Rapid response teams: Current perspectives

By Shirley A. Jackson, DNP, RN, CRNP-K, CCNS, CHSE

Abstract: Rapid response teams (RRTs) have been in existence for nearly 25 years. The team's purpose is to assess and manage patients who experience acute clinical deterioration. The critical care nurse performs a vital role in the function of the team. This article reviews the composition, responsibilities, and common challenges of RRTs.

Keywords: acute clinical deterioration, barriers to activation, critical care nurse, early warning systems, end-of-life issues, medical emergency teams, rapid response teams

Mr. P, 64, was admitted to the medical-surgical unit from the ED with worsening dyspnea and productive cough over the last 2 days. He had been diagnosed with squamous cell lung cancer, but he was not a surgical candidate and was planning to undergo palliative radiation treatment instead. Mr. P's history included atrial fibrillation (AF), heart failure, type 2 diabetes, hypertension, and dyslipidemia. His vital signs were temperature, 97.5°F (36.5°C); heart rate (HR), 98 beats/minute; blood pressure, 13/89 mm Hg; respiratory rate, 16 breaths/minute; SpO2, 98% on 2 L nasal cannula. The chest X-ray done in the ED showed a left basilar infiltrate consistent with pneumonia. White blood cell counts were elevated but serum electrolytes were within normal limits. Arterial blood gas (ABG) analysis on room air in the ED revealed the following:

- pH 7.46 (normal, 7.35 to 7.45)
- PaCO2, 45 (normal, 35 to 45 mm Hg)
- PaO2, 77 (normal, 80 to 100 mm Hg)
- HCO3-, 32 mEq/L (normal, 22 to 26 mEq/L)

Three hours after arrival to the medical-surgical unit, Mr. P was found sitting in a tripod position with labored breathing. His SpO2 dropped to 86% on 2 L nasal cannula. The primary RN contacted the physician and Mr. P was placed on 100% non-rebreather mask (NRM), but his SpO2 remained at 86%. He continued to be dyspneic, tried to remove the NRM, and was in rapid AF at 140 beats/minute.

The rapid response team (RRT) was activated. The ICU RN and respiratory therapist arrived to find Mr. P with declining mentation. His vital signs were HR, 110 beats/minute (AF); respiratory rate, 28 breaths/minute; BP, 120/64 mm Hg; and SpO2, 92% on 100% NRM. The RRT gathered...
information from Mr. P’s primary nurse about the current situation. The respiratory therapist anestheised cause cracks and respiratory wheezes throughout the right lung, and diminished breath sounds in the left lung. The ICU RN paged the covering hospitalist to the event. ABGs on 100% NRB were: pH 7.21; PaCO₂: 108 mm Hg; PaO₂: 80 mm Hg; HCO₃⁻: 35 mEq/L. The hospitalist consulted the intensivist, and the RRT coordinated a rapid transfer to the ICU for endotracheal intubation and further intensive care. Three days later, Mr. P was extubated and returned to the medical-surgical unit.

Background
Mr. P's case is one example of the many assessments and interventions performed by RRTs across the country every day. Critical care nurses serve vital roles on these teams. RRTs have been in existence for nearly 25 years and are utilized in acute care institutions around the globe. 2 RRTs are designed to provide rapid assessment and intervention to any non-ICU patient who is experiencing acute clinical deterioration. The goal of early intervention during clinical deterioration is to improve patient outcomes. Rapid response systems have been shown to reduce cardiovascular arrests outside of the ICU and hospital mortality. 2, 3 The impact of RRTs on patient outcomes is evolving. More data are needed on long-term outcomes for patients treated by an RRT, including functional outcomes and quality of life. 4

An RRT functions within the rapid response system, which has two main functions: recognize urgent unmet patient needs and activate the RRT (afferent arm) and initiate an RRT response for assessment, intervention, and patient triage (efferent arm). 5 RRT activation

