Department of Medicine

ST-Segment Elevation (STEMI) Real Time Data Feedback –A Process of Care Initiative

Orlando E. Rivera RN
Lehigh Valley Health Network, Orlando_E.Rivera@lvhn.org

Nainesh Patel MD
Lehigh Valley Health Network, nainesh_c.patel@lvhn.org

Bruce Feldman DO
Lehigh Valley Health Network, bruce.feldman@lvhn.org

Mercedes Rios-Scott BS
Lehigh Valley Health Network, mercedes.scott@lvhn.org

David M. Richardson MD
Lehigh Valley Health Network, David.Richardson@lvhn.org

See next page for additional authors

Authors

Orlando E. Rivera RN, Nainesh Patel MD, Bruce Feldman DO, Mercedes Rios-Scott BS, David M. Richardson MD, J Patrick Kleaveland MD, David A. Cox MD, and Ronald S. Freudenberger MD

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Orlando Rivera RN; Nainesh C. Patel MD; Bruce Feldman DO; Mercedes Rios Scott BS; David Richardson MD; J Patrick Kleaveland MD; David Cox MD; Ronald Freudenberger MD

Lehigh Valley Health Network, Allentown, Pennsylvania

Abstract: (Background / Objectives)

Early identification of ST-Segment elevation Myocardial Infarction (STEMI) patients and prompt treatment aimed at reducing door-to-balloon time has been associated with reduction in mortality. 1 In order to further improve our STEMI process of care at Lehigh Valley Health Network, we reviewed a study by Bradley et al outlining six strategies for improving door-to-balloon (D2B) time in the STEMI patient population. 2 Following review of the literature we sought to add a process for real-time data feedback, as discussed by Bradley. We believed timely feedback would strengthen our collaboration with emergency medical services (EMS), and improve long term STEMI outcome.

Methods:

A standardized method of data collection and communication with a report card that contained information about each patient's care was created and implemented. The process included the appointment of a dedicated person (ACS Program Coordinator) responsible for the real-time feedback process, and the creation of an IRB-approved semi-automated Myocardial Infarction (MI) Alert database (Figure 1). This allowed for consistent and real-time (within 24 hours) data feedback generation. The real-time feedback process was implemented on April 1, 2009. Feedback, in the form of a report card, was provided to our EMS partners, Emergency Department (ED) nurses and physicians, as well as the cardiac catheterization lab nurses and technologists. Their performance during a STEMI emergency was documented, emphasizing time to diagnosis, treatment and patient outcome. Two versions of the report were implemented, the Hospital version (Figure 2), and the EMS version (Figure 3).

We performed a retrospective review of STEMI patients arriving to the ED between July 1, 2006 and March 31, 2013. Patients were stratified two ways - by the pre and post implementation of the real-time feedback process and the source of activation of the STEMI process of care (ED vs. EMS).

Results:

(Table 1)
- Between July 2006 and March 2013 a total of 1,635 STEMI patients were treated, of the total patients treated 1,385 (84.70%) received percutaneous coronary intervention (PCI).
- The ED activated the STEMI process for 1,040 (63.60%) patients.
- EMS activated the STEMI process for 595 (36.39%) patients.

Table 1.

STEMI Activation Source	Total (Volume)	No PCI	Before Implementation		After Implementation		Volume Percent Change (Adjusted)	D2B Change (Minutes)
			Total Volume	D2B (Minutes)	Total Volume	D2B (Minutes)		
All Combined	1635	251	503	71	881	65	20.42%	-6
EMS	595	61	139	45	395	41	95.37%	-4
ED	1040	190	364	76	486	63	-8.21%	-13

