

EDITORIAL COMMENT

# Post-Percutaneous Coronary Intervention Discharge Against Medical Advice



## Infrequent But Deadly\*

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Percutaneous coronary intervention (PCI) remains the most common revascularization procedure in the United States, with approximately 954,000 PCIs performed annually. Coronary heart disease has an estimated annual cost of more than \$200 billion (1). Discharge against medical advice (DAMA) occurs in 1% of all patients who present with acute myocardial infarction (MI) and is associated with fewer revascularization procedures and significant morbidity and mortality (2). In a prior study of 1,079 patients admitted with acute MI who were discharged against medical advice, risk for death or readmission for acute MI was 40% higher, even when adjusted for revascularization rate (2). Across all admission diagnoses in a retrospective analysis of 338,000 patients who were discharged against medical advice, predictors of DAMA included black race, younger age, male sex, low income, lack of health insurance, and a history of alcohol and substance abuse (3).

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In this issue of *JACC: Cardiovascular Interventions*, Kwok et al. (4) report the outcomes of 2,021,104 patients who underwent PCI and 10,049 of whom were discharged against medical advice. Data were obtained from the Nationwide Readmission Database and account for approximately one-half of the United States population, with PCI occurring

between 2010 and 2014. The primary endpoint was all-cause 30-day readmissions and reasons for readmissions. The 30-day readmission rate for patients who were discharged against medical advice was 16.8%, compared with 8.5% ( $p < 0.001$ ) among those who were not discharged against medical advice. Predictors of DAMA included acute MI and, as previously observed, younger age, male sex, lower income quartile, and higher rates of smoking and drug or alcohol abuse. Rates of acute MI for causes of readmission were twice that observed in patients who were not discharged against medical advice. Patients who presented with acute MI as a cause of readmission were twice as likely to die, and 3 times as likely to have a major adverse cardiac event (acute MI, stroke, transient ischemic attack, repeat PCI, emergency coronary artery bypass grafting, in-hospital death) if they were discharged against medical advice during their index hospitalization.

The cost of 30-day readmission following PCI has been recently reported, with significant increases in mean cumulative costs for patients (45% increase) who are readmitted (5). Kwok et al. (4) report that among patients who were discharged against medical advice, cost of readmission was significantly higher (\$13,717 vs. \$11,380,  $p < 0.001$ ) than among patients who were discharged routinely. Among patients who presented with acute MI as a cause for readmission, this cost difference was even more pronounced (\$15,183 vs. \$11,936,  $p < 0.001$ ). In addition to facing poorer outcomes, it is evident that DAMA patients present a significant societal burden in terms of additional cost.

Limitations of the study, as the investigators themselves outline, are related largely to the limits of the dataset used for primary analysis. The data

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do not include compliance or medication adherence, and therefore the event rates cannot be adjusted for such. The data do not specify rates of stent thrombosis (within the diagnosis of acute MI) and moreover are limited to in-hospital events and therefore do not capture out-of-hospital deaths. In addition, with follow-up longer than 30 days, significantly higher mortality and morbidity would be expected. Thus, although the conclusion regarding increased 30-day unplanned readmission rates among DAMA patients is robust, there is limited ability to better discern the magnitude of the adverse events as well as the causes of and the events leading to readmission.

The risk of DAMA may be heightened following an admission for acute MI requiring PCI, compared with other diagnoses that do not require as stringent follow-up and adherence to an important new medication regimen; the investigators emphasize that “patients who undergo PCI may carry the risks associated to their presenting condition but also those related to their treatment.” The point is that although highly effective in restoring coronary blood flow and relieving symptoms, PCI is a procedure that mandates a certain medication regimen for a time thereafter. Patients discharged against medical advice who are not compliant with dual-antiplatelet therapy (DAPT) would be at significantly increased risk for stent thrombosis and need for repeat revascularization. Many studies have shown that early discontinuation of DAPT within the first 30 days is associated with an increase in mortality and stent thrombosis. Mehran et al. (6) showed that when DAPT was discontinued because of lack of compliance (disruption) within 0 to 7 days after PCI, mortality was increased 5.7-fold, and the increase was 3.4-fold when it was stopped between 8 and 30 days. Stent thrombosis is the most common cause, and it has been shown to increase 26.8-fold when DAPT was discontinued within 30 days (7).

Of course, that factors that select for DAMA are often precisely the same factors that make follow-up of these patients difficult. In addition to the predictors of DAMA identified by the investigators and validated in prior studies, these patients may have language barriers or other barriers to understanding the gravity of their condition and the importance of medication adherence and follow-up. In lower income quartiles, they may not have the ability to interrupt their daily work with an extended hospital stay or follow-up visits, and insurance or medication

copayments may be prohibitive. Coexisting drug or alcohol abuse and mental health disorders are very common in this group and may further complicate proper medication compliance and regular follow-up. Precisely because of these challenges, these patients represent a salient target for improvement in patient outcomes as well as reduction in hospitalizations and costs.

The investigators list improved communication with health care providers, better access to prescription medications following PCI, and inpatient mental health support in the subset of patients who have mental health disorders as potential targets for reducing DAMA. Probing further, it seems that there are more concrete solutions that might be offered to DAMA patients or those at risk for DAMA. Improving access to care and follow-up through early office visits or home visits or telemedicine is imperative when a patient is discharged against medical advice following PCI. Shorter follow-up time (several days after discharge) may be indicated to assess the need for continued medical management or even identify early rationale for readmission in DAMA patients. Many need social services when they are homeless or do not have medical insurance. Where medication availability or affordability is an issue for DAPT and other secondary prevention regimen compliance, a course of DAPT should be physically provided to patients before they leave the hospital. From a procedural standpoint, stents that allow shorter duration DAPT may be indicated in subsets of DAMA patients who are at documented risk for medication noncompliance.

This analysis represents the largest report of DAMA patients following PCI to date and has identified an infrequent but deadly problem. Early recognition, early involvement of the health care team, including care managers, social workers, psychiatrists, addiction counselors, and others, is imperative. The interventional cardiologist is often the first person to care for the patient, particularly those with ST-segment elevation myocardial infarction, and therefore needs to take on the task of identifying susceptible patients and bringing together the needed health care resources to prevent the serious consequences of DAMA.

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