REVIEW ARTICLE

CURRENT CONCEPTS

Rapid-Response Teams

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Rapid-response teams have been introduced to intervene in the care of patients with unexpected clinical deterioration. These teams are key components of rapid-response systems, which have been put in place because of evidence of "failure to rescue" with available clinical services, leading to serious adverse events.[1] A serious adverse event may be defined as an unintended injury that is due in part to delayed or incorrect medical management and that exposes the patient to an increased risk of death and results in measurable disability.[2] Rapid-response systems aim to improve the safety of hospital-ward patients whose condition is deteriorating. These systems are based on identification of patients at risk, early notification of an identified set of responders, rapid intervention by the response team, and ongoing evaluation of the system's performance and hospital-wide processes of care.[1] Rapid-response systems have been implemented in many countries and across the United States.[3,4]

Rapid-response teams differ from traditional code teams in a number of ways (Table 1). They assess a greater number of hospitalized patients at an earlier stage of clinical deterioration, with the aim of preventing serious adverse events such as cardiac arrests and unexpected deaths. Thus, rapid-response teams assess patients in whom respiratory, neurologic, or cardiac deterioration develops rather than patients who have already had a respiratory or cardiac arrest.[5]

Whether rapid-response systems are effective is controversial. Their introduction was prompted by five before-and-after comparisons that were single-center studies.[6-11] These studies showed a reduction in the rate of cardiac arrests and a greater effect with a greater "dose" of care from the rapid-response team (i.e., a larger number of assessments per 1000 admissions).[12] However, a major multicenter, cluster-randomized, controlled trial called the Medical Early Response Intervention and Therapy (MERIT) study failed to demonstrate a benefit. Moreover, the results of meta-analyses have questioned whether there are benefits and have suggested that further research is required.[13,14]

This article explores the prevalence and consequences of sudden critical illness outside the intensive care unit (ICU) and reviews the concept of a rapid-response system and the controversies surrounding the increasing use of such systems.

FAILURE TO RESCUE

In patients with sudden, critical abnormalities in vital signs, a failure to react promptly or commensurately escalate care constitutes a "failure to rescue" and may result in a serious adverse event.[1] There are many reasons for sudden critical illness and for failure to rescue (Table 2), and they help to explain why serious adverse events are surprisingly frequent.

Table 1. Comparison between a Traditional Code Team and a Rapid-Response Team.*

Feature	Traditional Code Team	Rapid-Response Team
Typical criteria for calling the team	No recordable pulse, no recordable blood pressure, absence of respiratory effort, unresponsive	Low blood pressure, rapid heart rate, respiratory distress, altered consciousness
Typical conditions that the team assesses and treats	Cardiac arrest, respiratory arrest, airway obstruction	Sepsis, pulmonary edema, arrhythmias, respiratory failure
Typical team composition	Anesthesia fellow, ICU fellow, internal-medicine house staff, ICU nurse	ICU fellow, ICU nurse, respiratory therapist, internal-medicine house staff
Typical call rate (no./1000 admissions)	0.5–5	20–40
Typical in-hospital mortality (%)	70–90	0–20

* ICU denotes intensive care unit.

THE EPIDEMIOLOGY OF SERIOUS ADVERSE EVENTS

Serious adverse events expose patients to an increased risk of death. Many such events appear to result from insufficient, delayed, or incorrect medical care.

Studies in the United States[2,15,16] and other countries[17-19] show that serious adverse events are relatively common and often iatrogenic and that they are associated with disability and death. Research also shows that such events occur after failure to rescue.[20] Collectively, these studies present robust evidence that improvements are needed to overcome failure to deliver optimal care rapidly in hospital wards and that most serious adverse events due to such failure are preceded by clinically observable warning signs.[21-23]

Conditions that are commonly associated with failure to rescue include acute respiratory failure, acute cardiac failure, acute changes in consciousness, hypotension, arrhythmias, pulmonary edema, and sepsis.[24] In studies of rapid-response systems, the most commonly measured serious adverse events include cardiac arrest, unexpected death, and unplanned ICU admission.[25]

WARNING SIGNS

Several studies show that abnormal vital signs can help identify clinical deterioration in patients minutes to hours before a serious adverse event occurs.[21,26] Thus, in most cases, there is sufficient time to identify patients at risk and deliver an intervention. A logical preventive step would appear to be frequent and accurate measurement and reporting of vital signs.[27] What is less well established, however, is the proportion of hospitalized patients in whom abnormal vital signs develop but do not lead to a serious adverse event. In addition, the optimal thresholds for activation criteria in specific patient cohorts should be assessed to prevent excessive assessment of patients who have abnormal vital signs but who are not at risk for serious adverse events.

