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The Role of the Rapid Response Team in Patient Outcomes

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Learning Objectives

- Describe the functions and goals of the rapid response team (RRT)
- Identify roles and responsibilities of the RRT
- Discuss patient scenarios which would warrant the assistance of the RRT

Rapid Response Team (RRT) - Background

- Rapid response systems have been in existence for almost three decades (1).
- Due to their inclusion in the Institute for Healthcare Improvements “10,000 Lives Campaign” in 2005, rapid response teams (RRTs) have become a widely used patient safety intervention.
- As part of their National Patient Safety Goals in 2008, the Joint Commission required hospitals to implement systems to enable "healthcare staff members to directly request additional assistance from a specially trained individual(s) when the patient's condition appears to be worsening.” As a result of this, some form of a rapid response team is present in most hospitals in the United States (2).

RRT- Definitions

- The aim of RRTs is to improve the safety of hospitalized patients whose condition is quickly deteriorating.
- As patients may exhibit warning signs prior to deterioration, RRTs aim to prevent serious adverse events including cardiac arrest and death.
- Depending on your institution, your RRT may be called a different term. These may include critical care outreach, medical emergency teams, medical response teams, and rapid response teams (3).
- No matter what the term used to refer to an RRT, they all share two main features: an **afferent limb** (how the team is activated) and an **efferent limb** (the response of the team) (3).
- RRTs are generally nurse-led teams (3, 4).

RRT - Functions

- RRTs provide rapid assessment and intervention to any non-ICU patient who is experiencing acute clinical deterioration (1).
- The afferent function of the rapid response team is to recognize a patient with urgent needs and to activate the team (1, 3, 5).
- The efferent function of the rapid response team provides the assessment, intervention, and patient triage (1, 3, 5).

RRT - Goals

- The goal of the rapid response system is to provide early intervention during declining clinical status, such as respiratory failure, cardiac failure, altered mental status, hypotension, cardiac arrhythmias, pulmonary edema, and sepsis, improving patient outcomes (3).
- The purpose is to bring critical care expertise to the patient's bedside (6).
- RRTs have been shown to not only reduce cardiopulmonary arrests outside of the ICU, but also to reduce hospital mortality (1).
- There are many before and after studies that have shown that the introduction of RRTs is associated with a significant reduction in cardiac arrests in ward patients. The hospitals where the RRTs have operated for several years show the greatest efficacy (7).

Rapid Response vs. Code Blue

- RRTs differ from code blue teams in that RRTs respond while the patient is experiencing respiratory, cardiac, neurologic, or clinical decline, whereas code blue teams respond when the patient is experiencing either respiratory or cardiac arrest (3).
- RRTs exist in parallel with code blue teams (7).
- RRTs are designed to intervene and prevent deterioration that leads to cardiac or respiratory arrest (3, 7).

Rapid Response Activation

- RRT activation, or the afferent arm of the rapid response system, relies on timely identification of clinical deterioration and prompt activation of the team to deliver optimum patient care (1, 7).
- Identification and activation often rely on established clinical triggers facilitated by early warning systems (EWS) (1, 8).
- Some experts believe early warning scoring systems (EWSS) can provide benefits for patients and hospitals by identifying deteriorating patients even earlier, and this in-turn can help save more lives (9).
- Early versions of EWS used manual calculations via pen and paper, but with recent initiatives in healthcare information technology, many institutions have moved to an EWS in the electronic medical record (EMR) (1).
- Many EWS now provide an automatic score when physiologic parameters are entered into the EMR (1).
- Inputting the data correctly and in a timely manner increases the efficiency of the EWS (1).

Rapid Response Activation

- The RRT activation involves several steps which must occur in order: monitoring for an abnormality in a patient's vital signs or labs, recognizing the abnormality exists, and activating the system (7).
- Afferent limb failure, or delays in activation, can increase hospital morbidity and mortality (1, 6).
- There are three main categories that attribute to the reasons for delay: failure to monitor, failure to recognize, and failure to escalate (1).

Rapid Response Activation

- **Failure to monitor** was found to be due to numerous factors, including the fact that the frequency with which vitals signs are recorded varies by institution and ward, as well as incomplete vital sign monitoring. For example, lack of documenting respiratory rate (10).
- **Failure to recognize** can be due to many factors, such as lack of explicit criteria or policies for activating the RRT, infrequent presence and physical assessment by the nurse, and infrequent assessment and attendance by a physician, to name a few (7). Gaps in clinical judgement and clinical inquiry can also cause failure to recognize signs of patient deterioration (11).
- **Failure to escalate** clinical deterioration to the RRT was found to be due to several factors such as lack of information, lack of resources, organizational culture, fear of criticism, and calling the covering provider before activating the RRT (1).