Figures
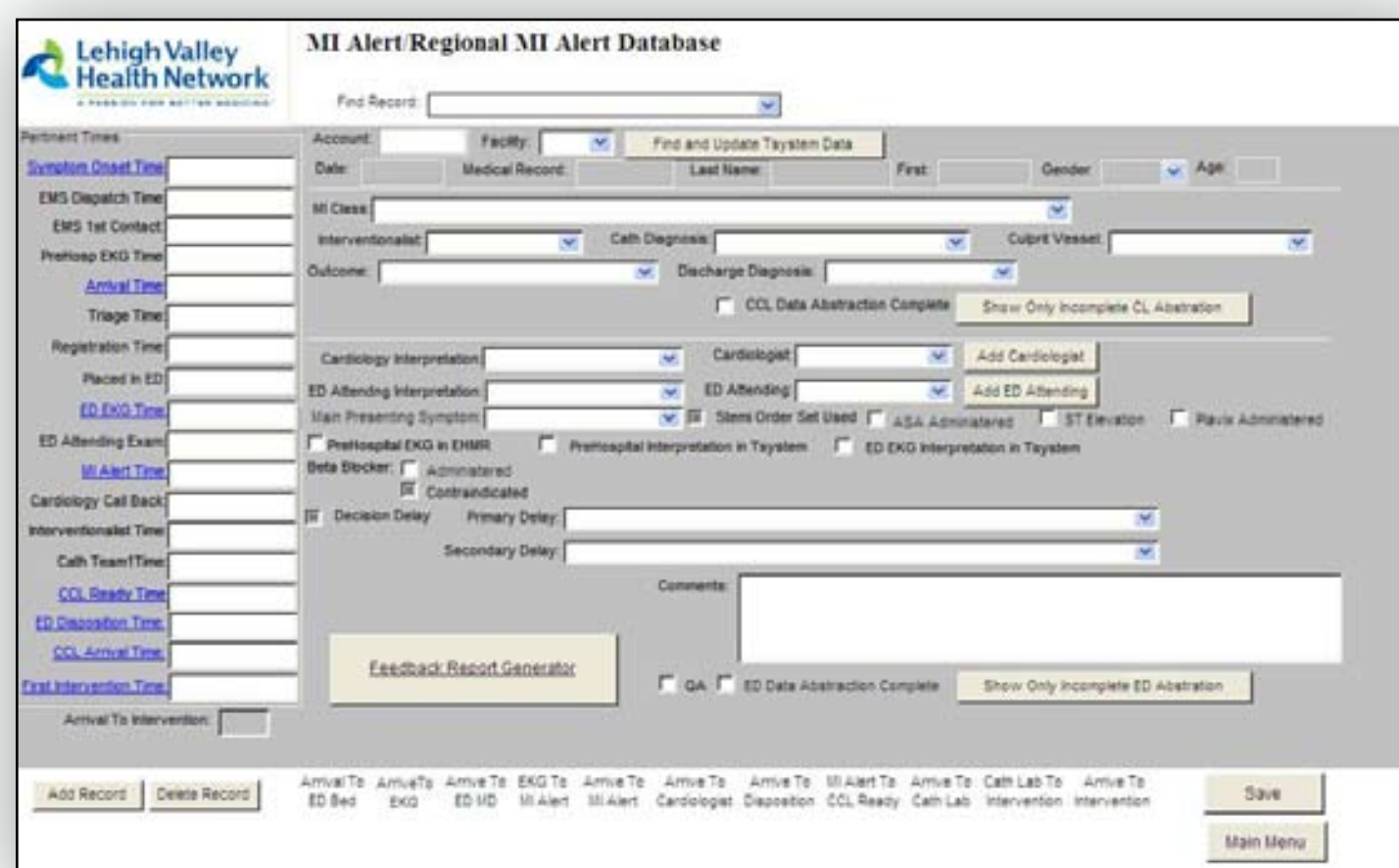
Figure 1. MI Alert Database

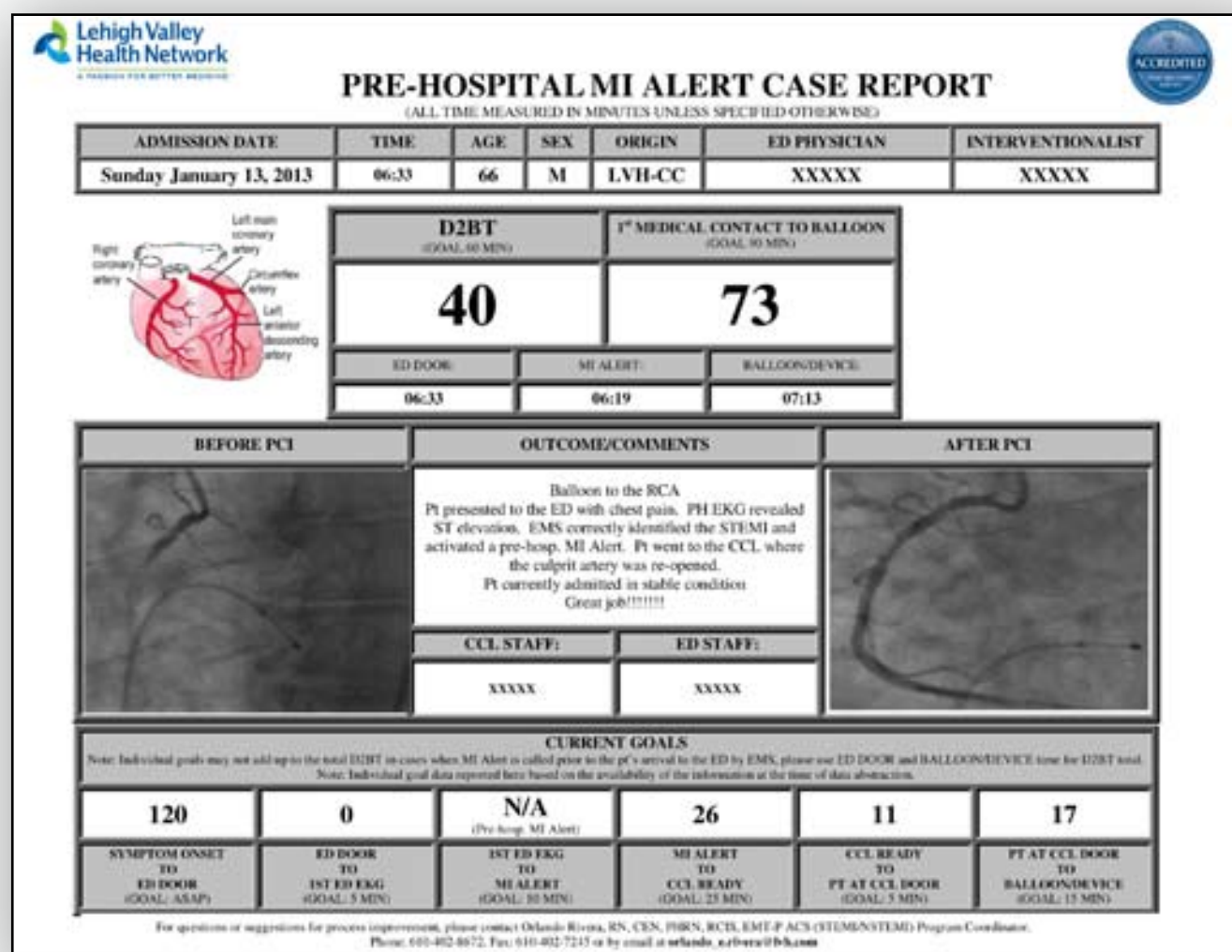**Figure 2.** Real-time Feedback Report (Hospital Version)

