INTRODUCTION:
Despite the strong acceptance of TKA, patients may defer or avoid surgery for any number of reasons. Surgery is indicated for patients with progressive disease, and only pain reduction is speculated to be the major cause for surgical treatment when more conservative methods have failed. Neglecting or delaying treatment can have negative consequences. Failure to treat a worsening condition of osteoarthritis may lead to joint instability and deformity, contractures, or advanced muscle atrophy. While the short term benefits of surgery are well known, there is little long-term data that quantifies the cost, mortality, and downstream disease for knee arthroplasty treatments. It has been speculated that improved mobility and function, along with reduced pain, may actually even lead to a reduced mortality risk in the long term. A number of studies have shown arthroplasty patients to have a reduced mortality risk compared to the general population, although the exact reason remains unclear. The purpose of this present study is to determine the differences in cost and health outcomes, including mortality, between knee OA patients who undergo joint replacement therapy and those who do not. The hypothesis is that OA patients who are treated with an arthroplasty procedure will have a lower risk of downstream health diagnoses of diabetes, cardiovascular diseases, depression, and mortality, as well as incur lower healthcare costs.

METHODS:
The Medicare 5% sample was used to identify patients with OA using the ICD-9 codes within the 715.X6 family during 1997-2009. All OA patients were separated into non-arthroplasty and arthroplasty (indicated by ICD-9 code 81.54) groups. Outcomes of interest included average annual payments adjusted to Jan-2011$, mortality, and new diagnoses of heart failure, diabetes, and depression. Differences in costs and risk ratios for each outcome were adjusted using logistic regression for age, sex, race, buy-in status, region, and Charlson score. The results were compared at fixed periods of 1 year, 3 years, 5 years, and 7 years after surgery.

RESULTS:
There were 80,629 non-TKA patients and 53,829 TKA patients with one-year follow-up data. These numbers dropped to 39,183 non-TKA and 25,904 TKA patients at 7 years. The 7-year cumulative average Medicare payments for all treatments for all medical care were $63,940 for the non-TKA group and $83,783 for the TKA group, an incremental 7-year cost of $19,843 (Figure 1).

The mortality hazard ratio of the TKA group ranged from 0.48 to 0.54 through seven years (all p<0.001) (Table 1). The risk of heart failure of the TKA group was 21.1% at 3 years (HR=0.89, p<0.001) and 40.9% at 7 years (HR=0.93, p<0.001). The risk of depression was higher for the TKA group at 1 year (rate=9.37%, HR=1.28, p<0.0001) and 3 years (rate=17.1%, HR=1.05, p<0.0093), but there were no long-term significant differences. There was a slightly higher risk for diabetes in the TKA group at 1 year (rate=24.8%, HR=1.05, p=0.0153) and 7 years (rate=45.5%, HR=1.05, p=0.0117), but not at 3 and 5 years.

Hazard ratios for mortality and new disease diagnoses after OA. The rate for each diagnosis is reported for the TKA group, while the hazard ratio estimates the relative risk for the TKA group compared to the non-TKA group.

DISCUSSION AND CONCLUSION:
We estimated the costs, mortality and diagnoses of new diseases for OA patients who either did or did not receive a TKA in the U.S. Medicare population. The study was a broad population based observational analysis across a patient cohort that constitutes a significant burden of osteoarthritis on the U.S. healthcare system. The incremental seven-year cost of TKA was found to be $19,843 per patient. This cost does not consider the cost of prescription drugs or other indirect costs, which have been reported to be much higher in OA patients who do not undergo TKA. The mortality risk for TKA patients was approximately half that of the non-TKA group. There was also a reduction of new diagnoses of heart failure at 3, 5, and 7 years after surgery. TKA patients were more likely to be depressed in the first three years after surgery, a finding that suggests the mental health of these patients should be monitored and treated if necessary. This study demonstrates the potential benefit of TKA in reducing mortality, at a relatively minimal long-term incremental cost.

SIGNIFICANCE:
Despite the prevalence and projected increase in OA in the elderly, there are little data that quantify the post-operative costs, mortality, and downstream disease for TKA treatments and for non-surgical management. We estimated the costs, mortality and diagnoses of new diseases for OA patients who either did or did not receive a TKA. The results demonstrate the TKA cohort as having a lower probability of heart failure and a dramatically lower probability of mortality, at a total incremental cost of $19,843.