FAILURE TO MONITOR

The measurement of vital signs is risk-free, inexpensive, and reproducible, and it identifies clinical deterioration in many patients.[28] However, studies have shown that such measurements may not be performed predictably, accurately, or completely.[25,29,30] The case of respiratory-rate monitoring is particularly striking.[30,31] This "failure to monitor" probably contributes to the risk of failure to rescue. Unfortunately, a major impediment to providing adequate monitoring is the cost of staffing and automated monitoring equipment.

FAILURE TO ESCALATE

An analysis of the actions of hospital-ward personnel during patient instability suggests problems such as triage error and inappropriate placement of severely ill patients on the hospital ward,[5] delays in doctor notification,[32] failure to attend to and assess the patient's deteriorating condition,[20] inadequate clinical assessment,[15,19,20,22] medication errors,[20] suboptimal response to the urgency of the symptoms,[20] and failure to seek help or advice.[20]

Many investigators have concluded that objective criteria for deterioration are needed; such criteria would clarify the expectations of staff.[1,33] In addition, these criteria should act as triggers for rapid referral to personnel with appropriate expertise and equipment. Deficiencies in identifying and responding to patients in crisis have been singled out for improvement and used to provide a rationale for rapid-response systems.[33]

PRINCIPLES UNDERLYING RAPID-RESPONSE SYSTEMS

Goal 16 of the Joint Commission's 2009 National Patient Safety Goals is to improve the identification of and response to clinical deterioration in hospital-ward patients. The goal states that organizations should select "a suitable method that enables health care staff members to directly request additional assistance from a specially trained individual(s) when the patient's condition appears to be worsening."[34] Rapid-response systems seek to address this goal.[1]

An important principle underlying rapid-response systems (and all critical illness care) is that early intervention can improve patient outcomes.[35,36] Even within a mature rapid-response system, delayed activation of the responding team is associated with increased mortality.[32] A logical sequence of events underlies the rationale for rapid-response systems. In particular, the system aims to "take critical care expertise to the patient before, rather than after, multiple organ failure or cardiac arrest develops."[37] Litvak and Pronovost[5] have suggested that assessment by a rapid-response team is needed when the patient is triaged incorrectly and sent to the hospital ward rather than the ICU or a monitored area. In addition, patients may require an assessment by the rapid-response team if they have received inadequate care or if clinical deterioration occurs despite adequate care.

In response to such observations, some form of rapid-response system is being implemented by hospitals throughout North America. The spread of such systems has been markedly augmented by their inclusion in the 3700 U.S. hospitals participating in the Institute for Healthcare Improvement's 5 Million Lives Campaign (www.ihi.org/ihi/programs/campaign). In Canada and Scandinavian countries, implementation of rapid-response systems is also increasing rapidly. Their cost-effectiveness and effect on patient outcomes, however, remain to be determined.

COMPONENTS OF THE RAPID-RESPONSE SYSTEM

Although most of the literature has focused on the responding team, the rapid-response system is a coherent and integrated system of care that has four components.[1] The first component, the system's afferent limb, is designed to identify clinical deterioration in patients and trigger a response.

Table 2. Reasons for Failure to Rescue.

Monitoring technology is used only in the intensive care unit or step-down units.
Hospital-ward monitoring is only intermittent (vital-sign measurements).
Intervals between measurements can easily be 8 hours or longer.
Regular visits by a hospital-ward nurse vary in frequency and duration.
Visits by a unit doctor may occur only once a day.
When vital signs are measured, they are sometimes incomplete.
When vital signs are abnormal, there may be no specific criteria for activating a higher-level intervention.
Individual judgment is applied to a crucial decision.
Individual judgment varies in accuracy according to training, experience, professional attitude, working environment, hierarchical position, and previous responses to alerts.
If an alert is issued, the activation process goes through a long chain of command (e.g., nurse to charge nurse, charge nurse to intern, intern to resident, resident to fellow, fellow to attending physician).
Each step in the chain is associated with individual judgment and delays.
In surgical wards, doctors are sometimes physically unavailable because they are performing operations.
Modern hospitals provide care for patients with complex disorders and coexisting conditions, and unexpected clinical deterioration may occur while nurses and doctors are busy with other tasks.

