

# Managing 30-Day Readmissions After PCI

Understanding the causes and identifying risk factors to prevent readmission.

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Hospital readmissions are an increasingly common problem with detrimental ramifications for both the patient and the health care system.<sup>1</sup> Right or wrong, 30-day readmission has been identified as a quality metric for a wide variety of medical conditions and procedures, including percutaneous coronary intervention (PCI). These rates are also used to influence reimbursement rates to hospitals.<sup>2</sup> Thirty-day readmission after PCI has been shown to be an independent predictor for mortality at 1 year.<sup>3-5</sup> Accordingly, many efforts are underway to reduce this phenomenon.

Although the frequency of hospital readmissions may not be a perfect quality metric, reducing them still represents a potential opportunity to improve clinical outcomes and reduce costs. Determining the true etiology for readmission is the crucial first step in understanding the issue and trying to decrease the frequency. It is important to realize that not all readmissions are associated with modifiable risk factors, as demonstrated by Khawaja et al.<sup>4</sup> Similarly, it is critical to identify readmissions when they may be preventable.<sup>6</sup>

## CURRENT DATA AND PREDICTORS OF READMISSION

Several studies have been published to identify which patients are at high risk of requiring readmission so that strategies can be put in place to reduce this rate. Although the etiologies of readmissions in a single institution are often not generalizable to other institutions, understanding them can still be helpful in laying the groundwork to reduce readmission rates at any hospital. For example, planned readmission to electively perform staged PCI procedures may be (erroneously) counted. However, such staged procedures may be safer for a patient than performing multivessel PCI at the time of the index admission. In some cases, this may be due to patient preference. Such reasons for readmission do not reflect a poor quality of care and may in fact reflect on it positively; accordingly, they should not count as a penalty to the institution. Furthermore, if staged procedures

have any effect on 30-day or 1-year mortality, patients who require multiple interventions for multivessel disease are at higher risk and might be expected to have worse outcomes, which would hopefully become apparent in an appropriate logistic regression analysis.<sup>3-5,7-10</sup>

Multiple studies of this issue have identified similar, nonmodifiable variables among other risk factors for readmission. The complete list includes older age (> 65 years), female sex, race (African Americans being associated with having worse outcomes), history of myocardial infarction, multivessel coronary disease, congestive heart failure, prior valve surgery, diabetes, cerebrovascular disease, peripheral arterial disease, chronic lung disease, chronic kidney disease, and emergent (vs nonemergent) PCI.<sup>3-5,7-11</sup> Socioeconomic status, including income, type of insurance (if any), housing, level of education, social support, and access to transportation, may be nearly equally as important as health status at predicting readmission.<sup>4</sup> Noncompliance with medical recommendations at discharge may also be due to socioeconomic factors, which is generally considered a nonmodifiable risk factor for readmission. In such situations, pharmaceutical assistance programs, home health visits, outpatient care management, and other, more accessible programs may help reduce noncompliance and therefore reduce readmission.<sup>4,12</sup>

Readmissions due to these factors may reflect on the quality of a health care system, although not necessarily on the quality of care related specifically to the PCI procedure. To predict which patients are at high risk for 30-day readmission after PCI, Wasfy et al developed a pre-PCI model to identify these patients prior to the procedure. This may allow for changes in the peri-PCI care, such as performing single (vs multivessel) PCI, involving care management prior to discharge, or helping with access to outpatient medications.<sup>10</sup>

In addition to the fact that many risk factors for readmission are not modifiable and therefore should not be considered to reflect poor quality of care, another potential flaw

of using readmission rates as a quality metric for PCI is that this intuitively tends to lay blame on periprocedural care. However, the etiologies for many readmissions are for non-cardiac reasons and are entirely unrelated to periprocedural care.<sup>3-5,7-9</sup> In a study performed at the Geisinger Medical Center, we found that nearly 40% of the readmissions in the 30 days after a PCI were unrelated to the index admission.<sup>11</sup> Despite best efforts, models or risk scores to predict readmissions may not prevent these “unrelated” readmissions from occurring.

## CAUSES AND PREVENTION OF READMISSION

Defining readmissions as preventable versus nonpreventable may be quite important, and much effort should focus on reducing preventable readmissions. Patients with procedural complications (eg, vascular access bleeding, coronary dissection, or stroke) or hospital complications (eg, nosocomial infections or renal failure) have an increased risk for readmission compared to those without complications.<sup>4,7,8,11</sup> Efforts to minimize the procedural and hospital complications involve best practice management for each patient—choosing the most appropriate and safest arterial access site (femoral vs radial), type of antithrombotic therapy, type of stent (bare-metal vs drug-eluting stent), length and diameter of the stent, and determining which arterial stenosis to treat.

Multivessel PCI is associated with a lower risk of readmission, in part because of a lesser need for a staged procedure at a later date.<sup>3</sup> However, treating multiple lesions at the same time typically involves more contrast, higher doses of antithrombotic therapy, and more blood loss, each of which may not only prolong the index hospitalization but may increase the risk of unplanned readmission as well. Even complete eradication of procedural complications would only have a minimal impact on the overall 30-day readmission rate, as many readmissions are due to cardiology etiologies that are unrelated to complications or to suboptimal care without a complication that occurred during the hospitalization.<sup>7,11</sup> When single-vessel PCI results in incomplete revascularization, this may also increase the risk of readmission—at least readmission due to recurrent ischemia and acute coronary syndromes.

