APPENDICES

Appendix A. Matching

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The goal of this project was to make prediction models using available non-RCT data sources. To accomplish this we used multiple registries to create a modeling database that included matched sets of paired knees (one with and one without TKR) that were similar in all respects except for the surgical procedure. Our process for creating a database of matched TKR to non-TKR knees has limitations which should be kept in mind when using the resulting models and predictions.

First, we only matched subjects based on data available within each study. While a TKR: non-TKR knee dyad may have come from 2 patients with the same gender, similar age and baseline knee pain, etc., other characteristics that were not part of the matching process may have differed. Second, we allowed for non-exact matches because we wanted to include knees that had TKR in our analysis even if we could not find a perfect match. We planned to adjust for covariates in the modeling process to account for remaining residual imbalances between the TKR and non-TKR groups. Third, we excluded subjects who did not have 1-year pain outcome data from the matching process. Non-TKR knees, that had a TKR during the follow-up period, were excluded from the matching process if 1-year follow-up in the non-TKR state was not available. The predicted outcomes for non-TKR are based on the assumption that the knee did not have a TKR within a year. Fourth, we also excluded knees with TKR that did not have 1-year follow-up data. There could be several reasons for lack of follow-up data, some of which may not lead to bias (study ended before follow-up could be done) while other reasons could lead to biased predictions. For example, if a patient had TKR and major surgical complications led to death, then the 1-year outcome data would not be available, and exclusion of these bad outcomes would lead to favorable predictions.

Lastly, our 'baseline' data may not truly capture status at the time a patient decided whether or not to have TKR. The NEBH and TMC databases of surgical cases did capture baseline information in a timely manner. However, the OAI and MOST databases were registries of subjects with knee osteoarthritis with timed data collection points (that included questions about whether or not a TKR took place since the last timed measure). Evaluating data at the knee-visit level allowed us to find subjects who had TKR, and we could then look back in time to find the nearest

assessment. For some patients that may have been within a month or two of the surgery, while for others, it may have been within a year. Since follow-up for TKR subjects started at the time of surgery, this also meant that the time between when baseline measures were done and the 1-year follow-up was longer for TKR subjects than non-TKR subjects. If one believes knee pain and function worsen over time in subjects that decide to get TKR, then our tool may underestimate the benefit of TKR as a result of our not having a true baseline assessment. However, our final regression models were built using data from all four databases where over 40% of knees that had TKR were from the surgical databases lessening the impact of varying elapsed times between the baseline assessment and actual TKR surgery.

The matching was done using SAS software[41] and the SAS Macro %GMATCH for greedy matching[38] downloaded in February 2014 from:

http://www.mayo.edu/research/documents/gmatchsas/doc-10027248.