

Using Wireless Technology to Improve Door-to-Balloon Times

Dhruva VN, Abdelhadi SI, Anis A, et al. ST-segment analysis using wireless technology in acute myocardial infarction (STAT-MI) trial. *J Am Coll Cardiol* 2007;50:509–13.

Study Overview

Objective. To examine the effects of implementing an automated wireless network to reduce door-to-intervention (D2I) times in ST-segment elevation myocardial infarction (STEMI).

Design. Before and after study.

Setting and participants. Patients with suspected STEMI who were identified by emergency medical services (EMS) personnel in the field between June and December 2006 were included. The STAT-MI network automatically transmitted the ECG obtained by EMS personnel to the University Hospital (Newark, NJ) emergency department (ED) and to the on-call cardiologist. The cardiologist accessed the e-mail containing the ECG via a smartphone and then triaged the patient via a direct phone call to EMS personnel. Patients with STEMI transported by EMS in the previous year were used as historical controls.

Main outcome measures. The primary outcome was D2I times for primary percutaneous coronary intervention. Secondary outcomes were door-to-cardiologist notification time and door-to-angiography time.

Main results. Differences in baseline characteristics between the 2 groups were not statistically significant. 80 ECGs were transmitted from EMS to the on-call cardiologist for evaluation, and 20 (25%) were interpreted as consistent with STEMI. After implementing the STAT-MI network, D2I time was reduced by 66 min (95% confidence interval [CI],

145.6–80.1 min; $P < 0.001$). Mean door-to-cardiologist notification time was reduced by 76 min (95% CI, 61.4 to –14.6 min; $P < 0.001$), and mean door-to-angiographic time was reduced by 60 min (95% CI, 108.1–47.6 min; $P < 0.001$).

Conclusions. Transmitting ECGs of patients with suspected STEMI via an automated wireless network can decrease D2I times to < 90 minutes, as recommended by American College of Cardiology/American Heart Association guidelines.

Commentary

One of 6 strategies suggested by Bradley et al [1] for improving door-to-balloon time includes ED activation of the cardiac catheterization laboratory while the patient is en route to the hospital. This strategy requires the integration and coordination of many different departments, including cardiology, emergency medicine, and EMS. In this study, Dhruva et al examined the use of wireless and Bluetooth technology to automatically transmit ECGs from the field to ED staff and cardiologists on call, which reduced D2I times an impressive 66 minutes.

Although the STAT-MI network is impressive and uses novel technology to overcome many obstacles of transmitting ECGs via EMS, the findings of this study are limited. Most institutions do not have the resources to implement such a technologically driven system, and many areas still do not have reliable EMS transmission of ECGs; therefore, this particular system may not be generalizable to other institutions with limited resources struggling with door-to-balloon

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times. Since the control group in this study did not necessarily have 12-lead ECG transmission before arriving in the ED, one cannot conclude that a wireless EMS system activating a cardiologist adds anything to a telephonic EMS system notifying the cardiac catheterization laboratory via the ED. In addition, the STAT-MI program was implemented during a time when door-to-balloon times were becoming more prominent as a quality measure, and therefore times could have improved regardless of whether or not a wireless automated network was implemented.

Applications for Clinical Practice

As door-to-balloon times become more important for

judging quality, wireless and Bluetooth technology can be used to instantly transmit ECGs from EMS to an on-call cardiologist in an effort to improve D2I times. However, the widespread dissemination of this technology would be costly and would require the collaboration of many different departments.

—Review by Robert L. Huang, MD, MPH

Reference

1. Bradley EH, Herrin J, Wang Y, et al. Strategies for reducing the door-to-balloon time in acute myocardial infarction. *N Engl J Med* 2006;355:2308–20.

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