Nonprocedural hospital complications, such as hospital-acquired infections, are a well-recognized cause of increased length of stay, cost, readmission, and even mortality. As expected, sicker patients needing emergent PCI, and especially patients in cardiogenic shock, typically require intensive care and may also require mechanical ventilation, central venous catheters, and urinary catheters. Although these may be necessary, they also increase the risk for hospital-acquired infections. Following evidence-based prevention guidelines in patients who do require these interventions

may reduce the incidence of nosocomial complications. Early identification of patients at risk for nosocomial complications should allow the health care team to be more aggressive in instituting guideline-recommended preventive means (eg, hand hygiene, maintaining sterile barriers, antiseptic skin preparations, using urinary catheters only when necessary) to reduce these complications and their sequelae, such as later readmission.<sup>13</sup>

Although some of the reasons that patients are noncompliant with medications may be due to nonmodifiable risk factors, as previously discussed, some may be modifiable and are therefore preventable. Patients with negative beliefs about medications are less likely to be adherent.<sup>14</sup> Educating patients on their disease and encouraging them to take ownership in its management can improve adherence and reduce health care utilization, including readmission.<sup>15</sup> Repetitive education should be part of a team approach—physicians, pharmacists, nurses, and care managers may all play a role.<sup>16</sup>

Such education can be critically important when it comes to the need for compliance with dual-antiplatelet therapy after a coronary stent has been placed. After a first heart attack, patients who were previously on no medications often go home on four or five new medications (aspirin, P2Y<sub>12</sub> inhibitor, statin, beta-blocker, and possibly ACE inhibitor, if the patient has a reduced ejection fraction, hypertension, or diabetes). For some patients, this could be upsetting or confusing (or both), reducing the likelihood that they will be compliant.

Noncompliance with dual-antiplatelet therapy is particularly likely to lead to early readmission if stent thrombosis occurs and the patient survives to reach the hospital. Many such patients do not. In fact, a low rate of readmission can in some cases result from a high rate of preventable mortality after PCI or other reasons for admission, and in these circumstances, this should obviously not be considered to reflect a high quality of care. A comprehensive team approach with physicians and pharmacists who can educate patients about their medications can have a major impact on outcomes that are a consequence of noncompliance. Optimizing the transition of care after discharge with thorough medication reconciliation and encouraging patients and/or caregivers to take a more active role in disease management and timely follow-up with health care providers are effective and inexpensive ways to reduce the rate of readmission.<sup>16,17</sup>

Are any care providers at fault if medications and instructions are given to a patient who is unwilling or unable to adequately see them through? And if so, does the fault lie with the discharging physician, pharmacist, care manager, or primary care physician? Early follow-up with physicians may not guarantee lower readmission rates for every patient,<sup>18</sup>

## TAKE-HOME POINTS

- Understanding the causes of readmission after PCI is the crucial first step in identifying patients at high risk for readmission.
- Best procedural practice is always recommended; however, even complete eradication of procedural complications would have minimal effect on the overall readmission rate.
- An organized, well-informed team approach including inpatient and outpatient providers can minimize the chances of later readmission.

but close follow-up with a provider after discharge to ensure compliance and stabilization may prevent exacerbations requiring readmission.

One of the more common cardiac reasons for readmission in prior studies has been congestive heart failure. Compliance and close follow-up is similarly important in patients with congestive heart failure. A patient's understanding of dietary restrictions and medications will help prevent decompensation. In patients with congestive heart failure or reduced left ventricular function, early follow-up (about 1–2 weeks) with a physician after discharge lowers the risk of readmission. Hernandez et al demonstrated that patients who were seen by a physician within 7 days after discharge had lower 30-day readmission rates than those without early follow-up. In most cases, patients in this study were seen by a physician other than the one caring for them in the hospital; the follow-up was more often with a general internist rather than a cardiologist.<sup>19</sup> Although some may see a handoff to another provider as a potential disruption in the continuity of care, with comprehensive transition planning, this can be a smooth process. A comprehensive summary of a patient's hospital encounter, including labs, imaging results, operative summaries, and medication reconciliation, can be most useful in making safe transitions after discharge. A well-informed team approach can improve patient care and reduce preventable readmissions.<sup>20</sup>

## CONCLUSION

Managing readmissions in the 30 days after PCI can be a labor-intensive process. Although readmission may not be a great quality metric for the PCI procedure itself, it may reflect the quality of the system delivering care. Regardless, it is the current established standard, and physicians need to consider the opportunities for improving care to such patients. First, understanding the causes of 30-day readmission after PCI in one's own system is critical to identify any preventable readmissions. Providing the best procedural and postprocedural care is important, but even complete

elimination of all periprocedural complications would have little impact on readmission rates after a PCI procedure.

Once the most frequent preventable readmissions are uncovered, a risk model may identify high-risk patients, thus allowing adjustments in delivery of care to minimize the risk for readmission. Educating patients and encouraging them to take a more active role in the management of their disease is necessary to improve both short- and long-term outcomes after PCI. A well-informed and comprehensive team approach (involving the hospital-based physician, primary care provider, pharmacist, nurse, and care manager) can make the transition from inpatient to outpatient smooth and less likely to require repeat hospitalization. ■

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