisational culture. The focus of SSSL is not on the adoption of a preferred model but on the implementation of a systematic response to a perceived need.

Addressing the question 'What are the characteristics of Rapid Response Systems', ICMET recognised that a RRS is more than just a team arriving at a patient's bedside, it comprises a number of components that draw on a wide variety of hospital resources⁶.

The SSSL Intervention called Implementing Rapid Response System comprises four bundle components based on the ICMET findings.



Figure two: RRS care components

1. Governance

Whatever the nature of the RRS implemented by an organisation it is important to provide adequate administration to support all levels of the system. It has been recommended that senior administrative support and senior medical staff leadership are necessary for the implementation and sustainability of RRS².

A governance group comprising senior staff should be established to oversee the development, implementation and review of policy and protocols that underpin:

- the RRS strategy
- the event detection criteria
- the crisis response procedures, and
- the evaluation process

With regard to governance ICMET strongly recommended:

*'that there be a RRS coordinator responsible for all aspects of the program including training, competence surveillance and maintenance, equipment maintenance, data collection, data management, quality assurance and patient safety opportunities.'*⁶

This role statement above highlights aspects of RRS that organisations will need to cover as part of RRS governance. The SSSL emphasis is not on the appointment of a coordinator but on ensuring these elements of a RRS are met.

2. Event detection

The intent of a RRS is to identify the signs that precede deterioration into critical illness and to respond to patient crises in time to prevent morbidity or death. Event detection is, ideally, recognising an event before it occurs, and acting to prevent its occurrence.

Event detection is dependent on the presence of organisation wide criteria that is understood and accepted as the basis for calling designated resources that will respond to a perceived need.

St Elsewhere Hospital
RRS Initiation Criteria

Breathing

Is the airway threatened?
Any signs of respiratory distress?
Is the respiratory rate <5 or >36 breaths per minute?
Is the oxygen saturation <90%?

Circulation

Is it a cardiac arrest?
Is the pulse rate <40 beats per minute?
Is the pulse rate >140 beats per minute?
Is the systolic blood measure <90mm Hg?

Neurology

Is there a sudden fall in level of consciousness
(a fall in Glasgow coma scale of >2 points)?
Has there been repeated or extended seizures?

Other

Is the patient making staff concerned?

Criteria widely used in Australia is reflected in figure two which is based on the Medical Emergency Team Criteria published by Hillman et al³. This combines objective data based on staff observation and subjective perception that may reflect the concern of staff, relatives or the patient. This is an example of criteria that individual sites may choose to vary or in particular expand.

Due to the subjective nature of some criteria it is important to ensure that the culture encourages the reporting of concern without the fear of criticism.

Across sites participating in the SSSL project there will be a range of technologies available for calling responders to the patient's bedside. It is important for the system to provide easy access for those initiating the call (for example, a single phone number) and ample means of alerting responders (for example, pagers and personal address systems).

Whatever criteria is chosen for event detection organisations will benefit by using mnemonic devices to keep the criteria and the system in peoples minds.

Figure three: RRS initiation criteria

3. Crisis response

In the same way that technology available to sites might vary, so too may the resources available for response to patient crises. Some sites have already implemented MET response systems, others have 'ramp-up' systems in place. ICMET noted that there is no current data available upon which to assess the merits of the different approaches to RRS⁶.

On this basis, the recommendation of the SSSL project is that all sites have a system for responding to objective and subjective criteria of patient deterioration that best utilises the available resources.

ICMET recommended that as a minimum a RRS should have the expertise for:

1. **assessment** of the severity of the patient's condition
2. **diagnosis** of the patient's condition
3. commencement of some appropriate **treatment**, and
4. **triage** of the patient for a higher level of care, for example from the ward to intensive care.

To embrace the ICMET recommendation assumes that each site either:

- currently has staff with the requisite skills who are available to respond to RRS and commence treatment as necessary
- or arrange provision of clinical training for appropriately qualified staff to ensure 'appropriate treatment' can be commenced.

The capacity to deliver training and maintain competency for staff involved at each level of the RRS has been recognised as an important part of the RRS governance and its effectiveness will be informed by the system evaluation.

4. System evaluation

The object of evaluation is not to find someone to blame when things go wrong, but to:

1. identify system strengths and staff successes with an aim to promote and maintain positive performance and staff morale
2. identify system failures with an aim to improve the system and educate staff

There are times when unexpected death occurs in the hospital environment, and it is not because an individual has failed, but inadequate processes have been exposed in tragic circumstances⁴.

It is important to create a culture that acknowledges positive outcomes, accepts responsibility for system failure and seeks to enhance performance by improving processes. Even where RRS has resulted in positive outcomes there may be lessons to be learned and process improvements to be made.

An appropriate place to begin evaluation is with a review of the antecedents. This review will provide a guide to both the adequacy of the 'initiation criteria' and the awareness of bedside staff.

System evaluation

1. Review antecedents
 - Adequacy of criteria
 - Awareness of staff
2. Assess effectiveness
 - Assessment
 - Diagnosis
 - Treatment
 - Triage
3. Give feedback

Also consider the effectiveness of the system response using the four components mentioned in 'Crisis response' (3. above).

The review is not complete until feedback has been given to staff, and process changes are made where necessary.

Establishing the strategy

Successful implementation of a strategy is motivated by leadership and commitment to provide adequate resources and attention.

The RRS strategy should identify the education process for clinicians, focusing on the criteria for initiating a RRS, the importance of identifying at risk patients, and the need for a fast response should any of the criteria be present. The criteria for initiating a RRS request should be displayed prominently throughout the hospital. After piloting the RRS strategy, ongoing education should be implemented for all hospital employees regarding the criteria.