Much attention has been paid to the afferent arm of the rapid response system. Optimum patient care relies on timely identification of clinical deterioration and prompt activation of the team. Despite positive attitudes toward RRTs, delays in activation, known as afferent limb failure, exist. Delays in activation can increase hospital mortality and morbidity. 5, 6 7 Frequency of delay ranges from 21% to 50% of all calls. 5, 7, 8

Reasons for these delays fall into three main areas: failure to monitor, failure to recognize, and failure to escalate. 9 Identification and activation often rely on established single clinical triggers or multiple weighted clinical triggers mediated by early warning systems (EWS). Many of the triggers used are physiologic, such as HR, BP, and respiratory rate. Others may be diagnostic information such as lab values. EWS function by identifying clinical deviations from normal, which are then weighted and provided as a total risk score. These scores can be used by the provider to help identify patients at risk for acute clinical deterioration. EWS scores can predict cardiac arrest and mortality within 48 hours, however, the impact of EWS on health outcomes and resource utilization is less clear. 10 (See Monitoring for clinical deterioration.)

It is possible that alterations in physiologic parameters are not the only indication that a patient is deteriorating. Some institutions have incorporated a "worried/concerned" criteria into their EWS or RRT activation criteria, which are based on nurse intuition. Causes of worry include such indicators as pain, agitation, patient not progressing, and patient indicating he or she is not feeling well. 11 Nurses may incorporate this subjective feeling into their assessment and decision to activate an RRT. The intuitive nature of this assessment makes it difficult to quantify. New worry indicator scores such as the Dutch Early Warning System (DEWS) are being developed and evaluated. 12 If these prove reliable and valid, they could be incorporated into EWS. 13

With the advent of point-of-care and continuous monitoring, vital sign documentation has improved; however, referral for help remains suboptimal. 14 Failure to escalate clinical deterioration to the RRT has origins in several factors. Lack of information, scarcity of resources, informal hierarchical culture, fear of criticism that the patient was not sick enough, and calling the covering provider before activating the RRT are all causative factors of delays in escalation and barriers to activation. 15-17 The case study included at the beginning of this article provides a sample of a delay in escalation because the nurse contacted the patient's healthcare provider before activating the RRT. Individual organizations should examine their facility's barriers and factors affecting delays in RRT activation.

Monitoring for clinical deterioration

Early warning systems
Several types of EWS exist, ranging from hard copy scoring systems to those involving continuous monitoring and automated risk score calculation. Early versions of EWS used manual pen and paper calculations. Hand calculations of scores were cumbersome and unsustainable. With the recent healthcare information technology regulatory initiatives, many institutions have moved to or are moving to an electronic medical record (EMR) where monitoring parameters utilized by EWS are routinely entered. Many EWS now provide an automatic score when physiologic parameters are entered into the EMR.

Inculping and utilizing the EMR data effectively increases the efficiency of the EWS. However, several studies have identified key vital sign and assessment data routines missing in the EMR. In a study aimed at describing the current practice of measuring and documenting vital signs, researchers studied all vital sign parameters that were collected and documented in the 48 hours preceding a severe adverse event. 18 Pulse rate and systolic BP were measured in 72% and 73% of cases, respectively. Respiratory rate was recorded in just 23% of cases. This is particularly concerning because considerable evidence exists that an abnormal respiratory rate is an early indicator of clinical deterioration. 19

The timing of data entry is also important to ensure early identification of deterioration. Significant delays have been reported in documentation of vital signs and early warning scores by RNs. 20 Cited reasons included lack of computer availability, poor computer functionality, excessive log-in times, and preferences for not documenting outside of regular duties. An excessive workload may cause an RN to not batch data entry at the end of the shift, defeating the real-time benefit of the EWS.

Electronic bedside monitors
An effort to address the delay in documentation and noncompliance with documentation parameters have evaluated point-of-care electronic devices meant to record vital signs, calculate a risk score, and escalate care for the institution's protocol. These electronic bedside monitors measure patient temperature, BP, HR, and SpO₂. The monitor can prompt the nurse to manually enter respiratory rate and additional parameter readings that can be used in the early warning score calculation.

