**STANDARDIZING DOOR-TO-BALLOON TIME (STEMI PATIENTS)**  
**UNIVERSITY OF PENNSYLVANIA HEALTH SYSTEM**

**Publication Year:** 2013

<table>
<thead>
<tr>
<th><strong>Summary:</strong></th>
<th><strong>Hospital:</strong> PENN Presbyterian Medical Center</th>
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<tbody>
<tr>
<td>Standardized process to reduce door-to-balloon time for STEMI patients.</td>
<td><strong>Location:</strong> Philadelphia, PA</td>
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<table>
<thead>
<tr>
<th><strong>Category:</strong></th>
<th><strong>Hospital Metrics:</strong></th>
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| - A: Arrival  
- B: Bed Placement  
- C: Clinician Initial Evaluation & Throughput  
- D: Disposition  
- E: Exit from the ED | - Annual ED Volume: 39,000  
- Hospital Beds: 300  
- Ownership: Not-For-Profit  
- Trauma Level: None  
- Teaching Status: Yes |

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<tr>
<th><strong>Key Words:</strong></th>
<th><strong>Tools Provided:</strong></th>
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| - Care Transitions  
- Consults  
- Continuity of Care  
- Patient Satisfaction  
- Wait Times | - N/A |

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<tr>
<th><strong>Clinical Areas Affected:</strong></th>
<th><strong>Staff Involved:</strong></th>
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| - Cardiac Catheterization Lab  
- Consult Services  
- Emergency Department | - Administrators  
- Cardiac Catheterization Lab  
- Clerks  
- Consult Services  
- ED Staff  
- Nurses  
- Physicians  
- Registration Staff  
- Technicians |
Innovation

Two years ago, our ED implemented several processes to reduce time from intake to EKG acquisition to facilitate earlier recognition of patients with potential STEMI. Since implementation, our median time to EKG from intake for acute myocardial infarction patients is a sustained six minutes for FY13, well below the American Heart Association goal of ten minutes. This however did not translate into either earlier notification of the Cath Lab nor to a reduction in our door to balloon (D2B) time, only reaching the goal of 90 minutes in 33% of our patient population. A review of the data showed the transition of the patient from the ED to the Cath Lab was a major limiting factor. In addition, although we were meeting a goal of 30 minutes from intake to Cath Lab notification (93% of the time), the goal itself was thought to not be adequate.

Utilizing our shared governance model, we formed a multidisciplinary team between the ED and Cath Lab Unit Councils to develop an effective standardized process that would reduce our D2B time. STEMI volume in general is low (one to two patients a month) but the stakes are high for patient outcomes. Root cause analysis suggested that off hours (weekends and nights) were likely areas of focus, although we frequently failed to meet the goal during weekday hours as well. Standardization of the process and involving key stakeholders in the development of the process were the two main innovations.

Studies have shown that patient outcomes directly correlate with having a door to balloon time of less than 90 minutes. This metric is also a core measure, which our department prides itself on consistently meeting, and is important for value based purchasing. After successfully reducing our intake to EKG times for patients with acute myocardial infarction, we unfortunately did not see a carry over to our D2B times for STEMI patients. Because D2B time is dependent on two different hospital departments, the ED and the Cath Lab, attempts at coordination and involvement of key stakeholders initially was not successful despite having good data to show that we were failing to meet our goal. We, one, had to convince staff that this was important and doable, and second, stop blaming each other for the failure and each take joint responsibility.

Innovation Implementation

Using a shared governance model, and under the leadership of the ED Unit Based Leadership Council (UBCL), the Emergency Department (ED) Unit Council and Catheterization Lab (Cath Lab) Unit Council collaborated in a combined task force. The unit councils are composed of nurses who chair the various sub-committees of the council: Practice/Professional Development, Education, Stewardship, and Quality. The ED UBCL working with Nursing Director of Heart Rescue charged each Unit Council chair with leading the taskforce. Stakeholders involved ED Unit Clerks, ED and Cath Lab nurses and physicians.

The first step towards implementation was to engage staff from both the ED and the Cath Lab regarding the nature of the problem.

We focused on two measures we thought would lead to a reduction in our D2B times:

- Intake to Cath Lab Notification
- Intake to Cath Lab Arrival

Intake to Cath Lab Notification

For the first metric, our data showed that we were meeting our goal of Cath Lab notification 93% of the time for FY12. Upon further reflection, we thought that notification earlier than 30 minutes may further reduce our D2B times and we sought to bring in additional stakeholders into the project, mainly the physicians of both departments. In order to save as much time as possible, we instructed the ED faculty to activate the Cath Lab as soon as STEMI was suspected and not to delay until the initial ED evaluation process was completed (x-ray and lab results for example). This then also required that the Cath Lab faculty be comfortable with potential "false" activations.
In cases where STEMI is questionably, we now still err on the side of notification and typically fax, text, or email a copy of the EKG as soon as possible.

