What Does the 30-Day Readmission Rate in Patients Who Have Had Percutaneous Coronary Intervention Reflect?

Study Overview

<u>Objective</u>. To evaluate demographic, clinical, and procedural factors associated with 30-day hospital re-admission rates and 1-year mortality for patients who had percutaneous coronary intervention (PCI).

<u>Design</u>. Prospective observational cohort study from January 1998 to June 2008.

<u>Setting and participants</u>. All patients at Saint Marys Hospital in Rochester, MN, undergoing PCI were fol-lowed in a prospective registry. All post-procedural and in-hospital events are recorded. To document long-term outcomes, each patient is contacted by trained person-nel via telephone using a standardized questionnaire at 6 months, 1 year, and annually. Patients were excluded if they declined authorization of their medical records for research, if their health care was paid for by the prison system or non-US governments, if they died before hos-pital discharge, or if they did not have 30-day follow-up.

In addition to post-procedural and in-hospital events, data elements collected included *demographic* (age, gender, marital status, education level, miles traveled to hospital, and insurance type), *clinical* (myocardial infarction [MI] type, unstable angina, time since most recent MI, multiple comorbid risk factors including CHF status, diabetes mellitus, hypertension, hyperlipidemia, renal dysfunction, cerebrovascular disease, chronic ob-structive pulmonary disease, metastatic cancers, and left ventricular ejection fraction), and *procedural* (urgency of PCI, use of drug-eluting stent, intra-aortic balloon pump, procedural success [< 20% residual stenosis], and in-hospital MI), and hospital length of stay char-acteristics.

<u>Main outcome measures</u>. All-cause readmission to any hospital within 30 days of discharge and 1-year mortal-ity following PCI.

<u>Main results</u>. Over the study period, a total of 15,498 PCI procedures were performed that met inclusion criteria. A total of 1459 (9.4%) of these were readmitted within 30 days; there were 106 (0.68%) deaths within 30 days. In adjusted multivariable analyses, several de-

mographic, clinical, and procedural factors were found to be associated with 30-day readmission. Demographic factors were female gender (odds ratio [OR]; 1.32; 95% CI, 1.17–1.48), having Medicare insurance (OR, 1.20; 95% CI, 1.01–1.43, reference was all other insurance), and a less than high school education (OR, 1.35; 95% CI, 1.17–1.55, reference was high school or higher education). Clinical and procedural factors associated with 30-day readmission were having CHF at presentation (OR, 1.36; 95% CI, 1.15–1.60), cerebrovascular disease (CVA/TIA) (OR, 1.22; 95% CI, 1.04–1.44), moderate-severe renal disease (OR, 1.46; 95% CI, 1.12–1.89), chronic obstructive pulmonary disease (COPD) (OR, 1.31; 95% CI, 1.12–1.54), ulcer disease (OR, 1.29; 95% CI, 1.05–1.59), metastatic cancer (OR, 1.92; 95% CI, 1.19–3.09), if the PCI was done electively (OR, 0.80; 95% CI, 0.70–0.91) and hospital length of stay > 3 days (OR, 1.59; 95% CI, 1.37–1.84). In adjusted analyses, 30-day readmission conferred a higher risk of 1-year mortality (hazard ratio, 1.38; 95% CI, 1.08–1.75).

Conclusion. Almost 10% of all PCI patients have hospital readmission within 30 days, and readmission alone increased the risk of dying within 1 year. Most risk factors associated with readmission are secondary to medical comorbidities and patient characteristics that are not amenable for targeted interventions to reduce the risk of readmission.

Commentary

Thirty-day readmission rates have become a target area for reimbursed hospital care. Driven by the Centers for Medicare and Medicaid Services (CMS) goals of improved quality of care and reduced costs, use of this metric reflects the notion that readmissions soon after a hospitalization are costly for the health care system and are surrogates for poorer quality of care delivered during and after the first admission. As a consequence, there is growing interest by hospitals, administrators, and clinicians to identify and target factors amenable to improvement that could affect the readmission rate.

This study by Khawaja et al demonstrates that specific post-procedural conditions, in this case PCI, have a high prevalence of hospital readmission (1 in 10 of these patients are readmitted). The majority of the factors identified by investigators that were associ-

ated with hospital readmission, however, were patient-related characteristics, ie, present regardless of the quality of care received. Gender, education level, type of health care insurance, and medical comorbidities were significant risk factors for 30-day readmission. They are not likely to be changed by the quality of care received during the index PCI hospitalization. This represents a conundrum for those attempting to use 30-day readmission rates as a benchmark for quality of care, or even as a reimbursement incentive/ deterrent. Readmission appears to be most associated with comorbid conditions of the individual patient. Reducing reimbursement to hospitals and institutions based on 30-day readmissions may be penalizing them for the types of patients they serve, not the quality of care delivered.

These study findings may instead guide clinicians in identifying patients who are likely to have more successful outcomes or may benefit from alternate diagnostic studies or interventions—a potential slippery slope with regards to selecting patients for expensive procedures. The decision whether or not to perform PCI should be driven primarily by cardiac risk factors. Over a third of the PCIs in this cohort were performed electively; elective PCI alone was in fact a favorable risk factor (OR, 0.80; 95% CI, 0.70–0.91), reducing 30-day readmissions by 20%. The majority of this cohort, however, required emergent or urgent PCI. While it is likely cardiac risk factors and clinical presentation indicated the need for PCI, the option to balance the risks and benefits of this emergent or urgent invasive procedure versus alternate diagnostic or therapeutic studies may not have been available and are not known as indications for procedures were not collected.

It is interesting to note that several of the factors identified as having an association with 30-day readmission are also used in the Charlson comorbidity score [1] (MI, CVA/TIA, CHF, COPD, renal disease, ulcer disease, cancer). The Charlson comorbidity score is a widely used prognostic index that estimates risk of death at 1 year based on disease conditions. (Additional diseases weighted in the Charlson index that do not appear to have been collected in this study are dementia, peripheral vascular disease, diabetes, liver disease, hemiplegia, and AIDS.) In turn, those patients who had 30-day readmission (even when adjusted for comorbidity risk factors associated with 30-day readmission) had a higher risk of 1-year mortality (hazard ratio, 1.38; 95% CI, 1.08–1.75).

A significant limitation of this prospective registry study is that data on clinical indications for PCI (except the level of urgency) were not available. As implied above, choice of PCI as a diagnostic versus therapeutic intervention based on indication would allow for a better understanding of whether or not alternate procedures (eg, noninvasive imaging stress testing) could be considered. Investigators were not able to account for the actual quality of patient care received during the initial PCI hospitalization as this was not directly observed. As this was not the objective of the study and such quality data are not typically collected in registries, causal inferences and observations of the actual quality of care received and study outcomes cannot be made. Additionally, the potential for confounding from unknown post-hospitalization outpatient care received and patient compliance could not be determined. Nonetheless, the sample size and comprehensive nature of the data collected for this study are robust. They confirm and expand on studies that solely used administrative data of high 30-day readmission rates for PCI patients [2] and find that hospital readmissions are significantly impacted by patient comorbidity, and readmission alone, much like the Charlson comorbidity score, is a marker for increased 1-year mortality.

Applications for Clinical Practice

The results of this study provide insight into risk factors for readmission within 30 days following PCI. The majority of these factors were patient characteristics (gender, education, medical comorbidities), which are not amenable to interventions to improve the quality of care received.

—*Review by Ula Hwang, MD, MPH*

References

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