

The Effect of Shortening Door to Balloon Time (<90 >Minutes) in STEMI Patients Transferred From Outside Hospitals

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Rapid Door-to-Balloon Time (≤ 30 minutes) in the Treatment of Acute ST-Elevation Myocardial Infarction (STEMI) is Associated With Reduced Length of Hospital Stay and Improved Clinical Outcomes

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Introduction

- Coronary artery disease is the leading cause of death in the United States. ST-Elevation Myocardial Infarction (STEMI) is its extreme manifestation. Significant research has been devoted to reduce the mortality and morbidity in this condition.
- In STEMI patients early reperfusion is an important consideration in improving outcomes.
- The 2007 ACC/AHA guidelines sets a goal of reperfusion of the infarct related artery to within 90 minutes of presentation. This benchmark was shown as a cutoff time beyond which significantly worsened outcomes could be expected and became known as “door to balloon time”. The 2013 ACC/AHA guidelines now recommends a FMC-device time of ≤ 90 mins.
- However there are fewer studies studying the effect of further reducing door to balloon time (D2B) on in-hospital mortality and length of stay.

Objective

- Our study examined the effect of very short D2B time ≤ 30 min on length of hospital stay and in-hospital mortality. The hypothesis is that further reducing the D2B time to ≤ 30 minutes will significantly reduce in-hospital mortality and length of stay.

