Scene STEMI Editorial

By Joseph L. Fredi, M.D., F.A.C.C., assistant professor of Medicine

For patients who present with an ST elevation myocardial infarction (STEMI) the best treatment is primary percutaneous intervention (pPCI) if it can be accomplished in 90 minutes or less. In rural states such as ours many patients do not reside in close proximity to a cardiac center that provides this service on a 24/7 basis.

The creation of acute MI networks does facilitate the transport of patients to pPCI centers and helps reduce the time to reperfusion. However, despite this, patients in our region who have to be transported to a pPCI center rarely achieve the 90-minute goal. There are many factors responsible, but one consistent finding is that STEMI patients spend an inordinate amount of time in an outside facility before transport to a PCI center. We have reported that for our institution the average time a STEMI patient waits in an outside Emergency Department for transport to a PCI center is 86 minutes. For every 30-minute delay in reperfusion there is a 7.5% increase in mortality.

In order to further decrease time to pPCI we have observed that patients with STEMI can sometimes be identified in the field with a 12-lead ECG. These patients can safely be transported directly to a pPCI facility. These “scene STEMI” patients have a consistent and impressive reduction in time to pPCI. We have been so impressed with this observation that we have created a protocol for “scene STEMI” and will be working closely with EMS agencies and providers to help further reduce time to pPCI for our patients with STEMI.

Expect to hear more about this in the coming months. It once again demonstrates that the best care for cardiac emergencies such as STEMI requires a coordinated effort among all who participate in the process. I think we all agree that our patients deserve nothing less than our best efforts.
We are a small, rural Emergency Department. We have 10 beds and see a yearly population of about 14,000. Despite limited resources and nearly 70 miles, by ground, to larger PCI facilities in Nashville, we have a CAN DO attitude.

After our STEMI drill for accreditation, all parties involved gathered to discuss what we had seen and where we could improve our process. We noted areas where we could save time and areas where we could improve without sacrificing patient care in the process.

Our process has improved, and recently we had a door-to-door-to-balloon time of 115 minutes, a hospital record and the PCI facility's record from a referring rural facility.

Our average door-to-EKG time is now four minutes, and 100 percent of our ACS patients are receiving ASA. However, our average out-the-door time is still 50 minutes, and our biomarker time is 74 minutes, with an average hospital scene time of 15 minutes. We still have room for improvement.

The processes continue to evolve and improve:

- We wrote new, streamlined ER orders and put into place protocols for when the ER physician is not immediately available.
- Air Transport is launched early, so we are not waiting for their arrival.
- Upon presentation to the ER doors, registration announces, “Chest pain for triage,” and then pages all ancillary services to the ER to assist our nurses in lab draws, EKGs, and chest X-rays.
- EMS carries our extension tubing so that IV tubing can be plugged straight into the patient instead of having to change it.
- All medicated IVs are placed on a dial-a-flow so Air Transport does not have to swap over tubing upon their arrival.
- Hands-off defib pads are placed on the patient so EMS or Air Transport can plug in quickly without having to change all the leads over.
- We are streamlining paperwork and developing a universal report sheet to reduce face-to-face reports to transport staff.

- On-call numbers to the PCI facilities and automatic patient acceptance is now the norm, so there is no more waiting for a bed.
- Teamwork is the name of the game. The secretary makes the calls, one nurse charts while one nurse does patient care.

Our hospital scene time is now averaging nine minutes. If it takes longer, we look for ways to improve.

It is an ever evolving process, but every patient and every minute counts. We reward our staff with pizza for great times, and discuss areas for improvement for not-so-great times.

I recently received an email from a PCI facility with great news. Our latest transfer had a door-to-EKG time of six minutes, a hospital scene time of 12 minutes, an out-the-door time of 39 minutes, and a door-to-door-to-balloon time of 107 minutes. This was a new hospital record, and a new PCI facility’s record, from a referring rural facility.

Guess I better break out the debit card and order some pizza.
An 87-year-old male presented to Vanderbilt’s Emergency Department via Nashville Fire Department with c/o severe, midsternal chest pain. Reported intermittent chest pain for two days but pain became severe and constant approximately two hours prior to arrival. Denies SOB. Admits nausea, vomiting and diaphoresis.