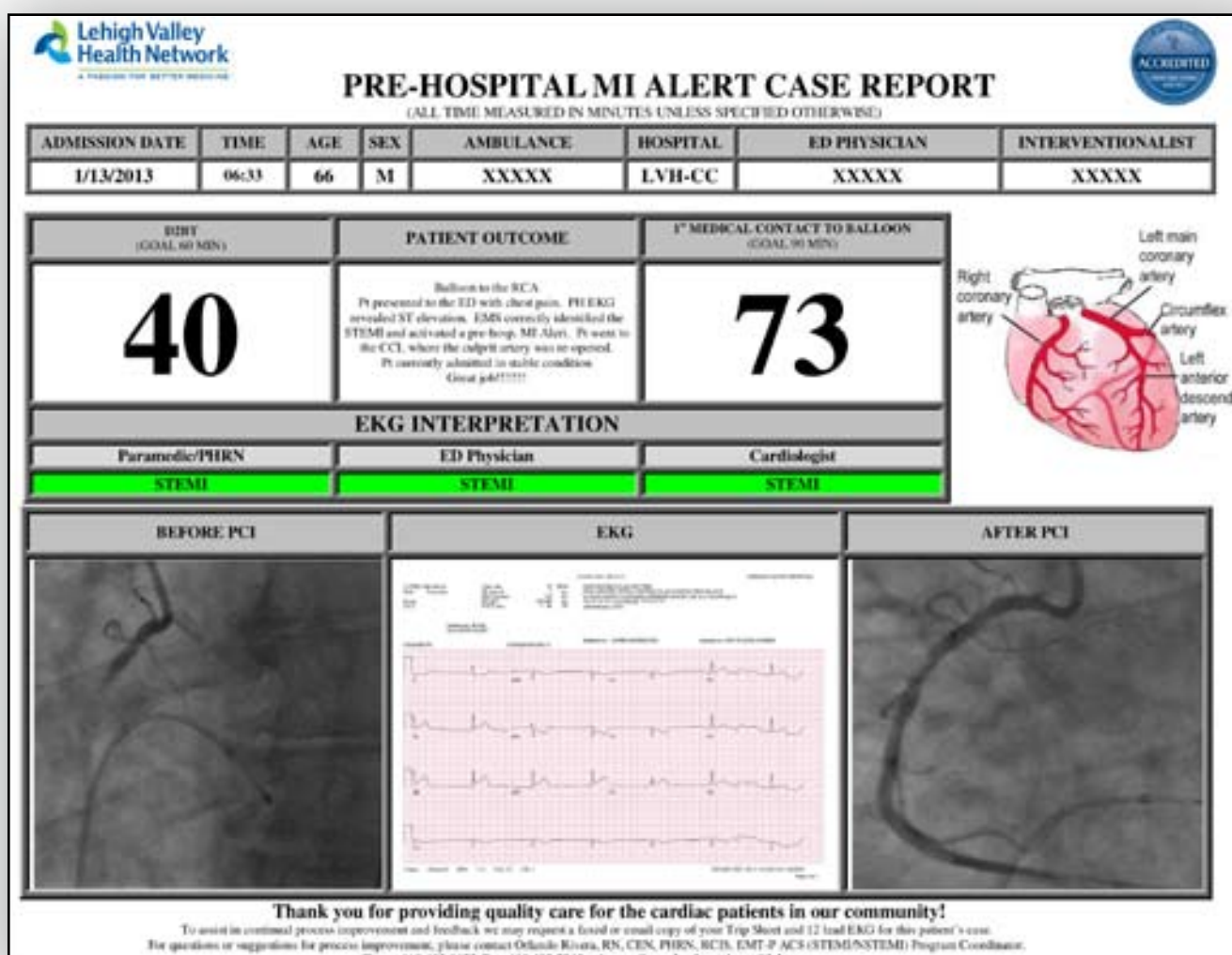**Figure 3.** Real-time Feedback Report (EMS Version)

