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Benefits of a Separate Airway Emergency Response Team

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Dr. Afifi and colleagues explain how establishing a dedicated hospital-based airway emergency response team resulted in the reduction of cardiac arrest calls, efficient use of available resources and minimized disruption in routine patient care. They also describe the method of process improvement used by an active, multidisciplinary team.

Background

Northwestern Memorial Hospital is a nationally recognized, 744-bed academic medical center located in Chicago, Illinois, USA. It is the primary teaching hospital for Northwestern University's Feinberg School of Medicine. The cardiac arrest team has been Northwestern Memorial Hospital's traditional standard for emergency response in the event of sudden cardiac arrest or patient unresponsiveness. The cardiac arrest team is a multidisciplinary team of healthcare professionals consisting of physicians from medicine, surgery, anesthesiology, nursing services, pharmacy and respiratory care. Members of the cardiac arrest team are concurrently paged to respond to a cardiac arrest by the hospital operator, once an automated arrest call button, located in any inpatient or outpatient clinical area, has been activated.

Quality Monitoring and Data Collection

Quality monitoring and arrest data are reviewed on a monthly basis by the Cardio-Pulmonary Resuscitation (CPR) Committee. The CPR Committee is a multidisciplinary committee comprised of representatives from both clinical departments and non-clinical support departments. The CPR Committee is under the medical direction of the Department of Anesthesiology and is chaired by a critical care anesthesiologist, who is responsible for coordinating the quality monitoring process, data collection and emergency response operations within the hospital. The CPR Committee regularly reviews any sentinel events from the previous month, as well as the volume of cardiac arrests, the location of each arrest and the probable cause linked to each cardiac arrest (as determined by the medical team attending the arrest and documented in the arrest summary).

Cardiac Arrest Data Review

Sequential reviews of the cardiac arrest data by the CPR Committee revealed that a significant number of cardiac arrest teamcalls were activated for patients that initially experienced a documented airway complication prior to their cardiac arrest (see figure 1, page 19). Upon review of this data, the CPR Committee theorized that the patient population experiencing respiratory failure prior to cardiac arrest may not have progressed to an actual cardiac arrest if earlier medical intervention by specialized clinicians was available to treat and augment respiratory efforts. Thus, the CPR Committee embarked on a quality improvement project to better respond to these patients.

Process Improvement - DMAIC

At Northwestern Memorial Hospital, quality improvement projects utilize a process improvement technique referred to as "DMAIC Process Improvement." DMAIC is an acronym that stands for Define, Measure, Analyze, Improve and Control. DMAIC is a step-by-step approach to process improvement. The goal of DMAIC process improvement is to reduce the defects or inefficiencies associated with a process, deliver measurable improvements and maintain these improvements over time. DMAIC is a very simple way for any group to organize their efforts to improve a complicated process.

Define

The first phase is Define. In the Define phase, the objective is to determine and define the problem that needs to be solved. The problem discovered through the CPR Committee's cardiac arrest data analysis was: the number of cardiac arrest team calls was increasing in patient populations that were not primary cardiac patients. The CPR Committee suspected that this increase was attributable to patients that developed airway complications, which, over time, progressed into cardiac stress and eventual cardiac arrest.

Measure

During the Measure phase, a strategy is established to determine how to measure the process and collect the data that is required to analyze performance. The cardiac arrest team nurse collected data on every cardiac arrest call to determine the number of cardiac arrest calls and the root cause for each. This data was then submitted monthly to the CPR Committee for their review.

Analyze

The third phase is Analyze. In this phase, the data is drilled down to the root causes of performance variation. This is the most analytical and statistically intensive phase. Data can often be displayed using a graph format to visually compare trends and highlight variation. The data obtained from this project indicated that, in a large number of cardiac arrest calls, the patient had a primary airway respiratory component, which was determined to be the root cause for the cardiac arrest. In these cases, the cardiac arrest was a consequence of respiratory failure.

Improve

In the Improve phase, the goal is to generate alternatives to the current process, assess the risk associated with each alternative, select the best alternative and pilot the solution. The CPR Committee responded to the findings by establishing an additional emergency response team called the Airway Emergency Response Team (AERT). The AERT would be activated for any patient who required emergent endotracheal intubation or any other emergency airway assistance. The AERT was chartered to provide early intervention for the prevention of cardiac arrest in airway patients. The AERT, consisting of an anesthesiologist, a nurse and a respiratory therapist, was less labor-intensive than the cardiac arrest team, which deploys a larger group of medical and support personnel.

Screening parameters for activating the airway team were put in place to ensure that the appropriate team was called to respond to emergencies. A hospital-wide educational initiative was established to educate the clinical staff about the AERT. Ongoing data is accumulating to help the CPR Committee monitor the AERT's success in reaching its goals of reducing the number of cardiac arrest calls over time, minimizing disruption to routine clinical operations and increasing efficiency by utilizing a specialized airway management team that requires fewer personnel than the cardiac arrest team.

Control

The final phase is Control. In the control phase, the intention is to error-proof the new process and to use tools to monitor the process. The data collected post-AERT implementation supported the hypothesis that the implementation of the AERT did reduce the number of emergency calls for the much larger cardiac arrest team. In fact, following implementation of the AERT, the ratio of emergency calls to the AERT to those of the cardiac arrest team underwent a gradual, but complete, reversal. (see figure 2). The CPR Committee did not note a significant increase in the number of total calls, which included both cardiac arrest and emergency airway calls. However, the cardiac arrest team calls decreased by more than half, whereas, over a period of 24 months, there was a 35% increase in the number of AERT calls. Continued monitoring of emergency response team data is critical for maintaining the improvements that were gained with the implementation of the AERT. The CPR Committee expects to observe a continued trend of a greater number of AERT calls compared to cardiac arrest calls.

Conclusion

The implementation of a dedicated, hospital-based airway emergency response team reduced the number of emergency calls for cardiac arrest. The airway emergency response team minimized the disruption in routine patient care compared to the cardiac arrest team, which requires a large number of clinical staff responders to be pulled away from their primary clinical areas.

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