Physical Exam:
BP – 112/70
P – 75
R – 16
T – 97.6
SaO2 – 97% on room air

General: Awake, alert
Respiratory: clear to auscultation bilaterally
Cardiac: rate regular rhythm, no murmurs

Diagnostic Tests: ECG

What is your diagnosis?
Review this ECG and then visit our website VanderbiltSTEMI.com and click on STEMI newsletter to see the answer and to view the catheterization video of this case.

Gold Star Recognition

We would like to recognize and congratulate these referring facilities for outstanding transfer times for STEMI patients:

🌟 Scene STEMI by Cannon County EMS on 10/02/2010: E2B = 112 minutes
Transported by Cannon County EMS and LifeFlight

🌟 Scene STEMI by White County EMS on 10/13/2010: E2B = 123 minutes
Transported by White County EMS and LifeFlight

🌟 Lincoln Medical Center on 11/11/2010: DD2B = 113 minutes and E2B = 138 minutes
Transported by Lincoln County EMS and AirEvac

🌟 VA York on 11/13/2010: DD2B = 89 minutes
Transported by LifeFlight

🌟 Crockett Hospital on 12/02/2010: DD2B = 107 minutes
Transported by AirEvac

DD2B (door 1-to-door 2-to balloon time)
E2B (EMS arrival on scene to balloon time)
Preliminary Result of the Vanderbilt STEMI Research Survey
By Jae Yoon Park, fourth-year VUSM medical student

In order to study aspects of systems involved in STEMI care for patients presenting to local hospitals, the Vanderbilt STEMI network conducted a survey in November 2010 of all institutions that transferred STEMI patients to VUMC over the past two years. The goal is to obtain data regarding delays and barriers that outlying hospitals experience when calling STEMI referral centers (SRC) for transfer of patients for primary PCI that can be used to improve the care of STEMI patients. About 2,990 surveys were sent out via mail and e-mail to ER physicians, directors, clinical coordinators and nursing directors in Tennessee and southern Kentucky. So far, only about 5.3% have been received, and we would like to receive more of your valuable responses.

From the preliminary analysis of the responses received, respondents treated about three STEMI patients per month, with median distance to the nearest PCI center of 10.5 miles. About 40% worked at an emergency department that was a part of a PCI center but did not have 24/7 coverage, and the majority worked at an emergency department with 10-30 beds. Regarding perceived barriers to arranging transport, many cited the availability of transport (EMS, paramedics, and/or helicopters) in addition to weather conditions as the major reason of delays. Other responses included system delays (paperwork, unnecessary steps/calls needed to activate catheterization lab, etc.) and distance to nearest PCI center as barriers. In addition, although the majority denied any delays in obtaining an ECG, atypical presentations and lack of ED staffing were cited as causes for delays. The majority of respondents did not have any difficulty in deciding which SRC to contact but among the few that had difficulties, patient preference was cited as the major issue. Lastly, although approximately 99% stated that feedback of patient outcomes was valuable, only about 44% reported to have always or almost always received such feedback.

According to the AHA, Tennessee ranks 48th out of 50 states in cardiovascular and coronary heart disease mortality, of which ST-elevation myocardial infarction (STEMI) is a major contributor. Various nationwide initiatives have been implemented to increase awareness and decrease reperfusion times for STEMI patients with the intent of improving outcomes. Regionally, the Vanderbilt STEMI network was created in 2007 to address such issues and provide organized efforts in increasing access to primary PCI and mobilizing systems of care for STEMI patients.

