

which was twice the number in our study. Unlike our study, which was restricted to only inpatients undergoing PCI, the NCDR analysis included only intermediate coronary stenoses. In addition, the NIS database represents a more generalizable portion of hospitals, as participation in the NCDR database is voluntary.

This study is limited by the data source, which is restricted to only inpatients and does not capture data on outpatient PCI procedures. In addition, being an administrative database, it could be subject to coding errors. Although this study suggests that there has been a nonstatistically significant relative increase in the rate of inpatient IVUS use from 2007 to 2013, intravascular imaging has been used in only a small fraction of inpatient PCI procedures (<10%). Future studies should investigate the potential barriers that could explain the low rates of intravascular imaging use in clinical practice.

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RESEARCH CORRESPONDENCE

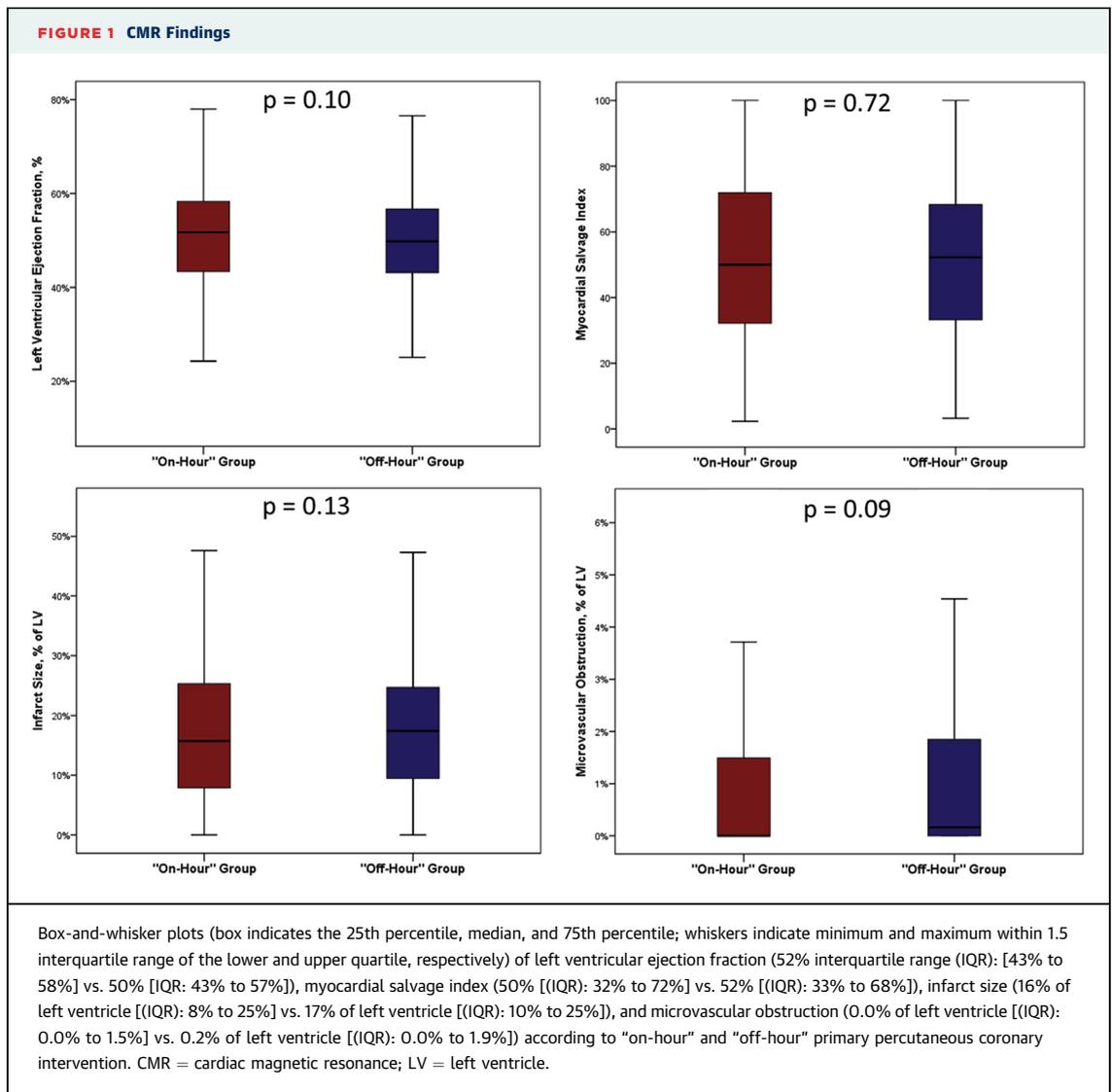
Impact of Off-Hours Versus On-Hours Primary Percutaneous Coronary Intervention on Myocardial Damage and Clinical Outcomes in ST-Segment Elevation Myocardial Infarction



