New York Hospital Queens: Improved Communication, Dedicated ECG, Reduce AMI Door-to-balloon Times

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New York Hospital Queens (NYHQ) is a 429-bed acute-care teaching hospital located in Flushing, N.Y. NYHQ is a Level 1 Trauma Center and a 911 receiving center for ST segment-elevated myocardial infarctions (STEMI). A member of the NewYork-Presbyterian Healthcare System and affiliate of the Weill Medical College of Cornell University, NYHQ in 2009 admitted more than 35,000 inpatients, and provided more than 139,000 outpatient and 115,000 emergency department visits. In keeping with its mission, “To be the premier health care institution serving our greater community by providing excellence in clinical care and patient safety, education, clinical research, and service,” NYHQ has won several awards for quality improvement, and provides care to all regardless of ability to pay.

Challenge
Research shows that quickly restoring blood flow through coronary arteries after a STEMI heart attack can minimize permanent damage to the heart and improve chances of survival and recovery. For this reason, The Joint Commission and Centers for Medicare and Medicaid Services (CMS) acute myocardial infarction (AMI) core measures require that STEMI patients taken to a facility with percutaneous coronary intervention (PCI) capability must be reperfused within 90 minutes of arrival, also known as “door-to-balloon” time. In the third quarter 2007, only 50% of NYHQ’s PCI times were below 90 minutes. For the first two quarters of 2008, the figures were 82% and 80%. Our challenge was to improve patient care, and our effectiveness and efficiency, by delivering PCI within 90 minutes in all indicated cases.

Preparation
We collected and analyzed data and found that our time to PCI in this period ranged from 290 to 33 minutes. Drilling down, we found that the time to electrocardiogram (ECG) and time in the ED varied most, and that these variations occurred whether the patient walked in or arrived by ambulance. Patients presenting to the ED with chest pain were waiting 20 minutes on average for an ECG, and more than 70 minutes to move from the ED to the Cardiac Catheterization Lab. Time from arrival to cardiac catheterization lab to revascularization was more consistent at about 20 minutes. To reduce these inefficiencies identified in the system, our AMI team set these goals:

- Obtain ECG in the ED in patients presenting with chest pain within 10 minutes of arrival.
- Decrease ED to cardiac catheterization time to less than 45 minutes.
- Achieve PCI (door-to-balloon) time less than or equal to 90 minutes 100% of the time.

Solution
Our AMI team was determined to work together to initiate process changes that would enable the team to work more efficiently and effectively, improve quality of care to patients and improve revascularization times. We started by identifying each step in our existing process. An AMI patient was followed through the ED and into the cardiac cath lab. Then each minute of the process was broken down and any unnecessary steps that contributed to wasted time were removed.
One avoidable problem we identified was time spent attaching and removing ECG sensor lead wires. We purchased new ECG machines with wireless capability. We also switched to using radiolucent pads that don’t need to be removed for STAT X-rays and transport of the patient to cath lab. Radiolucent pads are now used interchangeably with all cardiac transport and hard-wired cardiac monitors.

We found that time was also frequently lost locating and transporting ECG machines to the ED, and waiting for an ECG technician to arrive. One ECG machine and an ED technician were designated at triage to increase availability for STAT ECGs for patients presenting with chest pain.

Routing STEMI alerts through the hospital communication system sometimes resulted in delays, and paging the cath team and cardiologists separately took unnecessary time. We streamlined our communication by providing a designated STEMI phone line and a one-call pager activation system.

Pulling multiple medications also wasted precious time. We developed a single-pack medication system that includes all AMI medications.

We found that in many cases the most significant delays resulted from communication difficulties among the emergency, cardiology and cardiac cath lab services. So we developed an education program using our simulation lab to enhance team building and communication skills among caregivers. Working with each other in the simulation lab helped to enhance our team building and decrease time wasted by leveling hierarchies and encouraging open communication.

To keep everyone on track, we implemented monthly quality/performance improvement meetings in which we present quality data and analysis. This helps keep all team members informed of our progress, and gives everyone an opportunity to suggest process improvements.

**Results**

ECG time for patients presenting with chest pain has decreased from approximately 18 minutes to less than 10 minutes, reaching our goal in May 2009. The transfer time of patients from the ED to the catheterization lab (ED throughput) decreased from approximately 70 minutes to less than 45 minutes, reaching our goal in May 2009. Door-to-balloon time in less than 90 minutes 100% of the time was reached September 2008 and has remained at 100% through July 2010.

As a result of this experience, the AMI team at NYHQ recommends that hospitals look at their data results and analyze them to improve their processes and evaluate the need for change. Adopting process changes such as a dedicated ECG machine and technician, medication packets, single-call system with dedicated STEMI phone line and pagers can cut delays in PCI and help more patients avoid the cell injury, microvascular injury and heart wall myocardial necrosis that result from prolonged severe ischemia.

According to the National Registry of Myocardial Infarction, 4,500,000 STEMI events occur in the United States each year with a mortality rate of 6.5% to 7.5%. Quicker PCI will give these patients a better chance at survival and recovery.