Recently, most improvements have been focused on reducing institutional door-to-balloon (D2B) times of less than 90 minutes. Nationally, we have improved on this metric, from 50% with D2B < 90 min in 2005 to >75% in 2008. However, most patients transferred for reperfusion do not meet this goal, and based on our data, most of the delay in our STEMI network is spent (Continued on page 6)
What type of coronary stent has the lowest complication rate? The Dec. 9, 2010, issue of New England Journal of Medicine addresses this question regarding large coronary arteries. Kaiser et al 1 randomized 2,314 patients to receive sirolimus-eluting stent (first-generation stent), everolimus-eluting stent (second-generation stent) or bare-metal stent. Patients were found to have chronic or acute angiographic significant lesions. About two-thirds of patients would be categorized with acute coronary syndrome and ~50% of this group had acute ST-elevation myocardial infarction. Large coronary arteries undergoing percutaneous intervention were defined as requiring ≥3mm diameter stents (maximal diameter was 4mm given size availability of sirolimus-eluting stents). Some exclusion criteria were unprotected left main disease, cardiogenic shock or stenosis in prior bypass graft. All patients received aspirin therapy (75mg-100mg daily) indefinitely and Plavix (75mg daily) for one year. Ninety-five percent of patients self-reported using one antiplatelet agent at two years. Primary endpoints were death or myocardial infarction at two-year follow-up. Secondary endpoints included late outcomes (seven- to 24-month follow-up) and target-vessel revascularization. Primary endpoints occurred in 2.6% of the sirolimus-eluting stent group, 3.2% of the everolimus-eluting stent group, and 4.8% of the bare-metal stent group, which was not statistically significant. No differences in late outcomes were seen. Target-vessel revascularization was more common in bare-metal stents: 8.9% seen in bare-metal stents versus 3.1% and 3.7% seen in everolimus-eluting stents and sirolimus-eluting stents, respectfully. This was statistically significant with p-value of 0.007 (sirolimus vs. bare-metal group) and p-value of 0.002 (everolimus vs. bare metal group). No statistically significant differences were seen between the two drug-eluting stent types.

Prior studies have shown mixed results with drug-eluting stents vs. bare-metal stents. Stone et al 2 randomized patients to receive drug-eluting stents (paclitaxel-eluting) vs. bare-metal stents in patients undergoing acute myocardial infarctions. At 12-month follow-up, a higher percentage of patients in the bare-metal stent group required target-vessel revascularization than in the drug-eluting stent group (8.7% vs. 5.8%). Similar rates of death were seen at 12 months (3.5% mortality rate in both groups). Mauiri et al 3 completed a retrospective cohort study involving 7,217 patients with acute myocardial infarctions. In contrast to other studies, this study did show significant difference in mortality rate in patients who received drug-eluting stents vs. bare-metal stents. Mortality rates were 8.5% in patients with ST elevation myocardial infarction who received drug-eluting stents vs. 11.6% in patients who received bare-metal stents.

In conclusion, this randomized study demonstrates that in large vessels (≥3mm), bare-metal and drug-eluting stents were not significantly different for death or myocardial infarction at two-year follow-up, and the main benefit for drug-eluting stents is decreased target-vessel revascularization. An important limitation of the study was that the event rate was much lower than anticipated and the trial may have been underpowered to detect a difference in such small frequency rates – however, the 95% confidence intervals with the proportional hazards model rule out a substantial increase in the risk of death from cardiac causes or nonfatal myocardial infarction with drug-eluting stents vs. bare-metal stents. Given the modest benefit of drug-eluting stents, especially in large arteries, and balancing the risk of stent thrombosis, each individual patient will still need to be assessed for their own particular risk (Plavix compliance, risk of upcoming surgery, history of significant bleeding) when deciding which stent to choose.

at the outlying hospital. Also, a recent study by Terkelsen et al has shown how delays in overall systems of STEMI care impact mortality, stressing the need to focus on the whole system of care from the first medical contact-to-balloon time.

In order to assess reasons for delays that can be improved upon in our collaborative efforts in making Tennessee a better place for cardiovascular care, we need your help. The surveys we have sent out will be a valuable source of information to improve STEMI networks and make recommendations to the state task-force on STEMI care. The survey should take no longer than 10 minutes to complete. If you would like to complete the survey electronically, please visit the following website: VanderbiltHeart.com/STEMIsurvey.

Your feedback is extremely valuable to us and will be helpful as we move forward to better serve the residents of Tennessee and southern Kentucky. Please be honest in the surveys, and let us know if we can be of any further assistance for your STEMI program. Thank you in advance!

Please visit the survey website at VanderbiltHeart.com/STEMIsurvey


