

SECOND EDITION

RAPID RESPONSE TEAMS

Proven Strategies for Successful Implementation

DELLA M. LIN, MD

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My deepest thanks goes to the many people who shared their stories and tools for inclusion in this book. Patient safety and systems learning accelerates because of individuals and organizations like these, who see this journey not as competitive... but as fundamentally collaborative.

Introduction

Since the first edition of this book, the concept of rapid response teams (RRTs) has not only taken hold around the world, but also truly evolved into one of rapid response *systems*. It is clear now that the RRT or medical evaluation/emergency team is but a cog in the wheel of a system that should continually strive to recognize, rescue, and coordinate the care of a destabilizing patient in an increasingly timely fashion.

Yet, many hospitals are still in the early stages of implementing, evaluating, and sustaining their efforts around this cog—the RRT.

In this edition, we have added new chapters specifically addressing the Joint Commission's National Patient Safety Goal Requirement #16A, implementation of family-activated RRTs, and the advent of early warning systems. In addition, we have framed our discussion to align with the current language regarding afferent, efferent, and audit arms of rapid response systems. Finally, we have updated Appendix A by revisiting many of the case studies featured in our first edition, as well as adding new case studies from hospitals that have implemented early warning systems and family-activated RRTs.

Healthcare is on a journey that is moving from the traditional “cardiac arrest teams” to rapid response systems built around at-risk patients. This edition allows us to explore the current landscape of rapid response systems, reflect on how the concept has progressed, and look toward a more coordinated, safer healthcare delivery system that will continually aim to eliminate all preventable deaths.

CHAPTER 1

THE EVOLUTION OF RAPID RESPONSE SYSTEMS

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Sudden, unanticipated in-hospital cardiac arrests are rare. Patients usually exhibit signs and symptoms of destabilization hours before they actually arrest. The literature regarding rapid response teams (RRTs) makes a compelling argument about the need to do a better job of catching the warning signs of patients in distress. The question hospitals and healthcare professionals must ask is also compelling: *Are some hospital deaths predictable and preventable?*

This possibility is humbling to those of us who pride ourselves in providing high-quality care. In hospital after hospital, a review of cases and systems reveals too many instances of gaps, missed signals, and failed coordination that result in serious patient complications and, sometimes, deaths.

For example, a 2005 report of the National Confidential Enquiry into Patient Outcome and Death (www.ncepod.org.uk) identified many recommendations for system improvement. The study—which reviewed both public and private hospitals in England and Wales—found that more than 66% of patients who were transferred to the ICU demonstrated signs and symptoms for more than 12 hours prior to admission. Almost 30% of hospitals did not utilize any organized form of an early warning system, with only 1% having an RRT (also called a medical emergency team [MET] or medical response team) in place. Approximately 89% of patients did not have a clear resuscitation status in their hospital health record.

These findings make it clear that we must improve the way in which we bring timely care to our patients. Matching the most appropriate expertise and necessary intervention to the bedside has been an important aim in designing safer rapid response systems in healthcare delivery.

Studies on the Effectiveness of RRTs and METs

Over the past decade, a growing number of studies have been published in peer-reviewed journals regarding RRTs and METs.

In addition to these published reports, clinical teams in many hospitals across the United States and around the world have been able to demonstrate their own local improvement in the following outcomes:

- Remarkable drops in cardiac arrest numbers within months of implementation
- Significant drops in the number of unanticipated ICU admissions
- Earlier rescue of patients, resulting in improved survival rates and lower mortality rates
- Increased hospital cost savings due to fewer complications, fewer patient ICU days, and reduced lengths of stay

Several key teams of researchers have contributed a great deal to our knowledge to date. In Victoria, Australia, one of the first explorations of the concept of an MET was led by Rinaldo Bellomo, MD. He found that instituting a critical care–based MET—consisting of an ICU physician, ICU nurse, and respiratory therapist—decreased the number of cardiac arrests and postsurgical complications, as well as overall hospital mortality.^{1,2}

More recently, Bellomo in 2008 shared the aggregated information of MET implementation in Australia and New Zealand. He and his colleagues describe the shared information as the “first multi-centre before-and-after comparison in a broad cohort of hospitals for relevant outcomes in a ‘real life’ setting . . .” Presently approximately 60% of hospitals in Australia and New Zealand have an MET service in place. In the data that Bellomo and his colleagues have gathered comparing rates one year before MET introduction to rates one year after MET introduction, these hospitals have reduced the number of cardiac arrests admitted from the floor to the ICU from a mean of 6.33 to 5.04 ($p < 0.024$).³

Another important team of researchers is led by Michael Buist, MBChB, RACP, FJFICM. In the *British Medical Journal*,^{4,5} Buist and colleagues shared that their Melbourne, Australia–based team at Dandenong Hospital found a 50% drop in unexpected cardiac arrests within three years following their 1996 MET implementation. In addition, the team’s findings suggested that several predictable physiologic signs could be used to identify a patient in trouble.

