

Prehospital 12-Lead ECGs Help to Reduce EMS-to-Balloon Times

CASE STUDY

Challenge:

Fast, Accurate Prehospital 12-Lead ECG Transmission to Reduce Time Between EMS Arrival and STEMI Patient's Balloon Procedure

For STEMI patients, each passing minute equals more heart-muscle damage. Rapid diagnosis and Percutaneous Coronary Intervention (PCI) dramatically increase a patient's chance for survival. According to the American Heart Association (AHA), approximately 400,000 people suffer STEMI annually. But in hospitals with cath labs, only 40 percent of these patients receive appropriate treatment within the 90-minute door-to-balloon (D2B) time recommended by the AHA and the American College of Cardiology (ACC).¹ Delays in treating this most lethal type of heart attack can cause catastrophic heart damage and death.

New insights highlight the importance of prehospital ECGs and stress the vital role EMS plays in positive STEMI patient outcomes.² A push to think beyond D2B times sparked the EMS-to-Balloon (E2B) Challenge: a benchmarking concept that suggests STEMI patients receive treatment within 90 minutes of first contact with EMS.³ The E2B Challenge gives EMS, the emergency department and the cath lab each 30 minutes to perform their duties. Success relies upon two main components: coordinated regional systems and accurate prehospital ECGs.

Obtaining a prehospital 12-lead prior to medication is important because it will influence not only prehospital treatments, but hospital processes as well. "For prehospital providers, an ECG indicating a STEMI dictates certain protocols," said Scott Matin, executive director of Clinical, QA & Education Services for Monmouth-Ocean Hospital Service Corporation (MONOC)—New Jersey's Hospital Service Corporation. MONOC's response area covers over 1,800 square miles and serves more than 2.8 million residents; the service responds to more than 3,000 cardiac calls annually. "The location of the STEMI within the heart also helps to determine what specific treatments should be used for that patient. A prehospital 12-lead can also ensure the patient gets appropriate care...as quickly as possible."



Scott Matin



Until recently, EMS providers lacked a fast, consistent method for transmitting high-quality 12-lead ECGs to receiving hospitals. According to Scott Matin, his agency's paramedics had been faxing ECGs via cell phone for about 10 years. The challenges frequently outweighed the benefits.

"If you were driving down the road and your cell site dropped, the 12-lead stopped transmitting," Matin said. Retransmitting was not always feasible, said Matin. Paramedics treating urgent patients can't stop rendering care to resend an ECG. It was frustrating for paramedics—and not ideal for STEMI patients, whose condition can change rapidly. "Myocardial infarctions can progress quickly," said Matin. "In many cases, the first ECG may be inconclusive. If the first ECG didn't show a STEMI, and we couldn't retransmit in the event a repeat ECG indicated a STEMI, the cath lab might not be activated prior to our arrival at the hospital. This delays treatment."

Previous methods for transmitting prehospital ECGs proved frustrating for the receiving hospitals as well. "We had no receiving stations at our hospitals, we had no alarming," said Jeff Adams, director of Cardiovascular Information Systems for Saint Barnabas Health Care System in New Jersey, which utilizes MONOC's paramedic services. "The paramedics would either have to go through medical control, who would call and tell us we had an ECG on the fax, or the ambulance crew would call us. Then we'd have to go through all the other faxes and find the ECG."



Jeff Adams

Prehospital 12-Leads Reduce EMS-to-Balloon Times

Fax transmissions posed additional problems for physicians and cath lab teams. “Doctors didn’t always want to trust a sloppy, low-quality ECG off a fax machine,” said Matin. “They might wait to activate the cath lab until an in-hospital ECG was performed and they knew for sure.”

Solution:

Digital ECG Transmission System Allows Paramedics to Quickly and Easily Transmit 12-Leads



In an effort to reduce E2B times for its approximately 200 STEMI patients annually, MONOC partnered with the Saint Barnabas Healthcare System to improve the speed and accuracy of prehospital ECG transmissions. Enter the LIFENET® STEMI Management Solution from Physio-Control. Using the latest broadband technology, this all-digital system enables paramedics to transmit 12-lead ECGs from the LIFEPAK® 12 defibrillator/monitor in the field to a secure web-based system. The system then relays the information securely via the Internet to hospital care teams and cath labs, or directly to a cardiologist’s handheld device. The LIFENET STEMI Management Solution bridges the gap between prehospital assessment and in-hospital care, ensuring critical patients receive the right treatment at the right place and at the right time.