This component includes the criteria for calling the rapid-response team, the means of assessing these calls, the personnel who trigger system activation, and the mechanism of activation. The second component, the efferent limb, is the response, which includes both the personnel and the equipment brought to the patient. Patient safety and quality improvement constitute the third component, which provides a feedback loop by collecting and analyzing data from events and improving prevention and response. This component reviews data on calls for the rapid-response team and their outcomes in order to develop strategies that prevent clinical deterioration meeting the criteria for a rapid response and that optimize the outcomes for patients who undergo assessment by the rapid-response team. The fourth component, which is the administrative or governance component,[1] coordinates resources to facilitate improved care, overseeing the appointment of responding-team staff and the purchase of equipment and coordinating the education of hospital staff regarding the rapid-response process.

The key characteristic of rapid-response teams is that they are activated when a patient fulfills predefined criteria. Many organizations print mnemonic cards to promote use of the criteria (Fig. 1). Calls for the rapid-response team bypass traditional unit-based, hierarchical, and stepwise less-to-more-skilled approaches to care. The team responds rapidly (within minutes) to the call and delivers critical care equipment and expertise to the patient's bedside[1] (see the Supplementary Appendix, available with the full text of this article at NEJM.org). The team may or may not be joined by the patient's primary caregivers, as designated by the facility.

RESPONSE-TRIGGERING CRITERIA

The efferent limb is triggered by identified "calling criteria," based on derangements in vital signs. In addition, many organizations include a "staff worried" criterion to permit activation of the rapid-response team in the case of a patient who is considered to need an escalation in care. In some institutions, family members can activate the system. In the United Kingdom, many hospitals use calling criteria based on the Modified Early Warning System,[38] in which scores for vital signs are added to obtain a total score. In some American centers[10] and most Australian centers,[6] the presence of any one abnormality is sufficient for activation (Fig. 1). Multiparameter weighted scoring systems may be time-consuming or inaccurately calculated.[38] Simple calling criteria may be less sensitive and specific, but they predict an increased risk of death and appear to promote response activation.[23,28,31]

COMPOSITION OF THE RESPONDING TEAM

The composition of the rapid-response team is tailored to the institution's goals, the team's aims, the severity of illness in the patients it assesses, and institutional resources. Typically, in larger hospitals, the team includes at least one critical care physician or fellow (the so-called medical emergency team).[39] In the United States, there are rapid-response teams led by nurses or respiratory therapists[40] and physician-led medical emergency teams.[10] In Australia,[6] New Zealand, and Scandinavia, the typical model is the medical emergency team.[39] The few nonrandomized, before-and-after studies at single centers that reported improved patient outcomes have involved medical emergency teams.[12] However, no studies have compared the benefit of medical emergency teams with that of nonphysician-led rapid-response teams. The apparently superior benefits of medical emergency teams may simply reflect a reporting bias associated with the staffing levels and structure of rapid-response teams at academic centers.

INTERVENTIONS AND OUTCOMES

As noted above, the most common conditions that trigger the rapid-response system are acute respiratory failure, acute cardiac failure, acute changes in consciousness, hypotension, arrhythmias, pulmonary edema, and sepsis.[24] An audit of conditions that trigger the rapid-response team within an institution permits the development of specific preventive and response strategies.

Some interventions performed by the response team are simple (administration of oxygen, intravenous fluids, diuretics, and bronchodilators and performance of diagnostic tests). However, many patients require critical care interventions.[6] Some evidence suggests that the system can also help address the planning of end-of-life care.[25,41]

EFFECT ON PATIENT OUTCOMES

The only multicenter, cluster-randomized, controlled trial of medical emergency teams is the MERIT study.[25] After 2 months of observation and 4 months of preparation, the MERIT investigators randomly assigned 12 Australian hospitals to medical-emergency-team implementation and 11 to continued standard care for 6 months. On primary analysis, MERIT showed that implementation of the medical emergency team was not associated with a decrease in cardiac arrests, ICU admissions, or unexpected deaths. A post hoc analysis of the MERIT study showed a significant improvement in outcomes (fewer deaths and cardiac arrests) when the data were analyzed in an as-treated model rather than an intention-to-treat (as-assigned) model. These findings, however, are hypothesis-generating at best. In this analysis, there was also a significant and linear decrease in poor outcomes as medical-emergency-team responses increased,[42] a finding similar to that of a single-center study.[43] The implications of the MERIT study remain the subject of much debate, because of issues of statistical power, data analysis, study design and execution, and contamination (delivery of the intervention [medical emergency team] in control hospitals by using the code team to assess patients not in cardiac arrest or respiratory arrest). A few non-