Rapid Response – Criteria for Calling RRT

The reasons for calling a rapid response may be different depending on your institution (refer to your specific guidelines), but generally the nurse or another member of the healthcare team may call a rapid response for the following reasons:

- Heart rate greater than 140 beats/min or less than 40 beats/min
- Respiratory rate greater than 28/min or less than 8/min
- Systolic blood pressure greater than 180 mmHg or less than 90 mmHg
- Oxygen saturation less than 90% despite supplementation
- Acute change in mental status
- Urine output less than 50 cc over 4 hours
- Staff member has significant concern about the patient's condition (2).

Rapid Response – Criteria for Calling RRT

Additional criteria used at some institutions:

- Chest pain unrelieved by nitroglycerin
- Threatened airway
- Seizure
- Uncontrolled pain (2).

RRT Members

The RRT members may vary by institution but typically include:

- Primary nurse
- ICU nurse
- Respiratory therapist
- Resident (institution-specific)
- Hospitalist MD
- Nursing supervisor
- Pharmacist (institution-specific)

RRT – Roles and Responsibilities

- The functioning of the team, also known as the **efferent arm**, affects the overall outcomes of the rapid response system. Every team member has a valuable role (1, 7).
- The **primary nurse** should remain at the patient's bedside and communicate relevant information using SBAR format, such as what prompted the RRT activation, as well as past medical history, including current medications, recent diagnostic test results, and code status (1, 12).
- The RRT (critical care) **nurse** is typically responsible for leading the initial and ongoing patient evaluation and assessment, and in conjunction with the rest of the team, initiates approved procedures and protocols. The interventions can include providing supplemental oxygen, obtaining a 12-lead EKG and labs, and administering medications based on the presence and type of cardiac arrhythmias (1).

RRT – Roles and Responsibilities

- The **respiratory therapist** is responsible for the initial and ongoing respiratory assessment and basic airway management, such as administering supplemental oxygen, airway clearance, and in some cases, noninvasive positive pressure ventilation (1).
- The **physician** (hospitalist and/or resident) is responsible for ongoing assessment and management of patient needs and ordering medications/interventions specific to patient problem. The physician may also facilitate discussion and implementation of end-of-life care if warranted (3).
- The **nursing supervisor** is responsible for arranging disposition to a higher level of care if necessary, assisting with documentation, facilitating interventions, and providing general support (1).
- The **pharmacist** may attend all calls or only on a consultative basis. The addition of a pharmacist to the RRT has been shown to reduce medication administration time, as well as to optimize medication selection and dosing (1).

RRT - Performance

- Five key categories have been identified as important to the RRT's success: organizational culture, team structure, expertise, communication, and teamwork (1).
- At the conclusion of the rapid response, a debriefing can help the team reflect on performance. Providing positive reinforcement and encouragement to the primary nurse is especially beneficial (1).
- Another major benefit of the rapid response system is real-time education for the primary nurse (1).

Case Study #1

- Mrs. Smith, 65, presented to the ED with cough productive of yellow/green sputum and worsening dyspnea over the last four days. She was recently diagnosed with non-small cell lung cancer. She has plans to undergo chemo and palliative radiation. Her past medical history includes atrial fibrillation (AF), diastolic heart failure, type 2 diabetes, hyperlipidemia, hypertension, and hypothyroid.
- Mrs. Smith's vital signs:
  - Temperature: 98.1° F
  - Heart rate (HR): 85 beats/minute (atrial fibrillation)
  - Respiratory rate (RR): 18 breaths/minute
  - BP: 118/73 mmHg
  - SpO2: 91% on room air (RA)
- She was placed on 2L O2 via nasal cannula and her SpO2 increased to 95%. The chest x-ray in the ED showed bilateral lower lobe infiltrates consistent with pneumonia. Her white blood cell count was elevated at 15.2, with potassium at 3.4 and creatinine at 1.6. Her other electrolytes were within normal limits.
- The arterial blood gas (ABG) on room air revealed:
  - pH 7.29 (normal: 7.35 to 7.45)
  - PaCO2 49 (normal: 35 to 45)
  - PaO2 78 (normal: 80 to 100)
  - HCO3 20 (normal: 22 to 26)
- Mrs. Smith was started on antibiotics, given potassium repletion, started on IVs at 60ml/hour for elevated creatinine and admitted to the telemetry floor.