Buist and his team also recently reported the results of a six-year audit of Dandenong's cardiac arrest and MET calls from 2000 to 2005. During that period, the number of MET calls increased by 46%. Most significantly, Dandenong experienced a sustained decline in its in-hospital cardiac arrests. Cardiac arrests were reduced by 24% per year ($p < 0.001$) with the overall rate dropping from 2.4 arrests/1,000 hospital admissions in 2000 to a rate of 0.66/1,000 hospital admissions in 2005.⁶

In reflecting on the hospital's experience, Buist emphasizes the importance of the team as being part of a larger system improvement effort. In particular, he found that their case *“[highlights] that having a medical emergency team based in the intensive care unit, along with telling ward staff about the team and in-service education, was not sufficient.”*

Success was not achieved by dropping a modular team such as an MET into the hospital structure. Instead, it required a more comprehensive approach including leadership, culture change, orientation/educational programs, and robust, timely feedback of audit activity to all team members.

Expanding the Concept to Systems

In the United States, one of the key research teams focused on RRT/MET is led by Michael DeVita, MD, of the University of Pittsburgh Medical Center (UPMC). DeVita and his team found a 17% decrease in cardiac arrests, which was associated with a concomitant increase in the use of METs.⁷ More recently, the UPMC team was one of the first to look at how to explore the concept of a family-activated RRT, which was named “Condition H,” a complement to UPMC's original medical emergency response team, which was named “Condition C.” As DeVita's team continues to expand the concept of an RRT into rapid response systems, UPMC now has other specialized teams that focus on ensuring that the most appropriate expertise comes to the bedside in the most timely manner (e.g., blood administration teams, Condition M [for mentally agitated patients], a difficult airway team, and a chest pain team).

There is great opportunity for each of us to ask whether our hospitals currently provide a system of care optimally designed to identify and rescue as many of these failing patients as possible (See Figure 1.2). Can an RRT model help? Is it possible that we will reach a point in the

not-too-distant future where there will be *no* unanticipated cardiac or respiratory arrests in the non-ICU setting? Is it possible that one will never hear “Code blue/cardiac arrest/cardiac resuscitation” paged overhead about a patient on a medical-surgical floor?

Moving into the Spotlight

RRTs and rapid response systems have been gaining broader support. In December 2004, the Institute for Healthcare Improvement (IHI) recommended RRTs as part of its six-plank campaign to encourage U.S. hospitals to save 100,000 lives by June 2006. More than 3,000 hospitals participated in the campaign, and in December 2006 the IHI unveiled its expanded “Five Million Lives” effort. The RRT initiative is still an integral part of the campaign, making the drive to put RRTs in place in hospitals even more vigorous.

More recently, the Joint Commission has added National Patient Safety Goal Requirement #16, which requires that a hospital “select a suitable method that enables healthcare staff members to directly request additional assistance from a specially trained individual(s) when the patient’s condition appears to be worsening.” Integrating an RRT into a system for improved rescue would certainly satisfy this goal’s requirement.

Many other professional societies, including the Society of Hospital Medicine, have lent additional support for the concept of RRTs and systems into improving the safety of our healthcare delivery.

A Pause for Reflection

An important study was published in *The Lancet* in June 2005, giving RRT proponents cause for concern. Kenneth Hillman, MD, director of intensive care at the University of New South Wales in Sydney, Australia, and colleagues reported on a prospective study of 23 Australian hospitals.⁸ They compared the effects of hospitals with an MET implementation to hospitals without an MET implementation. After baseline measurements over two months, 12 hospitals implemented an MET and the other 11 did not change their programs. The study demonstrated that there were no significant differences between the two groups. This apparent lack of difference surprised many researchers and provided an opportunity to reflect on success factors and broad replication of RRT/MET programs in all hospitals.

On subsequent closer evaluation, the study's negative results were thought to be the result of several factors:

- Hospitals in both groups had an overall decrease in the number of cardiac arrests post-implementation. Were the context and attention given to METs in Australia such that all hospitals (including the controls) reflected MET-like implementation to some degree?
- Some of the non-MET group hospitals had teams that functioned very much like METs.
- A larger number of hospitals were needed to provide statistical power and sensitivity to the changes. The actual baseline data differed from the original baseline expectations used when creating the study design.
- Implementation within hospitals in the MET group was highly variable and was not stringently controlled. For example, trigger criteria were not consistently applied and a significant number of patients who suffered cardiac arrest met MET criteria without an MET call being made.
- Perhaps the question should not have been a strict MET versus control comparison, but instead a question of the associated changes within each group. When asking whether the MET hospitals had a greater rate of change from their baseline as compared to the control hospitals, there were statistically significant differences.

