To the Editor: In ST-segment elevation myocardial infarction, reperfusion with primary percutaneous coronary intervention (pPCI) is a time-sensitive process. On the basis of current American College of Cardiology/American Heart Association guidelines (1), door-to-balloon time (D2B) has become a reportable core measure of quality and correlates with outcomes in high-risk and early presentation patients (2). However, reperfusion of the infarct-related artery (IRA), measured by door-to-reperfusion time (D2R), can occur at a time other than that of the initial balloon or device deployment. The purpose of our analysis was to compare D2B and D2R to determine how often D2B overmeasured, undermeasured, or was equivalent to D2R.

We prospectively studied 145 consecutive, nontransferred patients who presented to our emergency room with ST-segment elevation myocardial infarction and underwent pPCI between December 14, 2007, and December 13, 2008. All patients received aspirin, unfractionated heparin, and eptifibatide before the procedure. We recorded D2B (time from emergency room arrival to the first use of an intracoronary balloon, stent, or thrombectomy device in the IRA) and D2R (time from emergency room arrival to the first documentation of TIMI [Thrombolysis In Myocardial Infarction] flow grade 2 or 3 in the IRA) for each patient. An independent reviewer later verified D2R.

The D2B and D2R variables were significantly skewed, and the sample size was not large enough to approximate normal Gaussian distributions. Therefore, comparisons between D2B and D2R were performed using Wilcoxon matched-pairs signed rank testing, reported as median values with associated ranges of the 25th and 75th percentiles. A 2-tailed p value < 0.05 was considered significant. All statistical analyses were performed using STATA version 7 (Stata Corp., College Station, Texas).

In our series of 145 consecutive cases, D2B was equal to D2R in 43 cases (30%), longer (reperfusion documented before device utilization) in 84 cases (58%), and shorter (additional device and/or drug therapy required after the first device to establish TIMI flow grade 2 or 3) in 18 cases (12%) (Fig. 1). We found D2B was longer than D2R by ≥5 min in 59 cases (41% of total cases), and by ≥10 min in 30 cases (21% of total cases). The median time for D2B to occur was of 67 min (25% to 75%, range 53 to 81 min) and for D2R, it was 61 min (25% to 75%, range 49 to 77 min). The difference between D2B and D2R (case-by-case D2B minus D2R) was highly significant (median of +2 min, Wilcoxon rank sum highly significant at p < 0.0001).

Our findings indicate that D2B commonly overmeasures D2R (D2B > D2R in 58% of cases), where reperfusion is documented before device utilization. Upon reperfusion, the patient may benefit from the team having “nonpenalized” time to reassess the patient’s clinical, hemodynamic, and anticoagulant status and to consider various strategies of therapy including balloon dilation, direct stenting, thrombectomy, and/or adjunctive pharmacologic support. Direct stenting, which is perhaps advantageous following establishment of flow (3), is better performed by pre-deployment administration of intracoronary vasodilators. This nonpenalized time spent to optimize final reperfusion stands in stark contrast to a gaming strategy of blindly plodding ahead according to pre-specified and potentially inappropriate procedural protocol to selfishly optimize a metric (D2B). This is acknowledged by the 2008 American College of Cardiology/American Heart Association Task Force on Performance Measures, who states that “the goal of pPCI is to restore flow in the IRA,” and that in cases in which reperfusion occurs before device utilization, “the operator may use more time in the consideration of the approach to device therapy without significant adverse consequences for the patient” (4).

Our findings indicate that D2B sometimes undermeasures D2R (D2B < D2R in 12% of cases), where additional device and/or drug therapy are required to establish reperfusion (Fig. 1). In this circumstance, although the metric has been “achieved” (device utilization), the patient and purpose have not yet been served (reperfusion).

Whereas D2B reflects the quality of an institution’s process of care, D2R more accurately reflects patient outcomes. This dichotomy was addressed by the 2008 Task Force, who supported the process of device (D2B), as opposed to the outcome of reperfusion (D2R), citing the consistency of this metric with existing guidelines (1) and the more objective ascertainment of device time by nonclinical abstractors. They acknowledged, however, that D2B does not identify the time of reperfusion and that this is a process measurement and not a performance measurement. Others (5), however, have supported tracking time to reperfusion, citing the more accurate correlation to clinical outcome and the unfortunate push toward gaming a system to benefit a device metric rather than clinical outcome.

The difference between D2B and D2R is statistically significant and warrants reconsideration of which metrics institutions and professional societies track, compare, and report. We found that D2B is an accurate metric for the quality of an institution’s process of care, and D2R is the better metric by which to assess the quality of care regarding patient outcomes. We should track both D2B and D2R as key metrics in pPCI, hopefully allaying an unnecessary and inappropriate force to rush to device therapy upon initial reperfusion, while heightening efforts to achieve reperfusion should it fail with initial device therapy.
Letters to the Editor

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We fully agree with the importance of following such rules, not only during the reporting and writing phase but also during the design and implementation of clinical trials.

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