Figure 4. Effects of Real-time Feedback on Pre-Hospital STEMI Volume (July 2006 through March 2013)
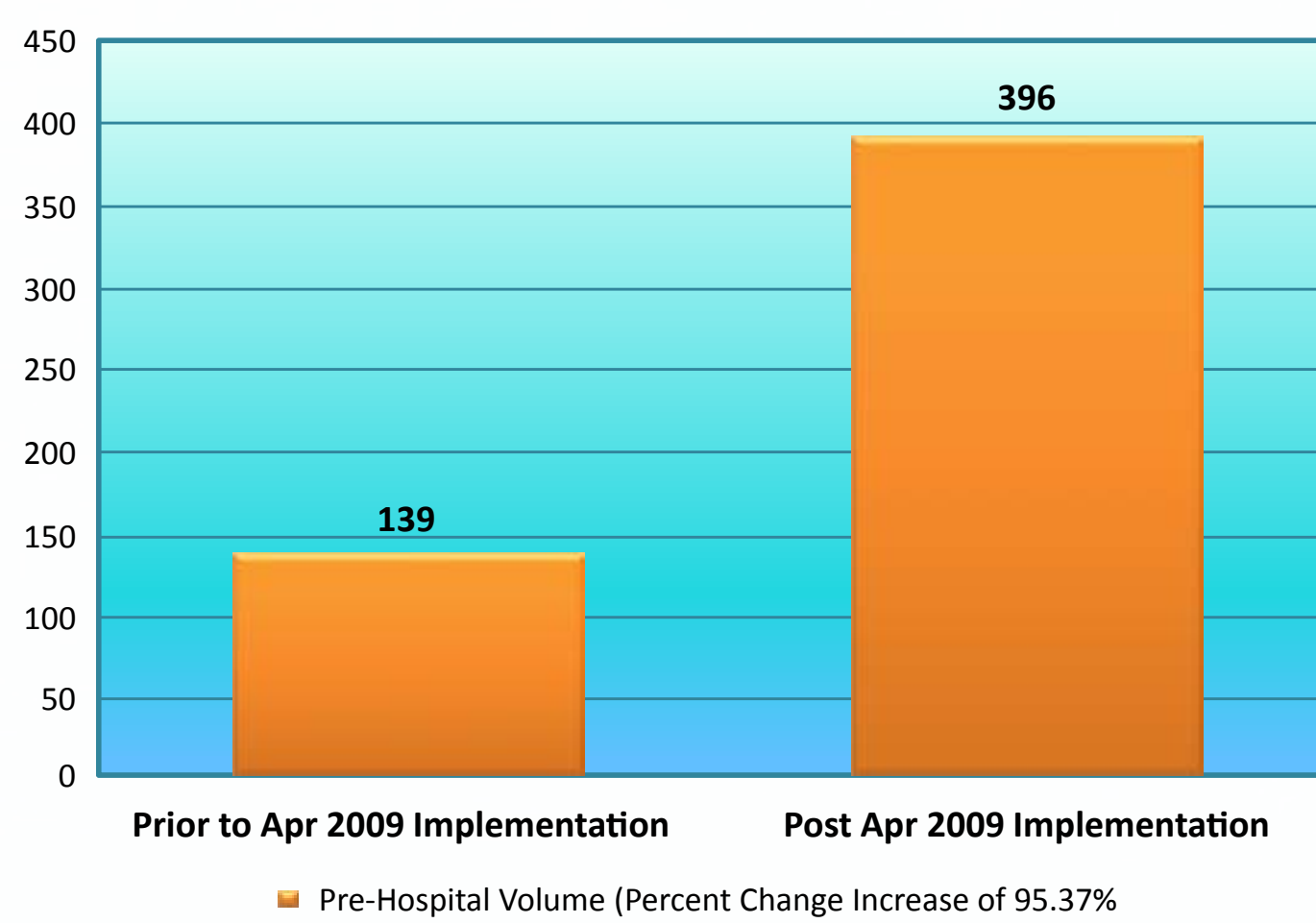