Continuous electronic monitoring
Evén when bedside devices are used to prompt nurse assessment and automatically calculate an early warning score, there still remains periods of time when patients are not monitored. As vital sign and EWS documentation practices are studied, revealing omissions and delays in entry, continuous electronic measurement may help. Continuous monitoring provides an ongoing representation of the patient's clinical status, in contrast to intermittent monitoring, which may miss early deterioration signs between observation times. 21 Nursing staff can escalate care based on the continuously trended data.

Patient feedback on continuous monitoring systems has been very positive. 22 Reports of nursing satisfaction with the continuous monitoring system is also positive, ranging from 70% to 93% satisfied. 23, 24 However, this technology has the potential to increase alarm fatigue. Organizations must ensure alarm parameters are tailored to the users and that nurses are customizing alarms to the patient clinical status to avoid desensitization.

Structure of the team
The functioning of the team (afferent arm) also affects the overall outcomes of the rapid response system. The composition of an RRT is multidisciplinary and varies by institution, but commonly includes an ICU nurse, a respiratory therapist, and the nursing supervisor. The critical care nurse often

is the ICU charge nurse who may not have an assignment or may have the primary role of rapid response nurse and attends all RRT activations. 25 Respiratory therapists are vital to the team because many activations have ventilation or oxygenation concerns. Pharmacists may attend all calls or respond on a consultative basis. The addition of a pharmacist to
the RRT has been shown to reduce medication administration time as well as optimize medication selection and dosing. The patient’s primary care provider is an important RRT member. In some RRT models, the provider automatically responds to every RRT activation. In many institutions, the provider does not respond to every activation but is available as needed. Typically, the critical care nurse is responsible for leading the initial and ongoing patient evaluation and, together with the rest of the team, initiates approved protocols and elevates the call to the provider if necessary. These protocols are a means to begin treatment prior to provider arrival and can include interventions such as providing supplemental oxygen, obtaining a 12-lead ECG and labs, and administering medications based on the presence and type of cardiac dysrythmias.

The respiratory therapist is responsible for initial and ongoing respiratory assessment and basic airway management such as administering supplemental oxygen, airway clearance, and in some cases noninvasive positive pressure ventilation.

The nursing supervisor is responsible for arranging disposition of the patient to a higher level of care if necessary, assisting with documentation, facilitating interventions, and providing general support.

The patient’s primary nurse is a valuable member of the team. The primary nurse should remain at the bedside with the team to provide information such as what prompted RRT activation, and pertinent patient history including current medications, recent diagnostic test results, and code status.

Performance of the team

The team must work collaboratively to provide care. Five key categories have been identified that are important to the RRT’s effectiveness: organizational culture, team structure, expertise, communication, and teamwork. Further, the organization in which the RRT operates must support a culture of patient safety and all team members must possess a solid understanding of the role of the RRT, the design of the team, and the role of each of the team members. Members must possess clinical expertise and crisis management skills.

Interdepartmental relationships often improve with the use of an RRT. At events, the disciplines work together to improve patient outcomes and can experience first-hand the valuable contribution of each member. Attending events outside the ICU heightens awareness of what nurses experience in medical-surgical units. Effective teamwork relies on shared purpose, familiarity, and collaboration. After RRT activation, review or debriefing can help teams reflect on performance. Positive reinforcement for the primary nurse on a job well done and encouragement to utilize the team again in the future can be accomplished in these debriefings, this is particularly important for novice nursing staff.

Several studies have examined attitudes toward RRTs. Nursing staff who utilize an RRT find it a positive experience. Nurses believe the process reduces cardiopulmonary arrests and prevents minor problems from becoming major problems. They also believe that RRTs are helpful in managing sick patients and they feel safer knowing that an RRT exists in their hospital. Despite early concerns, staff do not believe that these teams increase workload and feel the assistance of the team can improve their own skills in managing deteriorating patients. Staff often welcome the expertise of the RRT and the chance to collaborate with colleagues to manage deteriorating patients. There is also an element of emotional support provided by the RRT that reassures nursing staff involved in tense clinical situations.

