Interdisciplinary collaboration is an essential component of Riverside Medical Center’s continuous quality and process improvement program. Riverside Medical Center has employed the Plan-Do-Check-Act (PDCA) model for quality and performance improvement since the mid-1990s for all clinical and non-clinical disciplines. As a systematic approach to quality improvement, the PDCA model provides a planned, organization-wide approach to process design and performance measurement, analysis, and improvement. Use of the PDCA model ensures the appropriate steps are taken toward achieving improved processes and outcomes.

**Quality Improvement Structures and Processes**

Riverside’s Quality Improvement Plan is one structure that supports interdisciplinary collaboration involvement in continuous quality and process improvement. According to this plan, quality improvement efforts focus on “doing the right thing and doing the right thing well.” Quality improvement is accomplished by assessing patient care and other support processes in a systematic, ongoing manner in order to identify improvement opportunities and act on them in a timely manner. Quality improvement efforts are planned in a collaborative and interdisciplinary manner, and include all patient care disciplines.

In the first phase of the process, **Plan**, groups or individuals identify a potential improvement based on high risk, high volume, and/or problem prone processes. They will recommend relevant individuals to participate, specify performance expectations, and establish quality indicators against which results will be measured. Indicators will be developed with consideration of the patients’ needs and expectations, dimensions of performance, and regulatory and accreditation requirements. Team charters are developed and approved.

In the second step of the PDCA cycle, **Do**, interdisciplinary members of quality improvement teams implement changes designed to improve a process. This may be completed initially on a small scale or experimental scale (e.g., a pilot study) to minimize disruption of routine activity while testing whether the changes will work or not.

Interdisciplinary team members then **Check** whether the small scale or experimental changes are achieving the desired result. This step also includes continuously checking key activities to ensure that we know the quality of the output at all times and to identify any new problems when they arise. During this phase of the PDCA cycle, teams consider comparisons of data to baseline data or target/benchmarks and to similar processes/outcomes within or outside the organization. Identification and cause of outliers and any patterns and trends are also components of the Check phase.

The fourth step of PDCA, **Act** is based on the outcomes of measurements. If the change was implemented on a small scale, the interdisciplinary team may implement changes on a larger scale. This involves making the changes a routine part of the activity through
education of staff and policy changes. Act might also involve members of additional disciplines (persons, other departments, suppliers or customers) affected by the changes and whose cooperation is needed to implement them on a larger scale, or those who may simply benefit from what was learned during the PDCA project.

The PDCA cycle will be repeated when actions are not effective, when desired outcomes have not been achieved and maintained, or when root causes have not been identified and resolved. Therefore, as a foundation of Riverside’s quality improvement efforts, the PDCA model serves as the step-by-step process for ensuring the delivery of high quality patient care and optimal health outcomes. Riverside’s multi-year pursuit and designation of chest pain center accreditation serves as a stellar example of interdisciplinary collaboration using continuous quality and process improvement.

Chest Pain Center Accreditation

History and Structure

Riverside Medical Center underwent a successful survey to be designated as a Chest Pain Center on March 6, 2009, by the Society of Chest Pain Centers. Official notice of accreditation as a Chest Pain Center with Percutaneous Coronary Intervention was awarded on March 25, 2009. This designation requires the commitment to process improvement. With each cycle of accreditation the bar is raised, thus challenging our direct care staff to improve care delivery processes for better outcomes. The mission of the Society of Chest Pain Centers is to improve the clinical processes for early assessment, diagnosis, and treatment of acute coronary syndrome. Cardiology and emergency medicine physicians originally founded the Society of Chest Pain Center in 1998.

Riverside's journey toward achieving Chest Pain Center Accreditation began in October of 2007. A multidisciplinary team was formed, goals were set, and several opportunities for improvement were identified. One of our first objectives was to shorten the door to balloon time to less than 90 minutes, which is the standard of care according to ACC/AHA guidelines and our initial benchmark. Multidisciplinary standardized care processes were developed to include “right patient, right treatment, and right time.” Interdisciplinary risk stratification pathways were developed for assessing patients with chest pain, who access the hospital via a number of routes. This includes walk-in patients to our Emergency Department (ED), patients transported to our ED via ambulance, and possibly patients who are already in the hospital. Additional pathways were developed for patients with Non ST Elevated Myocardial Infarction and unstable angina. Patients with no assignable cause for their chest pain were also added to a chest pain pathway.

EMS and ED Process

Riverside Medical Center is located in Kankakee County. Our service area encompasses a large rural area in the area, resulting in potentially long transport times
for EMS personnel. Riverside is also designated by the Illinois Department of Public Health as a Resource Hospital, and is therefore responsible for training EMS providers. A key element on the Chest Pain Center accreditation journey was to provide EMS education, and strengthen the hospital relationship with our local EMS.