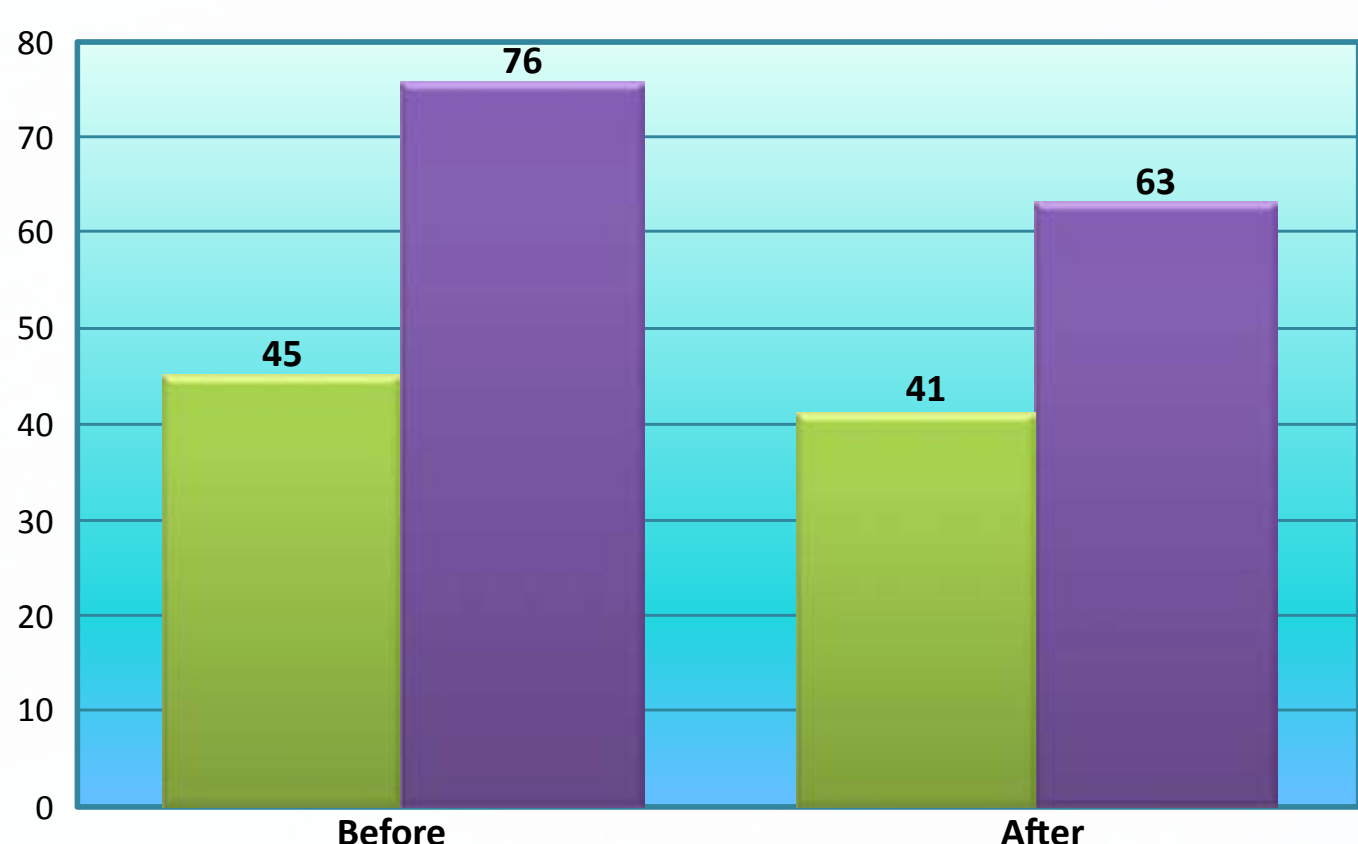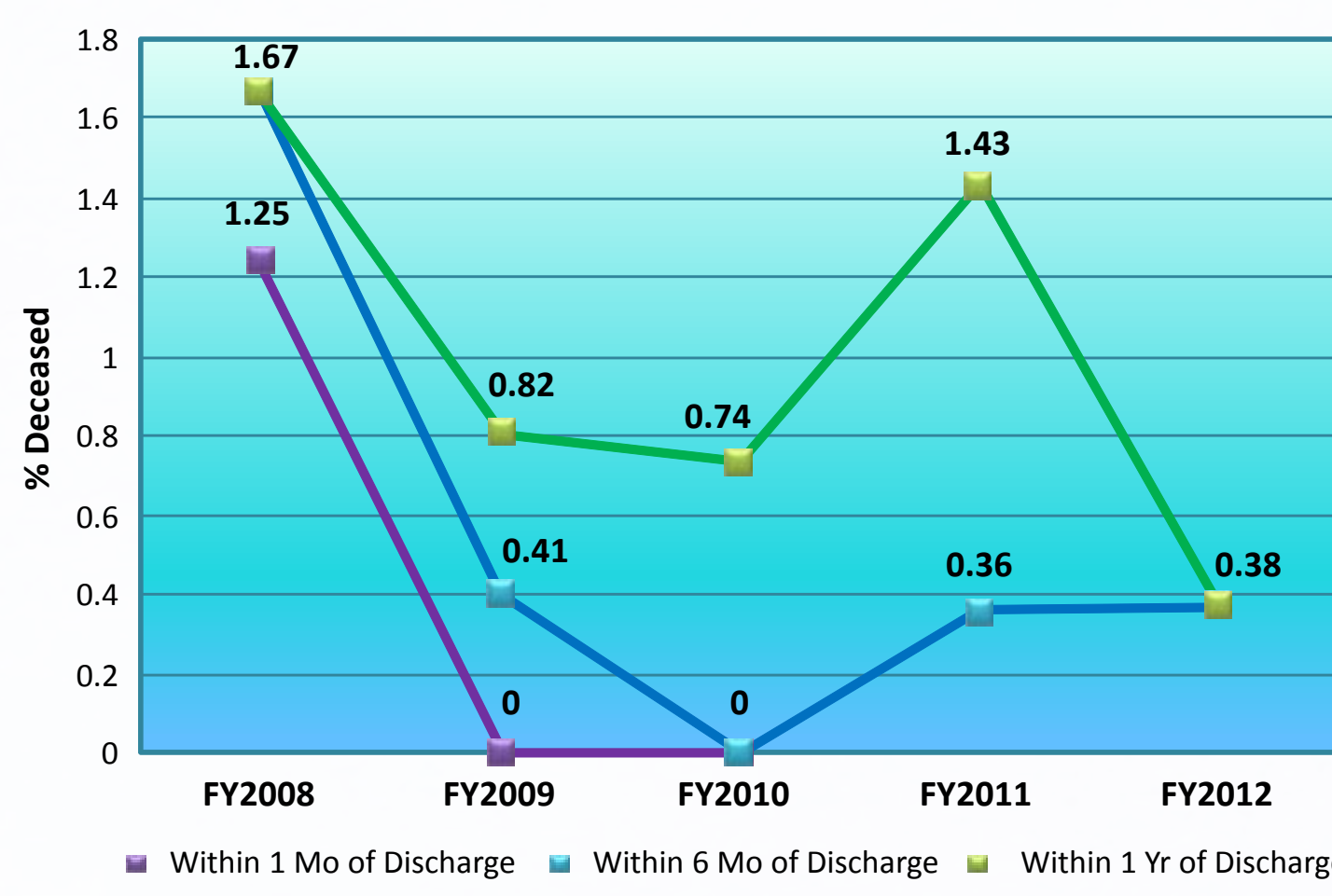**Figure 5.** Effects of Real-time Feedback on Door to Balloon Times (July 2006 through March 2013)