randomized, single-center, before-and-after trials have shown improved outcomes with rapid-response teams,[6-11] but their level of evidence is low. Two meta-analyses have failed to show a decrease in the rate of cardiac arrests in association with implementation of a rapid-response system.[13,14] Thus, the effectiveness of such systems remains uncertain and a matter of controversy.

OTHER POTENTIAL EFFECTS

The relatively controlled environment provided by a quality-improvement analysis of the activities of the rapid-response system permits bedside and conference-room education of nursing and medical staff.[44] Australian and Canadian nurses report that involvement in rapid-response systems teaches them how to provide better care for acutely ill patients.[45,46] In addition, such systems may contribute to better decision making about end-of-life care.[25,41]

Potential adverse effects of the implementation of a rapid-response system include additional cost, diversion of resources that could be used to care for critically ill patients, desensitization to emergencies, and a decreased sense of responsibility for patients on the part of the hospital-ward team.

STRATEGIES FOR SUCCESSFUL IMPLEMENTATION

The introduction of a rapid-response system is associated with many logistic, political, anthropologic, social, and medical challenges. They must be carefully considered, and a coordinated strategy must be applied to avoid implementation failure.[47] A rapid-response system is unlikely to succeed without support from hospital leaders, including senior medical and nursing personnel.[47] Up to 1 year may be required to explain the concept of the rapid-response system and to obtain support for its implementation.[6] It should be emphasized that the role of the rapid-response team is to provide a quick second opinion rather than to take over the care of the patient.[47] From the outset, the team should have adequate resources, in terms of both personnel and equipment, to manage any critical care event.

The system's afferent limb requires sustained education of hospital-ward staff. Without this effort, the system is likely to fail. Accordingly, repeated and multimodal education of existing and new hospital-ward staff is crucial. Appointment of a physician as team leader may be important because the physician can help expedite transfers to the ICU and can facilitate planning of end-of-life care.[12]

Successful rapid-response systems consistently deliver a high response "dose" (>25 calls per 1000 admissions). Mature academic systems have at least