Case Study #1

- Four hours after admission to the telemetry floor, Mrs. Smith was found walking from the bathroom to the bed with labored breathing and diaphoresis. She was only able to utter one to two words while gasping for breath in between. Her SpO2 was 85% on 2L nasal cannula. She was assisted back to bed and the primary RN contacted the physician who ordered the patient to be placed on a 100% non-rebreather mask. She continued to have labored breathing and her SpO2 remained less than 90%. She was also in atrial fibrillation with rapid ventricular response at 150 beats/minute. The RRT was activated.

Case Study #1

- The ICU RN, respiratory therapist, and hospitalist arrived to find the patient with altered mental status/lethargy.
- Patient's vital signs were as follows:
  - HR: 140-150 beats/min (atrial fibrillation with rapid ventricular response)
  - Respiratory rate: 30 breaths/minute
  - BP: 100/60
  - SpO2: 90% on 100% NRM
- The primary RN provided the rapid response team with the patient's past medical history, reason for presentation to the ED, medications received, and information related to the current situation. The respiratory therapist auscultated rhonchi and expiratory wheezes bilaterally in the bases with diminished breath sounds.
- The ABG on 100% NRM showed:
  - pH – 7.23
  - PaCo2 – 80 mm Hg
  - PaO2 – 105 mm Hg
  - HCO3 – 16 mEq/L
- The ICU physician was consulted and the RRT organized the transfer to the ICU for intubation and intensive care. Mrs. Smith was intubated, placed on the vent, antibiotics were continued, and she received low-dose diuretics. She was given IV metoprolol for her elevated heart rate. She received daily chest x-rays and ABG draws. Mrs. Smith was extubated a few days later and eventually transferred back to the telemetry floor.

Case Study #2

- Mrs. Green, 77, presented to the ED with chest pain, shortness of breath, lightheadedness, and cough. She has a past medical history of hypertension, diabetes type II, hyperlipidemia, coronary artery disease, anemia, depression, anxiety, and breast cancer in remission.
- Mrs. Green's vital signs in the ED:
  - Temperature: 100.5° F
  - HR: 110 beats/min (sinus tachycardia)
  - BP: 138/88 mmHg
  - RR: 20 breaths/min
  - SpO2: 93% on room air
- She was placed on 2L O2 via nasal cannula with an improvement in SpO2 to 96%. Her chest x-ray showed a right lower lobe (RLL) infiltrate and she was diagnosed with pneumonia. Her white blood cell count was 19.5, hemoglobin 9.4, potassium 3.6, magnesium 1.5, troponin 0.02.
- Mrs. Green's arterial blood gas on 2L O2 revealed:
  - pH: 7.32
  - PCO2: 50
  - PaO2: 83
  - HCO3: 25
- Mrs. Green was started on antibiotics, IVs, given repletion for her potassium and magnesium, and admitted to the telemetry floor with orders to trend her troponins every eight hours.

Case Study #2

- On hospital day two, you are a working the night shift as the primary nurse for Mrs. Green. You are alerted by the telemetry technician that your patient is alarming for a heart rate in the 170s. You go to Mrs. Green's room to check on her and find her with mild shortness of breath, anxiety, and she reports that she feels her heart racing. The monitor shows a narrow-complex tachycardia with a regular rhythm in the 170s. You call an RRT and obtain an EKG and vital signs.
- Her vital signs are:
  - Temperature: 99.8° F
  - HR: 170s
  - BP: 104/70
  - RR: 22
  - SpO2: 92% on 2L O2
- You increase the oxygen to 4L. The RRT arrives and you report the patient's history of present illness, past medical history, and events leading up to the call. You also let them know her vital signs and that you have increased her oxygen to 4L. The RRT nurse places the pacing pads on the patient and connects them to the bedside monitor, verifies the IV is patent and instructs you to prepare a bag of normal saline (NS).

Case Study #2

- The hospitalist first attempts vagal maneuvers by instructing the patient as if she were having a bowel movement, then he instructs her to cough as hard as she can. Since there is no change in Mrs. Green's heart rate, he then orders 6 mg of IV adenosine, followed by a 20 mL NS flush. You explain to Mrs. Green that the adenosine may make her feel like she is going to pass out, but the feeling will not last long. The first dose of adenosine has no effect, so the physician orders a second dose of 12 mg followed by a 20 mL NS flush. Mrs. Green has a brief run of sinus bradycardia followed by a return to a normal sinus rhythm in the 70s. Mrs. Green no longer reports anxiety or her heart racing.
- Her vital signs are now:
  - HR: 74 (sinus rhythm)
  - BP: 110/74
  - RR: 20
  - SpO2: 98% on 4L
- The physician orders a complete set of labs, including a basic metabolic panel, complete blood count, and troponin. Mrs. Green is now stable and she can remain on the telemetry floor.

