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CORR Insights®: Do Claims-based Comorbidities Adequately Capture Case Mix for Surgical Site Infections?

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Where Are We Now?

Evidence-based across-hospital comparisons are becoming increasingly common, particularly as pay-for-performance benchmarking (where a hospital's reimbursement rates are a function of its

performance relative to peer hospitals) is on the rise. Surgical site infections (SSIs) for total joint replacement are popular performance targets because joint replacement is a large cost driver for payers and SSIs are important because of their associated costs and morbidity. Risk adjustment for SSI rates are critical for fair comparisons, as hospitals caring for higher risk-patients will have higher infection rates compared to hospitals that care for lower-risk patients, even when identical infection-prevention protocols are used. Inadequate risk adjustment may result in a moral hazard wherein hospitals refuse to provide elective joint replacement surgeries to high-risk patients because of their higher infection risk and the resultant potential revenue loss. Can individual surgeon profiling be far behind, whether it be for SSI or another adverse outcome?

Where Do We Need To Go?

Using a robust and mature electronic health record (EHR) at a premier teaching hospital, the authors were able to estimate the benefit of adding clinical risk factors to an established comorbidity index (Charlson) for modeling risk adjustment for SSI in total joint replacements. This excellent use of an EHR demonstrates the research potential of these systems once they are fully integrated into the clinical and research enterprise.

In this study, the Charlson alone performs modestly well as indicated by hip- and knee-specific model C-statistics above 0.6, whereas adding four clinical variables provided only a very modest incremental improvement. The limited performance capabilities of the Charlson may reflect the derivation of that tool, which was created to predict inpatient mortality among hospitalized internal medicine patients at New York Hospital in Manhattan—very different populations and outcomes than SSI in joint replacement patients at Mayo Clinic. Additionally, the Charlson comprises only 19

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comorbidities among the tens of thousands of potential comorbid conditions (the ICD-10 currently contains 69,823 diagnosis codes).

Future work could test the risk adjustment effectiveness of the Elixhauser comorbidity index for total joint infections. The Elixhauser comorbidity index encompasses 31 conditions derived from acute care hospitalizations in California and was validated to predict mortality, length of stay, and hospital costs. Further, Elixhauser better predicted mortality after orthopaedic surgery than Charlson in a representative national sample [1]. However, neither of these comorbidity indices may be best for predicting SSI following joint replacement, as both were derived and validated in patient populations disparate from joint

replacement patients. The best path may lie in developing a novel comorbidity index for risk adjustment in elective orthopedic patients.

How Do We Get There?

Ultimately, we need to develop an elective orthopedic surgery specific risk-adjustment methodology that captures information from claims data and can be enriched with further clinical information for organizations that have fully formed EHRs. Fortunately, a number of established organizations (including the American Joint Replacement Registry) are capable of developing and validating this new methodology, as well as implementing

the capture of relevant clinical information on a broad scale. The development and validation of this risk adjustment methodology should arise from the orthopaedic community. Pay-for-performance metrics are our new reality. We have an opportunity to be proactive in developing robust risk adjustment to assure that fair comparisons are made between providers rather than being reactive to outside stakeholders making these decisions.

Reference

1. Menendez ME, van Dijk CN, Ring D. Who Leaves the Hospital Against Medical Advice in the Orthopaedic Setting? [Published online ahead of print September 4, 2014]. *Clin Orthop Relat Res*. DOI: [10.1007/s11999-014-3924-z](https://doi.org/10.1007/s11999-014-3924-z).