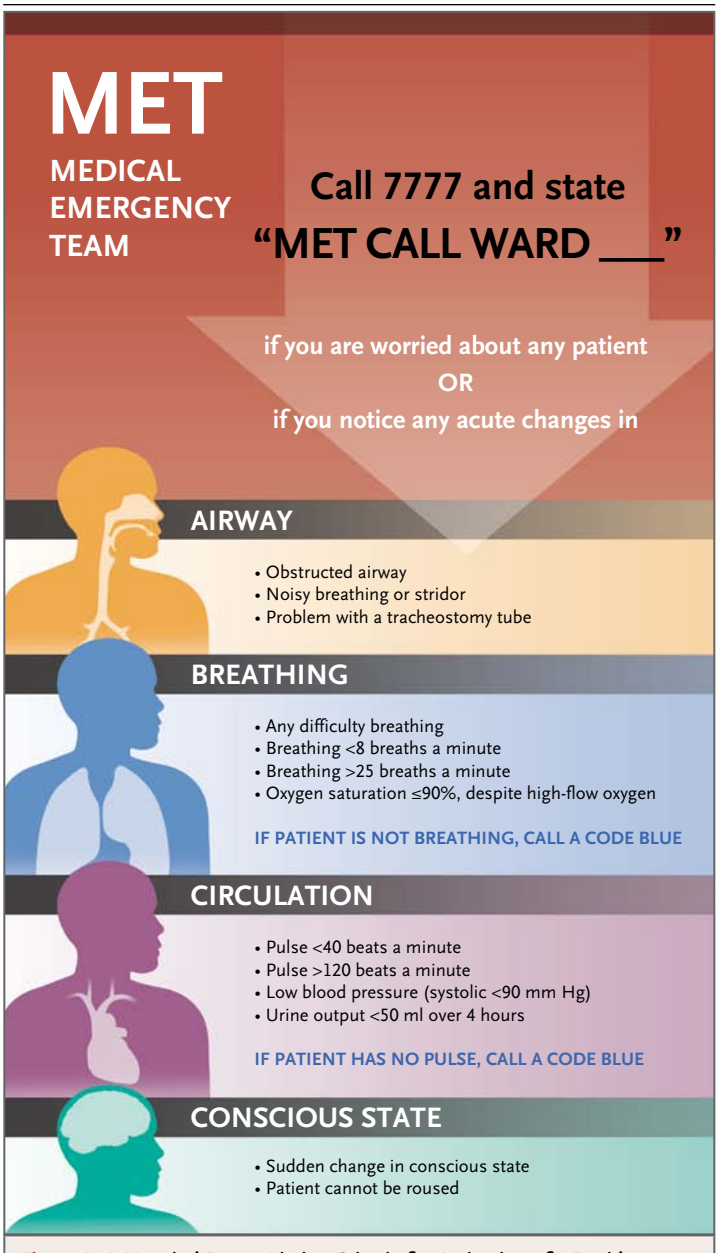

Figure 1. A Hospital Poster Listing Criteria for Activation of a Rapid-Response Team.

Such posters are displayed on the walls of hospitals to remind caregivers of the abnormalities in vital signs that are considered to require intervention. This poster is based on one displayed at Austin Hospital, Heidelberg, Victoria, Australia.

40 calls per 1000 admissions.[12] An increase in the response dose was reported to be associated with a progressive reduction in cardiac-arrest rates at three centers.[7,9,10]

Good training ensures that interventions are safe and effective. Simulation training improves team performance,[48] but the effects on patient outcomes have not yet been tested. In addition, simulation training permits a structured approach to managing clinical deterioration in a patient.[24,48]

Regular audits are needed to assess factors that contribute to activations and failures of the rapid-response system and to guide quality-improvement activities.[1]

AREAS OF CONTROVERSY

Evidence supporting the effectiveness of rapid-response systems comes from unblinded, nonrandomized, short-term studies at single centers, in which outcomes before and after the implementation of such systems were compared. These studies are subject to incorrect inferences about cause and effect or improved care with time. A recent before-and-after study of a nurse-led rapid-response team did not show a reduction in hospital codes or mortality.[40] Only a limited number of studies have shown sustained benefits of rapid-response systems.[7,9] A meta-analysis by Chan et al.[13] concluded that "although RRTs [rapid-response teams] have broad appeal, robust evidence to support their effectiveness in reducing hospital mortality is lacking." Similarly, a Cochrane meta-analysis[14] failed to confirm a benefit and suggested that "the lack of evidence on outreach requires further multisite RCT's [randomized, controlled trials] to determine potential effectiveness." Such trials are important for establishing the value of rapid-response systems in the prevention of serious adverse events in hospitals.

Implementation of a rapid-response system may theoretically "de-skill" hospital-ward staff. However, surveyed nurses in both Canada and Australia disagree.[45,46] Inappropriate patient care or conflict with the primary team may occur. However, patient safety is not likely to be compromised, and most rapid-response systems emphasize that patient care is the responsibility of the primary team. The optimal composition of the team remains unknown, although before-and-after studies that showed a benefit involved teams led by a physician.[12]

Implementation of a rapid-response system could divert critical care staff from other duties and jeopardize the safety of their ICU patients,[4] although no data exist to support this concern. Rapid-response systems require appropriate resources to meet demand. An ad hoc team may need to be replaced by a team dedicated to this purpose if patient volume increases sufficiently. Rapid-response systems may divert the focus away from other patient-safety initiatives,[4] such as promoting the use of hospitalists and nurse practitioners or increasing the number of ICU beds. However, level 1 evidence is also lacking for such interventions, and we have found the opposite: rapid-response systems foster a patient-focused and safety-conscious institutional environment.[49]

Implementation of a rapid-response system is potentially expensive. Future studies of the effectiveness of such systems should include a cost analysis that takes into account savings from reductions in serious adverse events. These studies should assess rates of in-hospital deaths from all causes, not just cardiorespiratory arrests outside the ICU. The cost of implementation can be minimized by expanding the duties of the existing code team to include assessment of patients who fulfill the criteria for activation of the rapid-response team and by limiting implementation to the wards with the most severely ill patients.

