

## Decreasing Predictive Power Of Co-Morbidity On Mortality After Total Hip Arthroplasty Over Time

Orthopaedics / Pelvis, Hip & Femur / Epidemiology, Prevention & Diagnosis

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### Background

The use of comorbidity, as a potential covariate for various clinical outcomes, has increased exponentially during the last twenty years for patients with total hip arthroplasty (THA). Despite the large interest, most studies find no or very little evidence that comorbidity influence any clinical outcome. It has nevertheless been suggested that mortality should be adjusted for comorbidity.

### Objectives

It is our belief that adjusting mortality for comorbidity for patients with THA is unjustified. Elective total hip replacement surgery is offered mainly to healthy individuals. Mortality for these patients is lower than for the general population. Our hypothesis is therefore that risk factors for mortality in these patients might set in after, and not before the surgical procedure.

### Study Design & Methods

We identified all patients from the Swedish Hip Arthroplasty Register (SHAR) with THA 1999 - 2012. These patients were linked to the Swedish National Patient Register (NPR), from where ICD-10-codes were extracted if occurring at hospital visits within one year preceding THA.

Individual ICD-10-codes were first identified as different comorbidities, which were then combined into three comorbidity indices for each patient: the Elixhauser comorbidity index and two versions of the Charlson comorbidity index.

We had a total follow-up period of 14 years that we divided into three sub-intervals of 0-5, 5-8 and 8-14 years after THA. We fitted extended Cox models with time varying coefficients to these intervals. We had both univariate models for each comorbidity and comorbidity index, and also sex- and age-adjusted counterparts together with a base model with age and sex only.

The predictive power of comorbidity on mortality was evaluated by a concordance index for survival data, based on Receiver Operations Characteristics (ROC) curves.

This value ranges from 0.5 to 1, with values closer to 1 being a better score.

### Results

We identified 120,836 patients, who were matching our inclusion criteria. High age and male sex were, as expected, associated with earlier death, and most comorbidities occurred more frequently among those who later died.

The highest concordance indices, for an unadjusted model, were observed for the Elixhauser

comorbidity index (0.59, 0.58 and 0.56 at the end of each period). The Charlson comorbidity indices performed slightly worse.

The base model, with age and sex alone, performed considerably better than all comorbidity indices (concordance indices 0.75, 0.74 and 0.74). The multivariate models with comorbidity adjusted for age- and sex performed just marginally better than the base model.

### **Conclusions**

The predictive power of comorbidity indices on mortality is weak for patients with THA, in fact weaker than age and sex. The predictive power also decrease over time.

If mortality must be predicted from comorbidity, and we believe that this should be avoided, then the Elixhauser comorbidity index looks like the best choice.