

## Research Article

# Implementation of an Advanced Practice Provider Rapid Response Team: A Pilot Study

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### Abstract

**Background:** Rapid Response Teams (RRT) are increasingly found in critical care environments and can positively impact patients by providing an opportunity for early detection and intervention for clients undergoing a health crisis. However, not all RRT are created equal, and RRT leadership provided by an Advanced Practice Provider (APP) has been shown to positively impact patient care.

**Objectives:** The purpose of the study was to compare the effectiveness in a pilot program of a RRT managed by Advanced Practice versus that of an RRT managed by RN. This project illustrates potential recommendations for implementation of an APP-led RRT.

**Methods:** Rapid response calls were collected over a 2 month period and categorized as either a) APP-RRT managed calls, or b) RN-RRT managed calls. Measured outcomes of each call were: admissions to the ICU, in-hospital cardiopulmonary arrests, failure to rescue rates, and LOS in the ICU.

**Results:** During the 2 month intervention period, the APP-managed team had lower ICU admission rates, lower length of stay in the ICU, lower number of non-terminal cardiopulmonary arrests, and a lower Failure to Rescue Rate.

**Conclusions:** Advanced practice providers are leaders that are uniquely qualified to provide additional modalities, beyond the scope of the registered nurse and advanced cardiopulmonary life support (ACLS), which are essential to improving patient outcomes.

**Keywords:** Advanced practice nurses; Acute care nurse practitioners; Rapid response team; Clinical nurse specialists; Medical emergency teams

### Introduction

The concept of a rapid response team (RRT) was originally developed in Australia in 1995, and now the practice has been disseminated worldwide, due to the positive impact on patient safety. Rapid response teams allow the bedside nurse to intervene before the client experiences cardiopulmonary arrest, by mobilizing a team of critical care clinicians, who act within minutes to the bedside [1]. Rapid response teams assist in treatment, assessment, and stabilization of a deteriorating client. Ultimately, the goal of the

RRT is to decrease the incidence of in-hospital codes, decrease readmissions to the intensive care unit, improve failure to rescue rates, and decrease patient mortality.

In 2004, The Institute of Healthcare Improvement's (IHI) 100,000 Lives Campaign proposed the nationwide establishment of the rapid response system for early identification and detection of cardiopulmonary arrest [2]. In addition, the Joint Commission on the Accreditation of Health Care Organization (JCAHO), in an effort to improve patient satisfaction and outcomes, proposed that rapid response team systems should be an integral component of the 2008 National Patient Safety Goals [3]. Each of these governing bodies seek to provide clients safer, integrated, and cost-effective care for the consumer and institutions alike [4,5].

Unfortunately, there is little uniformity in RRT composition, leadership, or training across the country. Therefore the present study was designed following a comprehensive needs assessment of the participating institution's culture, mission, and current response system. While the participating facility in the present study had an established RRT; it was determined, based upon the organizational construct and processes, that patients and staff would benefit most from having a dedicated advanced practice provider-managed team that was equipped with a higher level of critical care expertise. Previously the hospital utilized a registered nurse (RN)-managed rapid response system, which serviced all in-patients age 16 years and older and provided 24/7 care but did not have an intermediate care unit. Therefore patients in need of a higher level of care, but not necessarily at an intensive care unit (ICU), would be transferred to the ICU because the current RN-RRT was limited by their scope of practice. The creation of a RRT managed by an advanced practice provider (APP-RRT) provided an all-encompassing scope of practice and a variety of options for treatments and modalities that could improve patient outcomes [6].

## Methods

The present pilot study used the IOM's safety goals 10 to guide improvements in patient care. The intervention that was applied was the addition of an advanced practice provider as the team leader for the rapid response team (APP-RRT), which was compared to a traditional RN-led RRT (Control-RRT versus APP-RRT). Patients included were from a in a non-profit 600 bed north-east Georgia community hospital, patients were 2:1 male:female and the cohort ranged in age from 17 to 82 years. The SBAR (Situation, Background, Assessment, Recommendation) tool was utilized as the APP-RRT's communication benchmark to treat and manage the deteriorating patient [7].

Prior to implementation of the APP-RRT a comprehensive educational review across all nursing staff in the facility was performed that focused on: the purpose of an RRT, activation triggers, airway training, communication tools including the SBAR (situation, background, assessment, and recommendation) instrument. Weekly lunch and learn sessions were held for 4 months prior to the APP-RRT implementation for the participating nursing staff, along with further specific education regarding the scope of practice of the advanced practice provider. Further educational interventions provided prior to APP-RRT initiation included: an airway training seminar developed by the institutional anesthesia team that consisted of advanced airway training skills, along with glidescope training, laryngeal mask airway placements, and nasopharyngeal intubations.