In an article by Bradford D. Winters, MD, PhD; Julius Pham, MD; and Peter Pronovost, MD, PhD, of Johns Hopkins University,⁹ the authors caution the healthcare community not to put too much credence on observational studies. They warn that although the intent of creating systems to prevent patients from deteriorating is laudable, current studies are equivocal in evidence and inconsistent in definition of criteria and monitoring of outcomes. The authors advise hospitals not to rush too quickly to create RRTs.

However, in a thought-provoking 2008 *Journal of the American Medical Association* article¹⁰ Donald Berwick, MD, MPP, FRCP, president and CEO of the IHI, discusses the tension between random controlled trials and quality improvement. He describes the importance of social context in innovations. Ultimately, his commentary supports Buist's 2007 report that the system context of implementing the rapid response concept may be an essential consideration for success.

Four Components of a Rapid Response System

These facts mean that the RRT is not a simple drop-in module. The concept's implementation, initial success, and sustained effectiveness will require you to examine how it will fit within your hospital. Creating an RRT will be just the start of redesigning and refining how you provide care as a system in the hospital.

Since 2005, the aforementioned key researchers have been instrumental in bringing together the international community of rapid response/METs through an annual international consensus conference. In the first year of this conference, they made a clear statement that the evolution of RRTs should really focus on rapid response systems (see Figure 1.2).

They identified four main components of a rapid response system:

- The afferent arm: includes triggers and event identification
- The efferent arm: covers the intervention, whether by RRT/MET or other specialized teams with expertise within the hospital
- The administrative arm: includes leadership and support for the system
- The audit arm: consists of quality improvement efforts and lessons learned feeding back to the other arms of the system

This book will guide you through key questions and decision points as you determine your own hospital's need and maximize your afferent arm; define your team and optimize your efferent arm; monitor results through a robust audit arm; and ultimately diffuse, expand, and sustain the results of all of these arms with leadership oversight.

FIGURE
1.1

FOLLOWING THE PROGRESS OF RRTs: A CONVERSATION WITH KATHY DUNCAN

Kathy D. Duncan, RN, is faculty expert for the rapid response team (RRT) intervention of the Institute for Healthcare Improvement's (IHI's) "Five Million Lives" campaign. She previously served as director of critical care for a large community hospital, where she led the initiative to develop and implement an RRT. She also initiated a systemwide effort to develop RRTs in the other 15 hospital entities in the Memphis, TN-based hospital system as well as a communitywide effort to develop RRTs in local hospitals. As the IHI point person, Duncan has traveled the country advising hospitals on best RRT practices.

In this interview, Duncan discusses the growth of the RRT concept over the past several years.

Question: Do you think the Joint Commission's National Patient Safety Goal (NPSG) #16, which calls on hospitals to improve recognition and response to changes in a patient's condition, has caused the increase in the number of hospitals with RRTs?

Duncan: "No, I don't think so, and I'll tell you why. We already had 2,000 hospitals involved through the IHI 'Five Million Lives' campaign, even before the NPSG was in place. Instead, people are doing it because it's the right thing to do . . . not because it's a requirement. I truly believe this because I'm not getting any backlash from hospitals after the NPSG was released."

Q: What notable changes have you seen in the barriers/challenges since 2005?

Duncan: "Well, back in 2005, I saw a lot of resistance to implementation for reasons such as 'We can't afford it,' 'We aren't sure it works,' and 'The MDs are threatened by turf issues.' I rarely hear that anymore. For instance, all it takes is for an MD in his or her practice or his or her colleague's practice to have a rescue from an RRT . . . and they are **sold** [on the idea]."

Q: What do you advise hospitals that might be confronted with the rare "We aren't sure it works?"

Duncan: "I throw [IHI President and CEO] Don Berwick's words back at them . . . 'Why doesn't this work?' "

Q: What has stayed the same since 2005?

FIGURE
1.1FOLLOWING THE PROGRESS OF RRTs:
A CONVERSATION WITH KATHY DUNCAN (CONT.)

Duncan: “It appears that respiratory rate is still the superstar of RRT calls. Many investigators are really thinking that respiratory rate is the key. Even mild increases in respiratory rate are important—[an increase of] 20 is high, [and] 24 is really too high.”

Q: What are some innovative things that you are seeing in RRTs?

Duncan: “There are several innovative things that hospitals are doing. For example, some hospitals are adding nontraditional people to the team, [such as] a pharmacist who will respond to the call, and while the rest of the team is assessing the patient at the bedside, the pharmacist will pull up the medication administration record and review the medications for interactions and potential adverse drug events.”

Q: What RRT developments do you anticipate in the next year?

