The Novice Nurse's Guide to Calling "Code Blue"

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abstract

Would new graduate nurses activate rapid response teams (RRT) sooner if they learned a simple and effective decision-making model for determining hemodynamic instability? A significant number of scholarly articles report poor outcomes associated with delayed rescue interventions in the face of mental status changes preceding code blue activation. However, current RRT protocols do not stratify or give greater weight to changes in patient mental status compared with any other symptom associated with RRT activation. A decision-making model to improve the recognition of unstable patients was implemented on a cardiothoracic telemetry ward at a military medical center, resulting in an anecdotal 50% improvement in the unit's code blue survival rate. A controlled educational pilot program is needed to add scientific rigor and provide the necessary data to validate the original anecdotal findings associated with the decision-making model described in this article.

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Newly graduated nurses enter the job market facing the daunting task of honing fundamental nursing skills and learning when they should intervene aggressively on behalf of an unstable patient. Outside of nursing school, nurse intern programs, ward orientation, and clinical experience gained from working on the job, new graduate nurses have little experience to draw from when assessing hemodynamically unstable patients. Inexperienced nurses find themselves evaluating physiologic abnormalities of seemingly equal weight until they conclude that their patient requires further assistance from a rapid response team (RRT). This is of great concern because 80% of all patients who require in-hospital cardiopulmonary resuscitation (CPR) exhibit signs of instability hours before impending cardiovascular collapse (Downey, Quach, Haase, Haase-Fielitz, Jones, & Bellomo, 2008). How does a new graduate nurse make time-sensitive life-saving decisions without the benefit of experience?

SIGNS OF PATIENT DETERIORATION

Retrospective studies showed as early as 1990 that most code blues that required CPR were preceded by clinical deterioration of mental or respiratory status (Schein, Hazaday, Pena, Ruben, & Sprung, 1990). Smith and Wood (1998) later identified that 46% of all code blues were preceded by mental status changes and 48% were preceded by respiratory abnormalities. Offner, Heit, and Roberts (2007) published findings from their own retrospective study that indicated that 40% of patients who required in-hospital CPR experienced early mental status changes and 21% of code blues were preceded by respiratory abnormalities. Changes in mental status, often occurring hours before the initiation of CPR, can be an ominous sign associated with poor

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outcomes. Delays in response to acute changes in mental status have resulted in lower survival rates compared with any other symptom preceding code blue activation (Downey et al., 2008).

Should mental status changes demand immediate attention in preference to any other sign of patient instability? It has been well documented that brain tissue is the most sensitive major body organ to hypoxia (Leach & Treacher, 1998). Cellular hypoxia in the brain can be caused by inadequate red blood cell oxygenation, dysfunctional red blood cells, ineffective cerebral perfusion, or any combination of these causes (Leach & Treacher, 1998). Because brain tissue is profoundly sensitive to hypoxia, signs and symptoms consistent with cerebral hypoxia should draw the attention of any clinician and warrant further investigation.

To date, there is a paucity of literature that assigns weighted value to the identification of symptoms before cardiovascular collapse. Current evidence-based nursing practice encourages the use of RRTs to bring experienced clinicians and critical care resources to the bedside to assist unstable patients. Current RRT decision-making criteria classify all symptoms into an equally weighted list that includes heart rate, blood pressure, respiratory rate, oxygen saturation, mental status changes, urine output, and chest pain (Morse, Warshawsky, Moore, & Pecora, 2006). RRTs can effectively identify and treat unstable patients in the hospital setting, but would RRTs be more effective if they aided graduate nurses in making critical decisions?

DECISION PROCESSING

Hoffman, Aitken, and Duffield (2009) observed that newly graduated nurses cluster clinical information differently than their more experienced counterparts. Compared with new nurses, experienced nurses proactively gather a broader range of clinical cues before deciding to act on clinical abnormalities. In 1995, Greenwood and King (as cited in Hoffman et al., 2009) noted that although they do not collect as broad a range of clinical data, novice nurses gather a larger volume of clinical data and still fail to notice critical clues that the patient is decompensating. Perhaps new nurses need to gather more data because they cannot quickly cluster physiologic clues to trigger a nursing intervention (Greenwood & King, 1995, as cited in Hoffman et al., 2009). In addition, expert nurses place more value on familiarity with the patient's baseline status than inexperienced nurses. Over time, inexperienced nurses gain skill sets that allow them to recognize the interrelatedness of physiologic patterns and make quick and decisive clinical decisions (Hoffman et al., 2009).