Implementation of the present study occurred during April and May 2013, the APP-RRT treatment was limited to cases between 0700 and 1900, and the RN-RRT was limited to cases be-

tween 1900 and 0700. One critical care advanced practice provider managed each rapid response call throughout the intervention period for the APP-RRT. During non-APP-led RRT hours (1900-0700, daily), the RN-RRT was in place. During this daily period the ICU was staffed with one full-time APP on at all times, with 24 hour coverage of a critical care intensivist, who served as the collaborative mentor for the APP-RRT.

A comparison was made after 2 months of implementation between the RN-led RRT (Control-RRT) and the implementation of an APP-led RRT (APP-RRT). The comparison variables examined were the comprehensive treatment and interventions afforded to the clinically decompensating patient by the provider. The outcome variables measured were: ICU admissions, length of stay (LOS) in the ICU, failure to rescue rates, and in-patient codes which were compared between APP- and RN-RRTS.

## Results

A retrospective review of the institution's database for 2012 showed 660 RN-RRT activation calls, for an average of 55 calls per month; however, during the present study, an average of 66 calls per month occurred. All data for each rapid response team call was collected over a two month period and categorized into: (1) advanced practice provider-managed calls; and, 2) registered nurse-managed calls. A total of 60 rapid response calls were managed by the APP-RRT team, and 72 rapid response calls were managed by the RN-RRT (Table 1).

	Prior to training	After training		
	RN-led RRT	RN-led RRT (12 h/d)	APP-led RRT (12 h/d)	Both RRT (24/7 coverage)
RRT-calls (per month)	50	36	30	66
Calls admitted to ICU %, (n)	75%	52%, (38)	36%, (22)	45.4%, (60)
LOS (days)	7	6	4.2	5.3
In-hospital codes (n, %)	(15%)	6, (8.3%)	2, (3.3%)	8, (6.1%)
Deaths (n)		2	0	2
Failure to rescue rate, (per 1000 discharges)	0.007	0.006	0.002	0.004

**Table 1.** Impact of training and APP-led RRT implementation on patient care parameters.

<sup>a</sup>Failure to rescue rates were devised from an algorithm by the National Database of Nursing Quality Indicators. In the present study, failure to rescue was determined as patients that coded during the actual RRT call, and patients that experienced an in-hospital code

at some point in the hospital stay after the RRT call, as part of the in-patient code data.

Historically, in this institution 75% (n=495 patients) of the RRT calls continued to deteriorate and experienced cardiopulmonary arrest or required transfer to the ICU. In the present study, RN-RRT had a 52% (n=38 patients) admittance rate to the ICU whereas the APP-RRT had an admittance rate of 36% (n=22 patients). The RN-RRT patients experienced a length of stay (LOS) of 6 days in the ICU compared with the APP-RRT mean of 4 days. The RN-RRT had 6 in-hospital codes (8.3% of patients) and 2 deaths, whereas the APP-RRT had only 2 in-hospital codes (3.3% of patients) with no deaths.

For the purpose of the pilot study, failure to rescue rates were devised from an algorithm by the National Database of Nursing Quality Indicators. The database followed the premise that death following certain complications in the delivery of care could be avoided through early detection and intervention, associated with adequate surveillance [8]. Patients that survived these occurrences are regarded as “rescued” from death. Conversely, in patients that did not survive, a “failure to rescue” occurred. For the purpose of the pilot study, the author delineated failure to rescue as patients that coded during the actual RRT call, and patients that experienced an in-hospital code at some point in the hospital stay after the RRT call, as part of the in-patient code data. In the present study, the APP-RRT had a lower failure to rescue rate of 0.002 per 1000 discharges compared to the RN-RRT rate of 0.006 per 1000 discharges.

## Discussion

Healthcare organizations and clinicians have long engaged in outcome-driven quality improvement and assessment strategies. However, a pivotal report by the Institute of Medicine highlighted the alarming occurrence of iatrogenic injury and death amongst hospitalized patients, and emphasized the need to improve the quality and safety of care across the United States [9]. According to the IOM, procedures to improve patient outcomes must be: patient-centered, safe care, effective, timely, equitable, and efficient. Currently, public reporting of patient outcomes and activities is the norm, and standardized outcome measures along with national safety goals have been firmly established. As a result of this increased urgency the use of evidence-based practice has dramatically increased.