FUTURE DIRECTIONS

Another large, multicenter, randomized, controlled trial of rapid-response systems is desirable, but it would be challenging to execute.[50] In the absence of such a trial, the decision about whether to implement a rapid-response system will probably rely on individual institutional evaluations of unexpected deaths and cardiac-arrest rates and the implementation of corrective measures to reduce them. The greatest prospect for further assessing the effectiveness of rapid-response systems is in countries where they have not been widely implemented but where there is a commitment to do so.

Further areas for research include the quality of decision making with respect to activation of the rapid-response team, the true frequency and causes of deterioration requiring a rapid response, optimal team composition, and interventions that might optimize the outcome for non-ICU patients in whom critical illness develops. In addition, the optimal thresholds for activation criteria should be evaluated to prevent excessive assessment of patients who have abnormal vital signs but who may not be at risk for a serious adverse event.

CONCLUSIONS

Rapid-response systems have been introduced at hospitals in many countries, despite a lack of level 1 evidence that demonstrates their effectiveness. Their introduction has been driven by the belief that they make hospitals safer and prevent serious adverse events after sudden alterations in vital signs in hospital-ward patients. The rationale that early intervention is beneficial in almost all medical emergencies has also provided support for the introduction of rapid-response systems. Moreover, such systems are considered to be consistent with the concept that taking critical care expertise and skills out of the ICU to the patient's bedside (an ICU without walls) as rapidly as possible is physiologically and clinically sound. Because rapid-response systems are now part of the hospital landscape from the United States and Canada to Australia, clinicians need to understand their history and evolution, the nature and limitations of the evidence supporting their implementation, their potential benefits, and the controversies surrounding them. Although rapid-response systems are assumed to be models for advancing patient safety, they should always be part of a much wider strategy aimed at making modern hospitals safer.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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Vaccine-Derived Poliomyelitis 12 Years after Infection

TO THE EDITOR: DeVries et al. (June 16 issue)[1] describe a patient with vaccine-derived poliomyelitis. We were unable to clear chronic, asymptomatic, neurovirulent poliovirus infection in a similarly antibody-deficient patient despite the use of antiviral therapy, breast milk, and oral immune globulin.[2] In our patient, the mean IgG trough levels were 1000 mg per deciliter, and paralysis did not develop during an estimated 29 years of poliovirus infection. Neutralizing antibodies against his own poliovirus isolates were detected in his replacement immune globulin by the National Institute for Biological Standards and Control.[3] In the patient described by DeVries et al., the IgG trough levels were 438 and 648 mg per deciliter before the onset of paralysis, and the immune globulin–replacement product had recently been changed. Since immunity to enteroviruses is primarily antibody-mediated,[4] adequate immune globulin replacement is key for the prevention of paralysis in immunodeficient poliovirus carriers. Where possible, replacement immune globulin should be tested for antiviral activity against poliovirus isolates from such carriers until new antiviral agents that can cure this condition are available.[5]

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No potential conflict of interest relevant to this letter was reported.

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THE AUTHORS REPLY: With regard to the comments of MacLennan et al. concerning attempts to clear poliovirus from an asymptomatic patient with antibody deficiency: unfortunately, we were unable to test the immune globulin–replacement product that was used on this patient. Therefore, the level of antipoliovirus immune globulin present in the products this patient received is not known. As is illustrated by the case described by MacLennan et al. and our case, replacement immune globulin did not provide protection from poliovirus infection or the development of poliomyelitis.

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Since publication of their article, the authors report no further potential conflict of interest.

Rapid-Response Teams

TO THE EDITOR: In their review of rapid-response teams, Jones et al. (July 14 issue)[1] question the effect of such teams on end-of-life discussions. We compared the number of do-not-resuscitate (DNR) orders that were placed during the period from 1998 through 2005, before a system of rapid-

response teams was implemented at a Veterans Affairs (VA) hospital, with the period from 2006 through 2008, after the initiation of such a system. Although the initiation of the system had no effect on mortality or on the number of cardiopulmonary resuscitations, the 122 calls that were made by the rapid-response teams resulted in the placement of 33 DNR orders. The ratio of DNR orders to cardiopulmonary resuscitations during the period before the initiation ranged from 0.76 to 1.40, as compared with a ratio of more than 2.0 during the period after the system was initiated.