Real-time education for the medical-surgical nurse occurs in many situations and has been identified as a major benefit of the rapid response system. The RRT nurse often mentors and coaches nurses who are developing their assessment and critical-thinking skills. Communication skills are also fostered as the medical-surgical nurse observes interactions between team members. Formal education can improve identification of clinical deterioration by nurses and provide opportunities for RRTs to practice teamwork, communication, and leadership skills.

A recent systematic review was conducted on the effectiveness of education in the recognition and management of deteriorating patients. Educational programs that incorporate medium- to high-fidelity simulation have been shown to improve recognition and management of patient deterioration. In situ simulation simulation that takes place in the participants’ clinical environment provides a level of realism that can incorporate real-world distractions and organizational cultural norms, enhancing the learning. Web-based simulation also improves recognition of patient deterioration.

Patient and family participation

Many rapid response systems include a patient and family activation process. However, the literature is limited as to whether patient and family participation results in improved patient outcomes. Some data suggest increased consumer calls result in earlier intervention for patient deterioration. Clinicians have raised concerns that allowing the patient and family to activate the RRT might result in a significant increase in calls, some of which may be unrelated to clinical deterioration. This fear that consumer-based activation will overwhelm staff resources and information is unfounded.

More research is needed to determine how the participation of patients and families can be used in conjunction with clinician judgment for optimal patient outcomes. The essential elements of a successful patient/consumer RRT activation process for clinical deterioration include staff education and training about the program; patient education by the nursing staff; and educational materials that are clear, easy to read, and available in a range of multimedia. The critical care nurse, as a member of the RRT in particular, can play an active role in educating staff and developing educational materials for patients and families.

End-of-life issues

RRTs are increasingly involved in clinical deterioration as a result of patient-end-of-life (EOL) events, which may put members of the RRT in a position to make difficult decisions. In fact, 24% to 33% of all RRT activations involve EOL decision-making. Many signs and symptoms at EOL correlate with RRT activation triggers. Even though palliative care consults may have occurred prior to RRT activation, the patient and family may not have made their final decisions. Particular challenges during these events include decisions-making in the context of constraints and the severity of the patient’s clinical status when the team arrives. This is frustrating to the unit staff as well as RRT members, who may be forced to elevate care to a higher level, knowing that the chance of a positive outcome is minimal. During an acute clinical deterioration, the patient may not be in a position to make decisions. The RRT may not be skilled at engaging in EOL conversations with family and, due to the episodic nature of an RRT, typically have not established a relationship with the family. To address these challenges and knowledge gaps in EOL care, an organization in the United Kingdom has started a new training program for RRT members about patients who do not want to be resuscitated. Each member participates in a high-fidelity simulation involving EOL conversations with professional actors who play the part of the patient or family members. Colleagues watch via live-stream video. Debriefing follows the simulation, and the team members reflect on their experiences and the challenges of the event. Included in the debriefings are the legal, religious, and ethical elements of resuscitation decisions. To date, evaluations of the program have been largely positive.

Overcoming barriers

In an effort to mitigate barriers to activation and avert failure to rescue events, some RRTs or RRT members proactively round on patients discharged from the ICU. These clinical pathway programs are also referred to as ICU consult teams, critical care outreach, or ICU liaison nurses.

Evidence on the patient outcomes of these transition programs is conflicting. One systematic review

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Nurses often welcome the expertise of the RRT and the chance to collaborate in managing deteriorating patients.
Critical care nurses play a vital role in recognizing clinical deterioration and proactively assessing patients.

Conclusion

Rapid response systems have been in place worldwide for almost 3 decades. Throughout this time, multidisciplinary teams have been responding to circumstances of acute clinical deterioration to assist patients on risk at deterioration. In the ICU nurse liaison model, the nurse provides follow-up to patients discharged from the ICU, but also general surveillance of patients at risk for deterioration. In comparing multidisciplinary teams such as an ICU liaison clinic with an individual nurse program, risks of readmission to the ICU were similar and did not depend on the type of an intensive care methodology in expanding care, such as educating staff and patients to recognize clinical deterioration and participating in proactive assessments on patients at risk for deterioration.

REFERENCES