There is an ongoing debate on potential differences in outcome between ST-segment elevation myocardial infarction (STEMI) patients presenting outside of usual hospital working hours (“off-hours”) compared with patients presenting during classical working hours (“on-hours”) (1,2). The aim of this study was to evaluate potential differences in the amount of salvaged myocardium and the extent of myocardial damage by applying cardiac magnetic resonance (CMR) imaging in a large contemporary cohort of STEMI patients.

This was an analysis of the pre-defined CMR sub-study of the AIDA STEMI (Abciximab Intracoronary versus intravenous Drug Application in ST-Elevation Myocardial Infarction) trial (3). Consecutive STEMI patients presenting <12 h after symptom onset were included. Off-hours was defined as primary percutaneous coronary intervention (PPCI) during weekdays from 6 PM to 8 AM, weekends or holidays. Patients underwent CMR within 10 days after the index event. The standardized scan protocol for assessment of myocardial damage have been described elsewhere (3,4). Differences between groups were tested by means of the *t* test (Welch) and the Wilcoxon-Mann-Whitney *U* test. Proportions were compared by the chi square test and Fisher exact test. All tests were 2-tailed, and a *p* < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS Statistics 22.0.0 (IBM, Armonk, New York). The power of this study to exclude a difference in myocardial salvage or infarct size of 5% between groups is 83% and 99%, respectively.

Between July 2008 and April 2011, 795 patients consented to participate. A total of 791 patients (99%) had information regarding the time of PPCI. Of these, 461 patients (58%) received off-hours PPCI. The comparison between off-hour and on-hour patients revealed well-balanced age, risk factors, and comorbidities, resulting in similar Thrombolysis



In Myocardial Infarction risk score (all $p > 0.05$). There was no significant difference in angiographic characteristics or concomitant treatment. There was also no significant difference in CMR findings between groups (Figure 1). We observed 53 major adverse cardiac events (all-cause death, re-infarction, and new congestive heart failure) events (6.7%) after 12 months. Patients with off-hour or on-hour PPCI had a comparable major adverse cardiac events (6.7% vs. 6.7%; $p = 0.97$) rate.

The majority of patients underwent PPCI outside of usual hospital working hours, which is in line with previous studies (1,2) and highlights how commonly this scenario occurs in a time period with typically reduced resources. Our findings with so far unique recording of CMR outcome measures are reassuring and indicate that revascularization outcomes in STEMI patients do not depend on time of PPCI. The

major determinants to limit myocardial injury before PPCI are reduction of ischemia time and severity, and the major determinants thereafter are restoring microvascular coronary blood flow and reducing reperfusion injury. In our analysis, total ischemia time and door-to-balloon time were not significantly different between both groups. This observation and similar findings in other studies (5) underscore that short reperfusion delays can be achieved after hospital working hours, which is likely to be of major prognostic relevance. Of note, our cohort is too small to draw definitive conclusions regarding differences in clinical outcome.

In conclusion, this study fills knowledge gaps left by previous trials by showing that there are no significant differences in myocardial damage following PPCI whether it is undertaken during or after routine working hours. These data suggest

efficacy and safety for PPCI in STEMI patients independent of the time of revascularization in contemporary health care systems.

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