“Without a doubt, the LIFENET STEMI Management system has decreased E2B times,” said Matin. “We went from a 5-minute transmission the old way, to 30 seconds or less the new way. Because it takes so little time to actually send an ECG, you can send 10 of them while you’re driving down the road.” This is key in managing dynamic STEMI conditions. The LIFENET STEMI Management system works synergistically with ST Segment Trending within LIFEPAK products to capture 12-lead changes immediately, allowing medics to monitor changes and send this information quickly to hospitals, cath labs or cardiologists,” Matin continued.

Saint Barnabas has seen a huge jump in the number of prehospital ECGs it receives since adopting the STEMI Management Solution. In the past, Adams said, a day might pass between ECGs; they now receive up to two a day at some facilities.

“We’ve made a huge effort to meet the ACC’s D2B initiative and get our time under 90 minutes and to sustain that time,” said Adams, who explained that six of Saint Barnabas’ acute-care facilities were recently awarded three-year accreditation as Chest Pain Centers by the Society of Chest Pain Centers. “One of the best ways to cut your time is to get the ECG prior to the patient’s arrival.

“Let’s say hypothetically a patient is 10 minutes from our facility, and we receive an ECG. We can activate the cath-lab team during off hours; if it’s on hours, we can tell the cath lab they need to prep for a STEMI patient. Inarguably, we’re even saving more than that 10 minutes because everyone has time to prepare themselves so their processes are more efficient downstream.”

Result:

Reduced E2B Times Improve Patient Care and Outcomes

The LIFENET STEMI Management Solution buys STEMI patients time—and attention. The unit is simple to use and requires little management by paramedics, leaving them free to do what they do best.

“Because the new LIFENET system allows paramedics to send ECGs more easily and with less steps, they have time to deliver more care,” said Matin. “The system gives our medics more hands-on time, so we can deliver patients to the hospital with stabilizing treatment already initiated. Quick access to changing 12-leads helps us respond to a patient’s needs. This is one of the few pieces of technology in a long time that has made a significant difference for the patient.”



The LIFENET STEMI Management Solution represents an important component of Saint Barnabas' push toward better cardiac care. According to Adams, medical-care teams demand access to the latest, most effective tools for treating STEMI patients. "We have a tremendous amount of buy-in for improving treatment times system wide," Adams said. "Our physicians really take this to heart in order to most effectively manage our patients. They want this. They want it to improve care. They want their D2B times to look the best. It gives us an opportunity to exceed what other facilities can do."

The LIFENET STEMI Management solution represents a win for paramedics, hospital staff and patients. "I don't know how you could argue the benefits," Matin said. "This system improves patient outcomes by cutting E2B and D2B times. When EMS delivers the patient to the hospital, the ED and cath lab know they have a STEMI and can make that patient an instant priority, even in today's crowded emergency rooms. It helps the patient get treatment faster, get that balloon faster, and they benefit. That's indisputable."



Good, Fast and Cost-Effective

The LIFENET STEMI Management Solution represents a leap in technology—and cost-effectiveness. Because it's a web-based system, in most cases it requires no additional equipment—users simply download a software application onto their agency's existing hardware. Modest hardware purchases might be necessary for some, but the cost is minimal and the payoff is huge.

"Everything that is an upgrade or a patient benefit usually costs something," said Scott Matin, executive director of Clinical, QA & Education Services for MONOC—New Jersey's Hospital Service Corporation. "This is one of the few times when we got a huge benefit, with little cost." Because MONOC had not fully transitioned from an analog charting system to digital at the time of purchase, they had to acquire modems to enable the ECG transmissions. "We had to buy a little bit of hardware on our end, but the cost was minimal. It's a no-brainer for us: Our life is better. The patient's life is better. It's inexpensive. Everyone wins."

Jeff Adams, director of Cardiovascular Information Systems for Saint Barnabas Health Care System in New Jersey, said the LIFENET STEMI Management Solution is an investment hospitals can't afford not to make. "It's an inexpensive way to make a dramatic improvement in our D2B times," Adams said. "D2B times are looked at as almost a report card number for hospitals. This was a very important thing that our healthcare system needed to do. We couldn't bypass this."

Saint Barnabas invested in a few PCs for each participating facility, as well as simple things such as network drops and analog lines. "It's an easy system to install. It's an easy system to work with," Adams said. "There's not another company that provides anything similar. It's a cost-effective solution to putting together a world-class STEMI program."

1. www.americanheart.org, October 2008
2. Rokos et al. Rationale for establishing regional ST-elevation myocardial infarction receiving center (SRC) networks. *Am Heart J.* 2006, Oct; 152(4):661-7.
3. Rokos, I and Bouthillet, T. The emergency medical systems-to-balloon (E2B) challenge: building on the foundations of the D2B alliance. *STEMI Systems.* 2007; Issue 2, May.

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