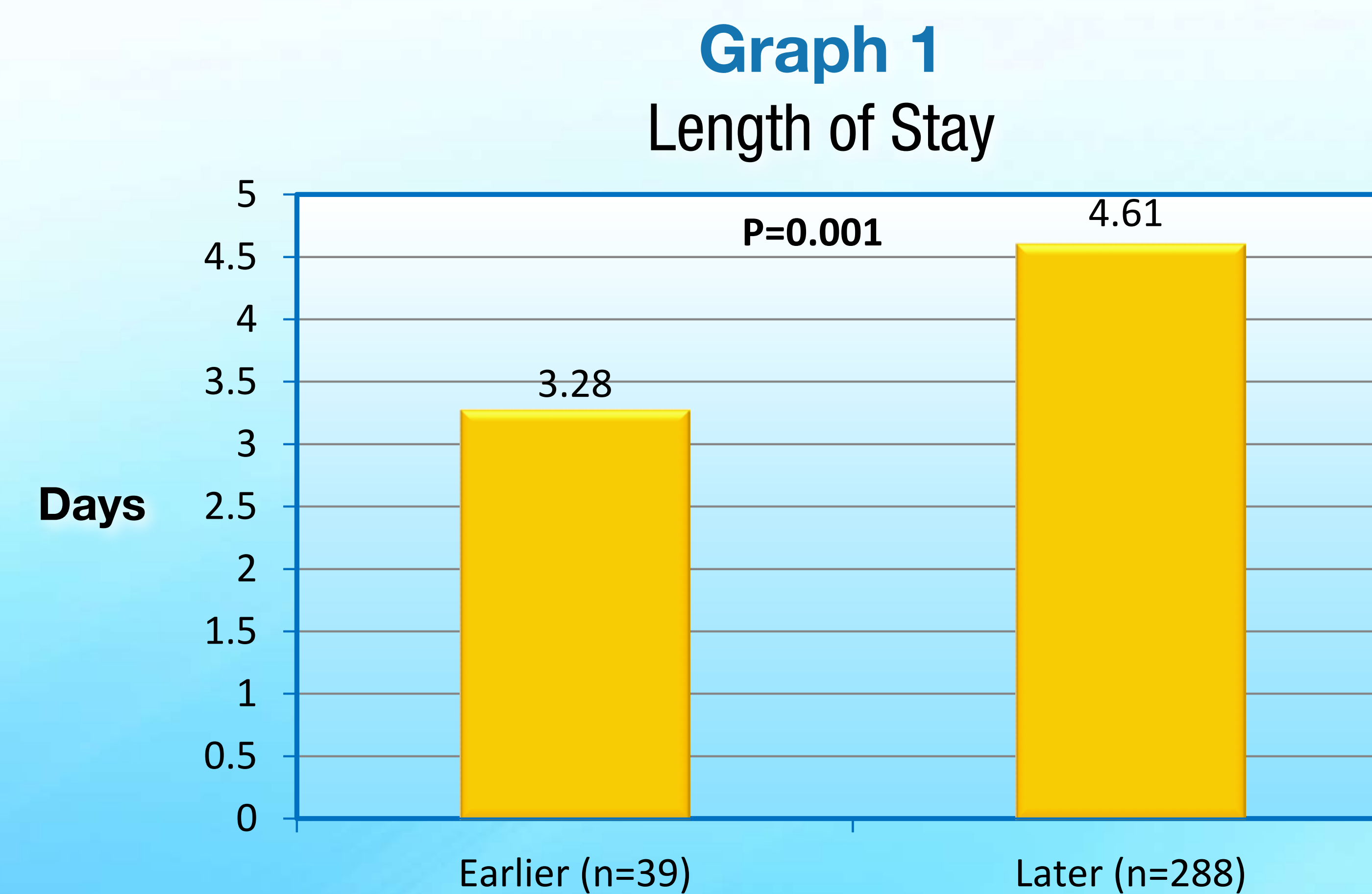
Methods

- We examined 356 consecutive patients who presented to Lehigh Valley Health Network, an 880 bed academic community hospital in Allentown, PA from 2008-2011. The study included patients who presented with acute STEMI and underwent percutaneous coronary intervention.
- Of these 356 patients 40 (11%) had a D2B of ≤ 30 min (referred to as the “earlier” cohort) and 316 (89%) had a D2B of > 30 min (“later” cohort).
- 28 patients were excluded from the length of stay calculation in the later cohort and 1 from the earlier cohort. Reasons for exclusion included death, presence of cardiogenic shock, transfer to other hospitals for advanced heart failure therapies, ventricular fibrillation requiring hypothermia cooling and preexisting multiorgan failure.
- D2B time of the cohorts is presented below. (Table1)
- Demographic data such as age and coronary artery risk factors such as, male gender, hypertension, tobacco use, history of coronary artery disease, diabetes, prior CVA and age were similar between the two groups (Table2). (p-values represent differences between groups after exclusions).

	Earlier (n=39)	Later (n=288)
Door to Balloon (min)	24.9	63

	Earlier (n=39)	Later (n=288)	p Value
Average Age (yrs)	61.3 \pm 10.0	61.9 \pm 13.0	0.711
Male Gender	71.7%	74.3%	0.747
Hypertension	71.8%	63.2%	0.077
Tobacco Use	25.6%	34.0%	0.276
Prior CAD	23.1%	25.3%	0.757
Diabetes	25.6%	21.2%	0.553
Dyslipidemia	76.9%	51.7%	0.001
Prior CVA	2.6%	4.2%	0.572

	Earlier (n=39)	Later (n=288)	p Value
Left ventricular EF%	50.7	47.7	0.061
Drug Eluting Stent	53.8%	61.8%	0.358
Anterior Infarct by EKG	20.5%	46.2%	0.001



Results

- Overall Mean time to hospital discharge in the earlier group was 3.28 days which lengthened to 4.61 days in the latter group ($p < 0.001$). Without exclusions the mean time to hospital discharge in the later cohort was 4.96 days. (Graph 1)
- Ten deaths were noted in the later group. No deaths were seen in the earlier group ($p = 0.001$).
- In the later group, 25 patients had cardiogenic shock compared to none in the earlier group.
- Left Ventricular ejection fraction trended towards significance being lower in the later group (50.7% vs 45.7%, $p = 0.06$). The prevalence of anterior myocardial infarction was higher in the later group ($p < 0.001$). (Table 3)
- Even after excluding patients in cardiogenic shock a clear difference is still noted in time to hospital discharge as it relates to door to balloon time.

Conclusions

- Reducing door to balloon time is associated with reduced length of hospital stay.
- Short door to balloon times were associated with fewer mortalities and episodes of cardiogenic shock.
- A hypothesis for this difference could include salvage of more myocardial muscle by faster revascularization, as demonstrated by a trend towards higher left ventricular ejection fraction in those revascularized early.
- Confounding factors include increased prevalence of anterior myocardial infarction in later cohort.
- Future direction involves quantifying scar burden by follow up echocardiogram or MRI as well as examining outcomes at 30 days and 1 year.

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