Establish the aim

Before starting any improvement work, it is always wise to establish the aim of the work. In this area of SSSL, the aim is to significantly reduce inpatient mortality by October 2006. A more specific aim should be developed by those responsible for implementing the RRS strategy.

The aim should be 'SMART':

- Specific
- Measurable
- Achievable
- Realistic and
- Timely.

Example Aim

'Reduce inpatient mortality by 40 per cent by June 2006 through the implementation of a RRS strategy'.

Implementing the strategy

Implementation of a successful strategy is motivated by leadership and commitment to provide adequate resources and attention. Prior to the implementation of a RRS strategy, the following should be considered:

- engaging senior leadership support
- determining the best fit for a RRS within your facility
- providing education and training
- establishing criteria and the mechanism for initiating a RRS
- using a structured documentation tool
- establishing feedback mechanisms
- methods for measuring the RRS strategy's effectiveness.

The focus of a RRS strategy is to assess and stabilise the patient’s condition and organise information to be communicated to the patient’s clinician. Then, if the circumstances warrant, a RRS can instigate patient transfer to a higher level of care. Additionally, the strategy should incorporate ongoing clinical education and support of hospital staff.

General considerations for improvement

Implementing a RRS can seem like an overwhelming challenge. If your team tries to do everything all at once, it may well prove overwhelming. Here are a few tips drawn from other quality improvement work and from those who have already achieved success in implementing RRS strategies.

Table one: Challenges and solutions

Challenges	Solutions
Fear of change	The antidote to fear is knowledge <ul style="list-style-type: none"> • Inform staff about the deficiencies of the present process and • Provide reasons to be optimistic about the potential benefits of a new process.
Lack of support by leadership	<ul style="list-style-type: none"> • Use opinion leaders (physicians) and data. • A business case for the project may help to win leadership support.
Uneven acceptance of new practices	<ul style="list-style-type: none"> • Use physician opinion leaders. • Review medical literature and feedback data on a physician-specific level. • Work first with early adopters and use their stories to convince the majority. • Share baseline data that demonstrates the reliability of the process.
‘Isn’t this the physician’s job?’	<ul style="list-style-type: none"> • Educating staff that implementing RRS is a team process. All disciplines must be involved and complete portions of the process.
Communication breakdown.	<ul style="list-style-type: none"> • Communicating the importance of implementing a RRS to staff. • Ongoing education of staff.

Measurement

To measure the effectiveness of the RRS strategy, accurate and pertinent data is required. A process for ensuring that information relating to all RRS requests is being captured is mandatory. This can be achieved through the completion of a specific record or form for every request for a rapid response.

To ensure consistency and relevancy in regard to data, include all inpatients requiring cardiopulmonary resuscitation or intubation; however, emergency department only patients and stillbirths should be excluded.

Process measurement

The effectiveness of the RRS may be measured retrospectively using a simple diagnostic tool called the '2 x 2 Matrix'. The analysis should involve collecting patient records for all in-hospital deaths over a 2-month period up to a maximum of 30 deaths and placing them into one of four boxes. The appropriate box is assigned as a result of the answers to the questions:

1. Was the patient hospitalised for comfort care/palliative care? Did the patient have a Not For Resuscitation (NFR) or Do Not Resuscitate (DNR) order in place?
2. Was a Rapid Response call made for this patient?

Plotting the results

- If yes to both questions, count in box one.
- If yes to question one and no to question two, count in box two.
- If no to question one and yes to question two count in box three.
- If no to both questions, count in box four.

		Rapid Response Provided?	
		Yes	No
Comfort/palliative care? NFR? DNR?	Yes	Box one	Box two
	No	Box three	Box four

Figure four: RRS process measure 2x2 matrix

The results in box four should be further scrutinised for the following:

- evidence of communication or planning failures
- failure to recognise a deteriorating patient condition.

The last step in the analysis of hospital deaths should be to review boxes three and four

for any evidence of adverse events.

An analysis of RRS data for patterns, trends and lessons learned is a vital part of system evaluation. The information gained from RRS requests can be used in a variety of instances, for example, to augment future educational plans.

To measure the effectiveness of the RRS strategy:

Hospital sites will submit by means of an eForm just two numbers.

1. The number of patients in the sample falling into Box 4, who, in the 24 hours prior to death, based on the RRS criteria, should have had a RRS activated and did not,
2. The number of deaths in the sample for the reporting period.

The SSSL project team will calculate a hospital site's process measurement by:

- Dividing the number of patients in Box 4 by the number of deaths
- Then multiplying the result by 100, this will provide the RRS rate per 100 bed days.

Number of patients in Box 4 who met criteria for,
but did not get, a RRS activated during the 24
hours prior to death

Number of deaths (not including Box 2)

X 100 = proportion of patients needing
but not getting a RRS

Outcome measurement

To ascertain the outcome measure of unexpected deaths:

Hospital sites will submit by means of an eForm just two numbers.

1. The number of unexpected inpatient deaths, and
2. The number of inpatient bed days during the reporting period

The SSSL project team will calculate a hospital site's implementation of the RRS by:

- Dividing the number of unexpected inpatient deaths by the number of inpatient bed days
- Then multiplying the result by 1000, this will provide the unexpected death rate per 1000 bed days

Number of unexpected inpatient deaths

Number of inpatient bed days

X 1000 = rate of unexpected death

Abbreviations

DHS	Department of Human Services (Victoria)
ICMET	International Conference on Medical Emergency Teams
ICU	Intensive Care Unit
IHI	Institute for Healthcare Improvement
RRS	Rapid Response System
SSSL	Safer Systems – Saving Lives

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