THE BODY'S OXYGEN SENSOR

A simple and reliable decision-making model is needed to help new nurses to bridge the experience gap and recognize the physiologic patterns that are associated with decompensating patients. To summarize, mental status changes and respiratory changes precede code blue activation (Offner et al., 2007; Schein et al., 1990; Smith & Wood, 1998), delayed response to acute mental status changes is synonymous with poor patient outcomes (Downey et al., 2008), and the brain is the most sensitive organ to hypoxia (Leach & Treacher, 1998). A simple and effective clinical decision-making model that immediately identifies a hemodynamic or respiratory origin as the cause of mental status changes would be an immensely useful tool for inexperienced nurses.

It is impossible to monitor homeostasis and oxygenation at the body's cellular level accurately without complex monitoring devices. However, the brain can serve as a sensitive, low-tech oxygen sensor to indicate whether the body is keeping up with its metabolic need for oxygen. In other words, no matter the cause, the brain can be used as an initial indicator of cellular oxygenation and homeostasis based on mental status changes in the presence of other telltale symptoms.

When mental status changes are combined with abnormal respiratory parameters or abnormal cardiovascular changes, as indicated by RRT protocols, it can be assumed that the patient is showing early signs of hemodynamic instability. The longer early signs of hypoxia (often seen as mental status changes) are left untreated, the more difficult it is to reverse the physiologic changes of cellular hypoxia. Steadily worsening chronic hypoxia ultimately leads to hypoxic cell injury and death (Bhatoe, 2011).

DECISION-MAKING MODEL

Simply stated, patients who can no longer meet their cellular metabolic needs will become increasingly hypoxic and ultimately die without intervention. It is as if the patient is slowly being pulled down into a physiologic whirlpool. The longer patients stay in the whirlpool, the less likely they are to survive. The image of a spiraling whirlpool provides an excellent conceptualization for a decision-making model to aid novice nurses in the recognition of unstable patients (**Figure**).

The decision-making model begins at the top of the **Figure** with suspicion of patient instability based on observed deviation from the patient's baseline assessment of mental status. The nurse is then prompted to obtain a full set of vital signs. The bedside nurse then groups the vital sign data into one of two categories, cardiovascular or respiratory. Fundamental respiratory vital signs are