Riverside personnel provided ongoing education and training on performing a 12-lead ECG, as well as transmission of the ECG to the ED. A Riverside Cardiovascular Advanced Practice Nurse, LaRee Shule, RN, MSN, APN/CNS, CCRN, CNRN, also conducted training for both ED staff and EMS staff on interpretation of the 12-lead ECG. LaRee developed an innovative 12 lead ECG evaluation transparency template to assist Riverside nurses and EMS staff in identifying EKG abnormalities that coincided with an MI [an explanation of LaRee’s development of this tool is provided in NK8]. This template was provided to EMS and ED as part of the ST Elevation Myocardial Infarction (STEMI) education program. A mandatory 12-lead ECG competency was also required for all ED and ICU direct care nurses, as well as any other staff who performs ECG’s. Annual refresher competency is also required.

Clock synchronization was accomplished between ambulance dispatchers, EMS personnel in all area ambulance services, ED personnel, and Cardiac Cath Lab personnel in order to document accurate times. Out-of-hospital times were included in the continuum of care. Feedback is provided to EMS and Performance Improvement STEMI results for (D2B) Door to Balloon Times are posted on bulletin boards for EMS.

EMS providers are also invited to attend the Code STEMI educational case review conferences during lunch-and-learn sessions. Any employees or students who are interested or involved in any way with the Code STEMI program may attend. During the Lunch and Learn, a Riverside Code STEMI case is presented. All staff who were involved with that particular Code STEMI event receives a personalized invitation to attend the Lunch and Learn. The case is presented and then discussed, giving attendees an opportunity to identify successes, areas for improvement, and recommendations to change practice or policies. These educational sessions have been well attended by EMS and hospital staff.

**Emergency Assessment and Treatment of patients with Symptoms of Acute Coronary Syndrome**

EMS education and communication is crucial to the success of the program. EMS providers identify a STEMI in the field and transmit the ECG to the ED. Based on the pre-hospital ECG, a Code STEMI may be activated. Upon activation, a multidisciplinary team responds to the ED to expedite the patient’s transfer to the Cardiac Cath Lab. One of Riverside’s first Code STEMI activations involved a 47-year-old male from a rural area. The EMS providers performed the EKG in the ambulance, and were able to identify the abnormal EKG and promptly notified the ED. Our Cath Lab personnel arrived before the patient, and the D2B time was only 30 minutes!
The Chest Pain Team developed a Code STEMI policy to provide standardized care and mobilize a rapid response team to the STEMI patient. The Code STEMI policy was presented and approved at the Emergency Preparedness Committee and added to the hospital Emergency Response Guide in February 2009. Code STEMI pocket reference cards highlighting interdisciplinary team member responsibilities were developed and distributed to the ED staff and ED physicians. Following is the Code STEMI policy.

Subject:
Code STEMI

Policy:
Rapid Diagnosis of Acute Myocardial Infarction or ST Elevation Myocardial Infarction (STEMI) is essential to initiating appropriate treatment and improving ACS patient outcomes. Code STEMI will be used to notify a team of clinicians who will respond to the Emergency Department to assist the ED physician and staff.

Procedure:
1. EMS that has a patient with EKG that is positive for STEMI will announce "Code STEMI" at the beginning of radio / cell communication. A copy of the 12-Lead EKG will be transmitted to the designated fax machine in ED or if unable to transmit, hand the EKG to the physician on arrival. Code STEMI may be utilized for ED walk-in patients with Chest Pain or Cardiac Symptoms.

2. ECRN / RN will request physician (cardiologist) information from the EMS provider / patient
   a. ED will page the cardiologist (911) or phone the office during regular business hours. (Monday-Friday, 9:00 AM - 5:00 PM)
   b. Evenings and Weekends, ED will call the physician answering service at 815-929-2972 to notify the appropriate cardiologist. Evening / Weekend Hours: Monday-Friday 5:00 PM - 9:00 AM, All hours Saturday and Sunday
   c. If the patient has no cardiologist, ED will page the on-call (city call) cardiologist.

3. ED secretary will notify switchboard by dialing "55" and request a "Code STEMI"

4. Switchboard will overhead page Code STEMI (24 / 7).
   Advanced practice nurse paged at 815-279-3633, (24 / 7).
   Cath Lab on-call team will be paged after hours.

5. STEMI team members consist of EKG, LAB, ED, CCL, 5 ICU, APN and Nursing Supervisor. This team will respond to the code activation to assist with care, documentation and transport of the STEMI patient.

