Prediction of Early Periprosthetic Joint Infection after Total Hip Arthroplasty: Development and External Validation of a Multivariable Model Based on Observational Registry data from Sweden and Denmark

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2021-10-15

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**Guarantor:** NPH, as the principal investigator, affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

**Word count:** 3,586

# Abstract

**OJECTIVE:** To develop a parsimonious risk prediction model for periprosthetic joint infection (PJI) within 90 days after total hip arthroplasty (THA).

**DESIGN:** Cohort study with register data. 88,830 patients from the Swedish Hip Arthroplasty Register used for model derivation and internal validation, and 18,854 patients from the Danish Hip Arthroplasty Register used for external validation. Logistic LASSO regression with bootstrap ranking was used for model development.

**RESULTS:** Incidence of PJI was 2.45 % in Sweden and 2.17 % in Denmark. A model with the the underlying diagnosis for THA, body mass index (BMI), American Society for Anesthesiologists (ASA) class, sex, age, and the presence of five defined comorbidities had an area under the curve (AUC) of 0.68 (95 % CI: 0.66 to 0.69) in Sweden and 0.66 (95 % CI: 0.64 to 0.69) in Denmark. This was superior to traditional models based on ASA class, Charlson, Elixhauser, or the Rx Risk V comorbidity indices. Internal calibration was good for predicted probabilities up to 10 %.

**CONCLUSIONS:** A new PJI prediction model based on easily accessible data available before THA, has been developed and externally validated. The model had superior discriminatory ability compared to ASA class alone or more complex comorbidity indices and had good calibration. We provide a web-based calculator (<https://erikbulow.shinyapps.io/thamortpred/>) to facilitate shared decision making by patients and surgeons.

# Key words: Total hip arthroplasty, prosthesis joint infection, prediction, model development, model validation

# Running title: Prediction model for PJI after THA