

# Comparing contemporary “revision burden” among hip and knee joint replacement registries

Brian J. McGrory, MD, MS<sup>1, 2</sup>; Caryn D. Etkin, PhD, MPH<sup>3</sup>; David G. Lewallen, MD<sup>3, 4</sup>; September R. Cahue, MPH<sup>3</sup>

<sup>1</sup>Maine Medical Center; Portland, Maine, USA;

<sup>2</sup>Tufts University School of Medicine; Boston, Massachusetts, USA;

<sup>3</sup>American Joint Replacement Registry; Rosemont, Illinois, USA;

<sup>4</sup>Mayo Clinic; Rochester, Minnesota, USA

## Introduction

- Hip and knee arthroplasties are common, successful procedures. However, success and durability are not guaranteed.
- The major outcome in joint registries is surgical revision.
- To compare revision across different national registries, the concept of revision burden<sup>1</sup> was utilized.
  - Revision Burden:
    - The ratio of revisions to the total number of arthroplasties in one year.
    - Measures the steady state of arthroplasty success in registries.

## Hypothesis

We hypothesized that revision burden would be similar across these national arthroplasty registries. Additionally, we thought that this burden would be decreased over the recent past compared to historic values.

## Material and Methods

- Registries included in analysis:
  - American Joint Replacement Registry (AJRR)
  - Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR)
  - New Zealand Joint Registry (NZJR)
  - Swedish Hip Arthroplasty Register (SHAR)
  - Swedish Knee Arthroplasty Register (SKAR)
  - United Kingdom National Joint Registry (NJR)
- Revision burden for both hip and knee arthroplasty was calculated from publically reported or from reported data of each registry (i.e., registries’ annual reports).
  - Revision burden was reported for the last four years, or since the registry inception.
  - Revision burden was based on the inherent definition of revision for each reporting registry.
  - Unweighted averages were used for overall comparison
    - That is, the overall volume of arthroplasties in a given health system was not taken into account for the aggregate totals – each health system was given equal weight
- For historic controls, data was abstracted from previously compiled and reported by Kurtz, et al<sup>2</sup>

## Results

### Contemporary revision burden, in percent

Registry	2011		2012		2013		2014	
	Hip	Knee	Hip	Knee	Hip	Knee	Hip	Knee
AJRR	NA	NA	NA	NA	NA	NA	10.0	8.1
AOANJRR	12.5	8.1	11.8	7.8	10.6	8.0	10.2	7.7
NZJR	13.6	6.6	13.2	7.7	13.7	6.8	11.9	6.8
SHAR & SKAR	10.5	6.1	10.8	5.7	10.3	6.8	10.2	6.5
NJR	10.8	6.1	11.6	6.6	10.9	6.3	9.7	6.0
<b>Unweighted Average</b>	<b>11.9</b>	<b>6.9</b>	<b>11.9</b>	<b>7.0</b>	<b>11.4</b>	<b>7.0</b>	<b>10.4</b>	<b>7.0</b>

### Historic revision burden by country, in percent\*

Registry	Hip	Knee	Years
Australia	18.2	10.8	1999-2002
Canada	13.1	6.1	2002-2003
Finland	18.3	7.9	1990-2001
Norway	16.4	8.0	1994-1998
Sweden	11.0	7.2	1992-2000 <sup>¥</sup>
United States <sup>§</sup>	17.5	8.2	1990-2002
<b>Unweighted Average</b>	<b>15.8</b>	<b>8.0</b>	

\* Reported from Kurtz, et al. JBJS, 2005.

¥ Time frame for Hip only; knee time frame 1988-1997

§ Derived from National Hospital Survey (NHDS) data; other countries’ data is registry based

Revision burden has decreased for hip replacements and remained relatively constant for knee replacements, both over the last 4 years and also compared to historic controls.

## Discussion

Revision burden is a ratio that includes early (<1 year) and late (≥1 year) revisions reported during the preceding year. The denominator is the number of arthroplasties performed during that year. Steady state measurement seems to be decreasing slightly for hip replacements and remaining constant for knee replacements in these registries. Knee revision burden appears lower than hip revision burden for each year. Understanding revision burden may be helpful in following surgical success over time in registry populations, and may help compare surgical success between registries.

### References:

1. Malchau H, Herberts P, Eisler T, Garellick G, Soderman P. The Swedish total hip replacement register. J Bone Joint Surg Am. 2002;(84 suppl 2):2-20.
2. Kurtz S, Mowat F, Ong K, Chan N, Lau E, Halpern M. Prevalence of primary and revision total hip and knee arthroplasty in the United States from 1990 through 2002. J Bone Joint Surg Am. Jul 2005; 87(7):1487-1497.

A special thanks to Ola Rolfson, MD, PhD, for his assistance with SHAR data.