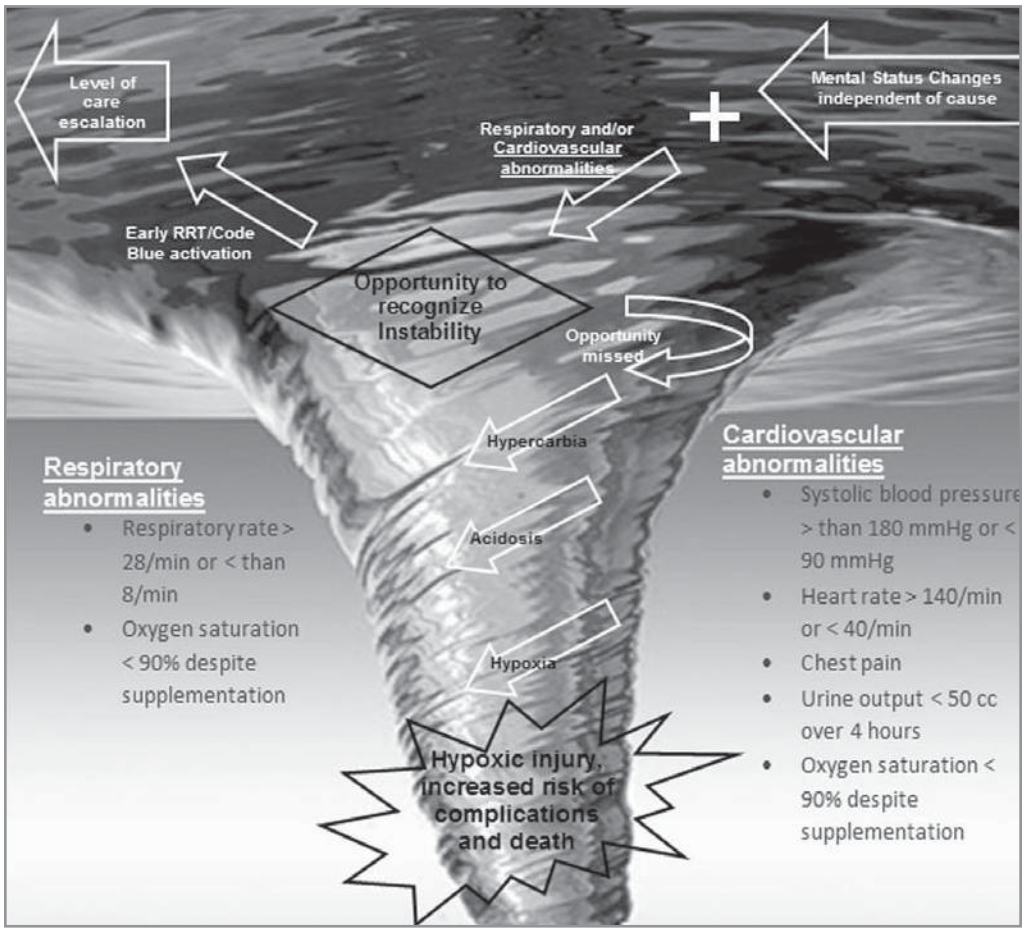

Figure. Brice/Houde decision-making model. RRT = rapid response team. (Image reprinted with permission from Hydro International/Paul Groom Photography.)

respiratory rate greater than 28 or less than 8 breaths/minute, ineffective ventilation, and oxygen saturation of less than 90% despite supplementation. Key cardiovascular vital signs are systolic blood pressure greater than 180 mm Hg or less than 90 mm Hg, heart rate greater than 140 or less than 40 beats/minute, chest pain, recent decrease in urine output to less than 50 ml over 4 hours, and oxygen saturation of less than 90% despite supplementation. Linking the patient's observed mental status to cardiovascular or respiratory abnormalities will help to prompt the new nurse to perform interventions to treat the root cause of the patient's altered mental status before RRT arrival.

BRICE/HOUDE MODEL

The benefit of the Brice/Houde decision-making model is that it simplifies the decision-making process for the new nurse by preclustering symptoms. There are no checklists or complicated scoring schemes to memorize, just one symptom (changes in the patient's mental status) that prompts an assessment, followed by identification of abnormal vital signs to activate an RRT. The time saved during the initial decision-making process limits the degree of the metabolic cascade that is set in motion by untreated cellular hypoxia. An increase in early recognition and intervention for unstable patients could have an immediate positive effect on clinical outcomes and ultimately decrease hospital litigation costs related to delayed definitive treatment.

This decision-making model was applied on a trial basis on a cardiac/telemetry ward at a major military treatment facility. The anecdotal findings did not have the benefit of large pre- and postimplementation metrics but correlated with significantly improved patient outcomes. The predominantly junior nursing staff consistently recognized patient instability and intervened after learning to use this simple decision-making model. Unstable patients were rapidly recognized and transferred to higher levels of care, and these patients avoided the injuries associated with CPR. The code blue survival rate increased by 50%. Admittedly, the total number of code blues in the anecdotal sample, only 10 patients, was too small for statistical significance. However, documentation within the electronic health record indicated that staff had implemented effective and appropriate rescue measures while waiting for the RRT or code blue team to arrive.

SUCCESS STORY

An example shows the power of this decision-making tool. One morning, a nurse was receiving report on a patient who had been agitated for most of the night but was finally "settling down." In the mean time, a new

graduate corpsman returned to the morning report and informed the team nurse that he suspected that the somnolent patient might be unstable. The corpsman was persistent and indicated that the patient was difficult to arouse and that her breathing pattern was inadequate. Within minutes, the patient was transported to the intensive care unit and intubated without any other intervention needed. The new corpsman recognized the signs and symptoms of an unstable patient quickly because he had a simple decision-making model to follow. He had successfully identified his first unstable patient without supervisory assistance.

CONCLUSION

The successful implementation of this decision-making model was based on extensive curriculum development and implementation that could easily be replicated at other institutions. This decision-making tool was designed to be simple, effective, and easy to remember for the novice nurse and could serve as a bridge to assist new nurses in making critical decisions as they become more seasoned clinicians.

Because the initial success of this decision-making model was based on anecdotal outcomes, another controlled pilot program implementation is needed to verify the outcomes reported in this article.

key points

Novice Nurse

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1. A change in mental status is an immediate red flag that could indicate patient instability.
2. Inexperienced nurses need a simple and effective decision-making model to aid in the recognition of unstable patients.
3. Patient outcomes associated with acutely unstable patients are heavily influenced by early recognition of this instability.

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