Figure 6. Longterm STEMI Mortality Rate FY2008 through FY2013 (July - March)

(Figure 4)
- Post implementation of the real-time feedback process, an Increase on STEMI patient volume was observed for the EMS group (95.37%).

(Figure 5)
- Post implementation, a reduction of median D2B time for ED STEMI activations was observed (76 minutes (n=364) pre and 63 minutes (n=486) post).
- Post implementation, a reduction of median D2B time for EMS STEMI activations was observed (45 minutes (n=139) pre and 41 minutes (n=395) post).

(Figure 6)
- Lower D2B times have contributed to falling long term STEMI mortality rates.

Conclusion:

Real-time feedback provided within 24 hours of patient arrival with STEMI was successful in reducing D2B time and improving long term clinical outcomes. Post implementation, the volume of EMS STEMI activations increased by 95.37%. One of the most beneficial outcomes from this process was improved communication with all members of the STEMI process of care team, including administrators, physicians, nurses, technologists, and EMS. A successful feedback process requires a dedicated person responsible for data collection and distribution. Providing an accurate, consistent, and timely feedback report will maximize the opportunity for reducing time to treatment and improving long term patient outcome. Our findings suggest that a real-time feedback process can be beneficial for hospitals looking to improve their STEMI process of care, improve long term STEMI patient outcomes, increase pre-hospital STEMI patient volume, and strengthen collaboration with EMS.

References:
1. Rathore SS, Curtis JP, Chen J, et al. Association of door-to-balloon time and mortality in patients admitted to hospital with ST elevation myocardial infarction: national cohort study. BMJ 2009;338:b1807
2. 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: 2308-2320.

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