6. The STEMI team will assume accountability and oversight to meet the goals on the STEMI worksheet
<table>
<thead>
<tr>
<th>Team member</th>
<th>Code STEMI ED</th>
<th>Team member</th>
<th>Code STEMI Inpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td>5ICU</td>
<td>Records events, adheres to time guidelines on STEMI form and keeps team updated of time elapsed. Completed form is turned over to CCL. Assists with transport to CCL. (PMs: assist with care of patient and clinical assessments)</td>
<td>5ICU</td>
<td>Bring timer and Zoll. Activates TIMER. Records events, adheres to time guidelines on STEMI form and keeps team updated of time elapsed. Completed form is turned over to CCL. Assists with transport to CCL. (PMs: assist with care of patient and clinical assessments)</td>
</tr>
<tr>
<td>CCL</td>
<td>Completes tasks as assigned, patient and lab prep for procedure.</td>
<td>CCL</td>
<td>Completes tasks as assigned, patient and lab prep for procedure.</td>
</tr>
<tr>
<td>CNS</td>
<td>Assists ED RN with care of patient and clinical assessments.</td>
<td>CNS</td>
<td>Assists ED RN with care of patient and clinical assessments. Groin prep if time allows. Assists with transport to CCL</td>
</tr>
<tr>
<td>Supervisor</td>
<td>Bed Management. PMs: Records events, adheres to time guidelines on acute stroke form and keeps team updated of time elapsed.</td>
<td>Supervisor</td>
<td>Bed Management. PMs: Records events, adheres to time guidelines on acute stroke form and keeps team updated of time elapsed.</td>
</tr>
</tbody>
</table>

The interdisciplinary planning team also developed a Code STEMI worksheet, which is a permanent part of the patient’s medical record. These forms are utilized for documentation on all STEMI patients and also serve as a quality improvement tools. The form is located on a clipboard with a timer in the ED nurses station. The timer is initiated upon arrival of the STEMI patient, and is a visual tool to help ED direct care.
staff stay on target with our D2B target. Several Code STEMI drills were conducted prior to official implementation of the policy. The goal is 5 minutes from time of arrival for the first ECG to be completed and given to the ED physician. The ED physician confirms the STEMI. Additional goals were established and include close collaboration among all members of the Code STEMI team.

- Goal: 6 minutes - for activation of Code STEMI
- Goal: 10 minutes - for On-Call Cardiologist to return page. If no page, secondary Cardiologist notified.
- Goal: 40 minutes - Cath Lab Team is ready for patient to be transported.
- Goal: 75 minutes - for Arterial access
- Goal: 85 minutes - for Balloon/Stent/Thrombectomy Deployed.

The Code STEMI interdisciplinary team meets weekly and evaluates the process, quality improvement data, and individual cases. The causes of outliers and any trends are carefully analyzed and root causes are identified. Comparison of D2B time with target benchmarks is reviewed. Recommendations and changes for improvement are made accordingly. Members of the interdisciplinary team include all levels of nursing, physicians, and ancillary managers and staff:

- Tanya Huston, RN, BSN, ED Manager
- Kevin Hack, ED Director
- ED Staff
- Cath Lab Manager
- Cath Lab Staff
- Mary Schore, RN, MSN, Quality Improvement Director
- Liz Wirth, RN, MSN, Cardiovascular Quality Coordinator
- ED Physicians
- Cardiologists
- Cardiac Surgeons
- LaRee Shule, RN, MSN, Critical Care Advance Practice Nurse
- Pat Blanchette, RN, Manager of Cardiopulmonary Testing
- Allen Kelly, RN, BSN, MSHA, Vice President of Perioperative and Procedural Services

**Outcomes**

Riverside Medical Center is a leader in cardiovascular care in our community. We are the only hospital in the community that performs Open Heart Surgery. Our direct care nurses, leaders, and medical staff have worked collaboratively to provide standardized care for patients who arrive to the ED with chest pain. The processes and policies that have been developed have decreased errors of omission, delays, and treatment gaps as evidenced by our quality improvement data. Riverside also participates in a national ACTION registry for data collection, which allows us to benchmark our results against other hospitals.
Community Outreach programs have been conducted on signs and symptoms of Acute Coronary Syndrome. Cardiovascular Health and wellness programs are also offered at Riverside. As an Accredited Chest Pain Center, Riverside is committed to improving the cardiac care provided for our community. Our average D2B time in December 2008 was 98.2 minutes (see graph below).

NOTE: We had 21 STEMI patients in 2008.

Since 2008, we have improved tremendously, which has been possible through interdisciplinary collaboration and utilizing the PDCA model for quality and performance improvement. The 2009 graph (below) shows our D2B time was consistently below the 90-minute guideline. (There were no eligible cases in September of 2009.) We established in internal best practice of 60 minutes or less (see 2009 graph), and exceeded our target in only three of 11 months in 2009.
We had 15 STEMIs between January 1, 2010 and April 30, 2010. Our lowest D2B time was 33 minutes. We had one STEMI D2B time over 90; it was 97 minutes. Our average D2B time for the first four months of 2010 was 54.13 minutes, below our internal target of 60 minutes. The next Chest Pain accreditation survey will be in 2011. Our long-term goal is to decrease D2B time to less than 60 minutes consistently before our next survey.

Summary

A multitude of professionals from a variety of healthcare disciplines inside and outside of Riverside Medical Center routinely collaborates on initiatives to improve the processes, which contribute to the high quality of care we provide. We use and rely on our quality improvement process of Plan, Do, Check, and Act to guide us in our efforts to provide care that yields the best outcomes for our patients. Our implementation and continuous monitoring of our Code STEMI program using D2B measures provided an excellent example of the outcomes of interdisciplinary collaboration on quality improvement for our chest pain patients.