Case Study #3

- Mr. Jones, 63, presented to the ED yesterday at 620pm with sudden onset right-sided weakness, slurred speech, and confusion. He was found by his family at 6pm on the day of presentation. He was last seen acting normally was that evening at 5 pm. His past medical history includes hypertension, type II diabetes, atherosclerosis, hyperlipidemia, atrial fibrillation, benign prostatic hypertrophy (BPH), cardiomyopathy, asthma, COPD, tobacco use, and obesity with a BMI of 37. His home meds include coumadin, metoprolol, lisinopril, Lipitor, Flomax, and glipizide.
- Mr. Jones' vital signs in the ED:
  - BP: 178/96
  - HR: 94 (atrial fibrillation)
  - RR: 16
  - SpO2: 94% on room air
- His labs showed white blood cell count 9.0, hemoglobin 11.5, platelets 200, INR 1.5. His glucose was 245. His sodium was 134. All other electrolytes were within normal limits. National Institutes of Health Stroke Scale (NIHSS) was 19 on arrival to ED. He had a non-contrast head CT, which showed hypodensity in the left middle cerebral artery territory. CT angiography showed a left middle cerebral artery (MCA) occlusion. Alteplase IV r-tPA was given with door-to-needle time of 35 min. He underwent mechanical thrombectomy with recanalization of the MCA. The next day he had only mild expressive aphasia and right facial droop. He was transferred to the neurology step-down unit at 630pm after his head CT showed no hemorrhage.

Case Study #3

- After you receive report from the dayshift nurse, you go in to assess Mr. Jones at 8pm and find him lethargic with mild hypoxia 91% on 2L. You call the resident physician covering the patient and inform him of Mr. Jones' change in neuro status and mild hypoxia. He orders you to increase the oxygen to 4L and continue to monitor the patient since his head CT at 630pm was normal. At 930pm, you return to his room to reassess him and he remains lethargic.
- Mr. Jones' vital signs are now:
  - Temperature: 98.5° F
  - BP: 130/70
  - HR: 76 (atrial fibrillation)
  - RR: 12
  - SpO2: 95% on 4L
- You again call the resident covering the patient and let him know patient remains lethargic but vital signs are stable. The resident orders complete blood count, coagulation studies, and basic metabolic panel and tells you to continue to monitor the patient.

Case Study #3

- An hour later, you check Mr. Jones' labs and find hemoglobin 9.0, INR 2.6, and all other labs within normal limits. You go to check on Mr. Jones and he is difficult to arouse and only responds to painful stimuli. You call an RRT. While waiting for the team to arrive you check his vital signs and find:
  - Temperature: 98.0° F
  - BP: 126/66
  - HR: 64 (atrial fibrillation)
  - RR: 12
  - SpO2 93% on 4L O2
- When the RRT arrives, you give report utilizing the SBAR communication tool. The RRT RN performs a neuro exam and finds the patient only responsive to painful stimuli with sluggish but equal pupils and a GCS of 8. The respiratory therapist increases the patient's oxygen to 6L. The physician orders a stat head CT. The RRT RN places the patient on the portable monitor, and with the help of the physician and respiratory therapist, they take the patient for the head CT. The CT shows a right-sided intracranial hemorrhage (ICH) with ventricular extension but without hydrocephalus. The nursing supervisor arranges for the patient to be transferred to an ICU bed. Upon arrival to the ICU, the patient is immediately intubated, a stat neurosurgical consult is placed, and the patient has an external ventricular drain (EVD) inserted. A head CT six hours later shows minimal improvement and the patient goes to the OR for a craniotomy. A post-op head CT shows near complete removal of the ICH. Three days later, the patient is extubated and eventually transferred back to the neuro step-down unit.

Conclusion

RRTs have become a widely used patient safety intervention. RRTs were developed by healthcare organizations to prevent poor patient outcomes by bringing critical-care expertise to the ward patient's bedside. The goal of the rapid response system is to provide early intervention during declining clinical status and to prevent cardiac and/or respiratory arrest.

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