One of the impacts of evidence-based medicine has been the rapid spread of the implementation of Rapid Response Teams (RRT) across the country. While the impact of RRT on patient care have been demonstrably positive, there have been inconsistencies in how RRT are staffed and led. Some RRT are supervised by critical care intensivists or physicians; however, in a rapidly changing

environment, more RRT leadership positions have devolved on the nursing staff. This can often lead to sub-optimal results because of scope of practice limitations, thus equipping RRTs with leadership with a broader scope of practice is critical to improving patient outcomes.

While Advanced Practice Providers are widely utilized across the country, only 4 systematic reviews have examined the use of an APP as a RRT leader [10,11,12,13]. In general, APP-led RRT resulted in a decrease in cardiopulmonary arrests, and a substantial decline in ICU admissions. However, it should be noted that in all of these studies, the APP-supervised teams were flagship teams and no prior RN-managed team or data was available for comparison of the impact of APP-leadership. Furthermore, while several pilot studies had examined the transition of no RRT to APP-led RRT, there are no studies examining the transition from an RN-managed RRT to an APP-led RRT. Therefore the present pilot study was designed to examine empirical evidence of the impact of implementation of an Advanced Practice Provider as an RRT leader compared to an RN-led RRT.

Prior to the initiation of the study, the participating facility averaged 50 RRT calls per month (Table 1). Following training and implementation of the APP-led RRT this rate increased by 32% (to 66 calls per month), indicating an increased willingness amongst staff to involve the RRT following the specific training. While the Intensive Care Unit admissions rate was reduced from 75% to 45% by both APP- and RN-led RRTs following training, the ICU admittance rate was lower in the APP-RRT than the RN-RRT (36% vs. 52%, respectively). After subsequent examination of the 22 patients admitted to the ICU by the APP-RRT, 14 patients did not meet ICU criteria, but needed a higher level of care or an intermediate care unit, which was not provided at the institution. Intensive care unit length of stay (LOS) was retrieved from the hospital's Acute Physiology Age Chronic Health Evaluation (APACHE) database, and was 6 days. The APP-RRT intervention decreased the ICU LOS by 1.8 days potentially reducing healthcare costs by \$42,000 per day [14]. One limitation regarding interpretation of the LOS outcomes is again the lack of an intermediate care unit, resulting in a longer than ideal ICU stay due to the need for the patient to be floor-ready. If the reduction in ICU admittance rates and LOS were extrapolated over a year, more than 1750 patient ICU days would be saved, at a cost savings in excess of \$73 million per annum.

In-patient code rates were benchmarked utilizing the American Hospital Association's National Registry of Cardiopulmonary Resuscitation (NRCR) [15]. In the six months prior to the implementation of the study 15% of RRT patients experienced cardiopulmonary arrest at some point. Following training the code was reduced by more than 50% (to 6.1%), but the greatest improve-

ment in code rate was observed in the APP-led RRT with a 3.3% incidence. Nationally, the benchmark for the Failure to Rescue indicator is 127.7 per 1000 discharges, with the participating organization at 142 for the year prior to the present study. Following the training and focus on RRT amongst staff, the Failure to Rescue rate was decreased, but the impact was greatest in the APP-led RRT. Extrapolating from the pilot study data, 24/7 APP-RRT coverage would have a 0.002-0.004 Failure to Rescue per month rate reducing the failure to rescue range from 40-82 per 1000 discharges.

Overall, the implementation of an APP-led Rapid Response Team was beneficial to both patients and staff. Staff education concurrent with the implementation of the APP-RRT ensured prompt detection and recognition of the compromised patient via effective surveillance, and immediate resource allocation augmented by best practices in interpretation, assessment, disposition, communication, and triage. The specialized training involving the deployment of an APP-led RRT and airway training appeared to have a beneficial impact on patient outcomes compared to the RN-led teams. Since all patient outcomes measures were improved in the APP-led RRT, and because APPs are uniquely qualified to execute the role of the leader of the team because they speak and understand the language of the nurse, provider, and patient, and have larger scope of practice, the patient care and fiscal advantages of having a dedicated APP-RRT at all times are evident. Although the RRT system is constructed on the model of ensuring patient safety, the system should be used as one component of a much larger strategy, to improve safety across the continuum

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