**Intake to Cath Lab Arrival**

For the second metric, the ED UBCL and Nursing Director of Heart Rescue created a taskforce, led by the chair of the ED and the Cath Lab Unit Councils, to standardize the process for transitioning patients with STEMI from the ED to the Cath Lab. Prior to this, there was a great deal of variance when it came to caring for a patient experiencing a STEMI. Before the initiative was implemented, staff were confused as to who was responsible for transporting the patient from the emergency department to the catheterization lab, especially depending on the time or day or week. The ED relies on hospital transporters while the Cath lab has its own transporters. There was, especially on off hours and off shifts (weekends and nights), no good mechanism for the ED to know when the Cath Lab was ready to physically accept the patient. This in turn led to delays in the ED having the patient ready for transport.

Through our shared governance model, both units were able to collectively discuss and agree upon a standard practice to improve patient outcomes and provide accountability. Now, once an ED physician identifies that a patient is experiencing a STEMI, the Unit Clerk overheads a "STEMI" alert.

**STEMI Alert**

This alert notifies all personnel working in the ED that a critical patient needs immediate attention. This usually facilitates having two registered nurses, a technician, and ED physician all at the bedside to expedite the patient's care. The primary registered nurse of the patient is responsible for having the patient ready to be transferred as soon as possible. This includes having the patient connected to a portable cardiac monitor and portable oxygen tank. When the catheterization lab team is ready, they send one of their transporters to bring the patient to the catheterization lab. During off hours and off shift, the second arriving Cath Lab member comes to the ED first, instead of the Cath Lab. The primary ED nurse then accompanies the patient during transfer and gives bedside report to the Cath Lab team, preventing a delay by trying to provide a verbal report prior to the transfer to the Cath Lab. This also ensures a safer patient handoff communication and builds relationships between the staff members of each unit. All of these interventions combined have created a standardization of care for patients experiencing a STEMI, most notably by decreasing our door to balloon times.

**Timeline**

The project began with a review of the FY12 in July, which led to discussions between the ED UBCL and the Cath Lab Nursing Director of Heart Rescue. We decided to focus on three measures to evaluate success or failure: intake to Cath Lab notification, intake to Cath Lab arrival, and D2B time.

The Cath Lab Unit Council was at that time in the midst of a leadership transition. In July and August 2012, while the Cath Lab Nursing Director of Heart Rescue worked to identify a new chair, he also worked to engage the Cath Lab physicians, while the ED UBCL presented the data to ED Faculty in July to work on reducing the intake to Cath Lab notification metric. The Cath Lab Unit Council had a named chair by the fall. Work then commenced on improving the other two metrics, intake to Cath Lab notification and D2B time. The new chair of the Cath Lab Unit council collaborated with the ED Unit Council chair to standardize the process. By December 2012, both the ED and Cath Lab departments were actively utilizing the new standard process.

**Results**

We tracked three main metrics: intake to Cath Lab notification, intake to Cath Lab arrival, and door to balloon time. All three metrics saw sustained reductions once implemented. After engaging the ED and Cath Lab physicians regarding earlier notification, we saw a decrease in median time from intake to notification from 30 minutes in half, saving about 15 minutes. After standardizing our process for transitioning patient from the ED to the Cath Lab, we saw a decrease in median time from intake to Cath Lab arrival, meeting a goal of sixty minutes in all cases. Finally, with the improvements in the above two metrics, the goal of obtaining median D2B times of under 90 minutes was achieved as well.
Cost/Benefit Analysis
There were no financial costs associated with the project, except for time. The most important benefit is to the patient, as studies, such as Effect of Door-to-Balloon Time on Mortality in Patients With ST-Segment Elevation Myocardial Infarction, J Am Coll Cardiol. 2006;47(11):2180-2186, have shown that time to primary PCI is strongly associated with mortality risk and is important regardless of time from symptom onset to presentation and regardless of baseline risk of mortality. The only financial cost savings would be as they relate to value based purchasing, which is a program initiative by the Centers for Medicare & Medicaid Services. This program rewards acute-care hospitals with incentive payments for the quality of the care they provide to people with Medicare, of which Door to Balloon time is a performance measure.

Advice and Lessons Learned
1. It is important to revisit your goals. In this project, we determined that our previous goal of 30 minutes from intake to Cath Lab notification was too high, and aimed to cut the time in half.

2. Engagement is a key, especially for projects that involve more than one unit. We also could not have achieved success on this metric without having the leadership in place in the Cath Lab.

3. Standardization was the answer. The ability to have the same process no matter the time of day or day of week ensured that staff is aware of what to do for all STEMI patients. Standardization also creates a culture of accountability that was previously lacking.

Sustainability
There were no resources associated with the project, except for time. Now that we have a standard process and engagement of key stakeholders, we plan on maintaining the improvement effort’s results. Leadership is a key to continue to coach for change to keep the improvement on track and ensure that everyone is committed. We also plan on using control charts to audit for monitoring adherence and stability of the process. Results will continue to be prominently displayed for staff to see. Lastly, we will continue to use the PDSA process, including root cause analysis, if the data starts to show variance from our goal of a door to balloon time of less than 90 minutes.