Duncan: “Well, I sit on the Scientific Advisory Board for the American Heart Association National Registry of Cardiopulmonary Resuscitation (NRCPR; www.nrcpr.org/StaticContent.aspx?Name=ProjectInfoMETRRT). Since February 2006, the NRCPR has been supporting the collection and analysis of [medical emergency team] data. The key is that they will have a really large database, and so their data analysis will be invaluable. I [am] really looking forward to this.”

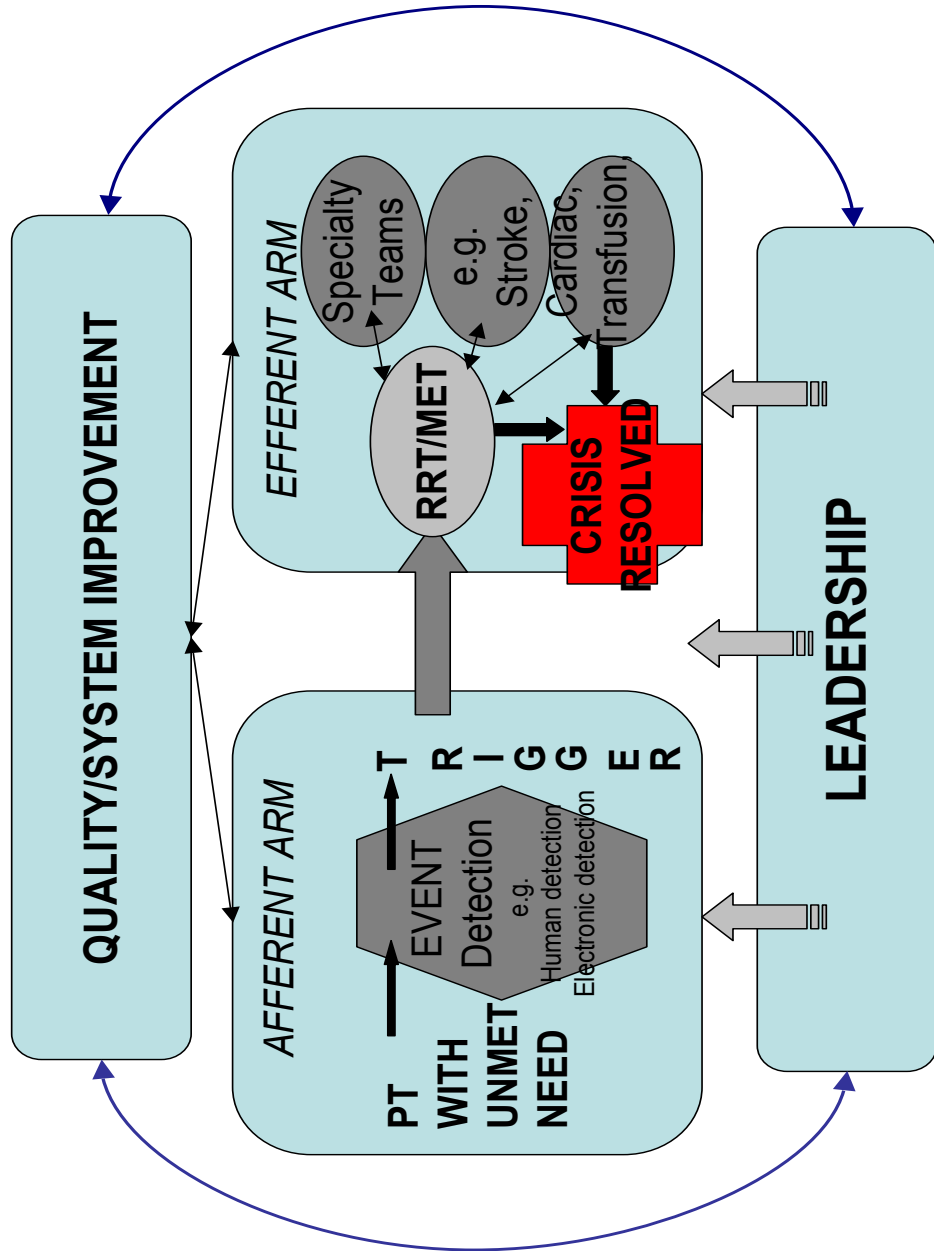
Q: Do you have any final advice for hospitals looking to implement or improve an RRT?

Duncan: “What we are seeing is a natural system change for hospitals for rescuing patients. As part of systems, hospitals are applying reliability principles around RRTs, pushing the reliability so [that] every code or transfer to the ICU is reviewed. Hospitals are taking ideas seen in other places—for example, the UK and their early scoring systems—and making their own models within their systems of care. This whole work around RRTs, it’s about systems.”

FIGURE 1.2

RAPID RESPONSE SYSTEM

Rapid Response System



Adapted from Devita, M and MET Consensus Conference

Endnotes

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