We noted significant improvement in the rate of survival to hospital discharge (23.7%) for the 139 patients who had a cardiopulmonary arrest after the initiation of the system, as compared with the rate (16.2%) for 592 patients before the initiation. Although there was a nonsignificant increase in the rate of cardiopulmonary arrests in a monitored setting after the initiation of the rapid-response system, our findings highlight an unintended consequence of the implementation of a rapid-response system: since patients with dismal prognoses were eliminated from potential resuscitation, there was an overall increase in the survival-to-discharge rates among patients who underwent resuscitation after cardiopulmonary arrest. The use of rapid-response teams can prompt a discussion of goals for care that can improve outcomes both hospital-wide and for individual patients.

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TO THE EDITOR: If mortality is the only outcome of interest, Jones et al. and others[1] call into question the efficacy of rapid-response teams. The ideal — that all patients address their end-of-life predilections before a crisis — is often neglected, so the deployment of rapid-response teams may also help address the planning of end-of-life care. In one study of 23 Australian hospitals, responders who were part of a rapid-response team were more likely than other caregivers to add DNR orders (8% vs. 3%).[2] In another study,[3] my colleagues and I compared the deaths of 197 patients before and after the deployment of a rapid-response system. Each team was instructed to carefully ascertain the wishes of patients for invasive restorative care versus comfort-only care. Comfort-only care was provided for 133 patients (68%) after the initiation of the rapid-response system, as compared with 90 patients (46%) before the initiation. Scores for quality of death[4] (including pain scores, subjective rates of suffering, and the presence or absence of pastoral care) were enhanced after the initiation of the rapid-response system. Crude rates of death may not accurately reflect the efficacy of such systems. The qualities of survivorship and death and the respect of autonomy may be outcomes of greater import.

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No potential conflict of interest relevant to this letter was reported.

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THE AUTHORS REPLY: We agree with the correspondents that rapid-response teams play an important role in the planning of end-of-life care. Felner and Smith report that 33 of 122 calls (27%) involved the placement of a DNR order, consistent with the findings of Parr et al.,[1] who suggested that 23% of 713 rapid-response calls should have been DNR.

In mature rapid-response services, limitations of medical therapy are often present before the activation of the team. Casamento et al. reported that 31.3% of calls were associated with limitations of medical therapy[2] (19.0% of cases before and 12.3% after the call). In other studies, 8 to 10% of rapid-response reviews resulted in new DNR orders.[3,4]

Manthous suggests that the use of rapid-response teams may improve the quality of death. In a pilot study, we reported that 35% of DNR

deaths were associated with a call from a rapid-response team during the admission. The rapid-response service participated in decision making with respect to DNR orders in approximately 10% of cases.[5] The documentation of DNR status occurred later in the hospital admission among patients who received a rapid-response call, as compared with those who did not receive such a call, with a mean (±SD) duration of 13.3±16.1 days after admission, as compared with 5.3±10.8 days (P=0.003). However, the time between the placement of the DNR order and death did not differ significantly between the two groups. This finding supports the contention of Felner and Smith that in many cases the deployment of a rapid-response team prompts discussions of goals of care.

Although some observers may argue that the use of limited rapid-response resources for patients at the end of life is inappropriate, there are a number of positive consequences. First, the discussions that are initiated during such deterioration may avoid invasive and uncomfortable interventions that the patient does not want. Second, as suggested by Manthous, such discussions may improve the quality of end-of-life care by the provision of timely comfort measures and pastoral care.

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Since publication of their article, the authors report no further potential conflict of interest.

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Mild Cognitive Impairment

TO THE EDITOR: In his Clinical Practice article, Petersen (June 9 issue)[1] states that the differentiation of mild cognitive impairment from dementia is "generally not difficult." This statement is controversial. Since the critical deciding factor is loss of function, this decision is largely one of degree, with an element of arbitrariness, given that most patients with mild cognitive impairment have some subtle functional deficits.[2] Much uncertainty can underlie the diagnosis of dementia in its early stages, and often it is unclear whether someone has mild cognitive impairment or has progression to early dementia.[3]

The challenge in identifying a transition point between the two clinical entities was one reason why the National Institute on Aging and the Alzheimer's Association convened a working group to revise the diagnostic guidelines for the symptomatic early phase of Alzheimer's disease in the absence of symptoms or signs of dementia.[4]

Thus, although considerable advances have been made in the area of biomarkers and dementia, until consensus is established in defining cutoff points for loss of social and occupational function, the distinction between mild cognitive impairment and dementia will remain challenging.

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