Total Joint Replacement Registry

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Total Joint Registry

- Largest total joint registry in the U.S. with >180,000 joints
  - THA
    - Primary 57,122
    - Revision 6,342
    - BHR 1,218
  - TKA
    - Primary 108,163
    - Revision 6,798
    - UKA 3,310
- Regions
  - CO, GA, HI, MAS, NCAL, NW, SCAL
International Registry Benchmarking

TJR Revision Rates

<table>
<thead>
<tr>
<th>Total Joint Registry</th>
<th>THR</th>
<th>TKR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Period</td>
<td>Revisions per 100 observed component years</td>
</tr>
<tr>
<td>Kaiser Permanente</td>
<td>2001-2011</td>
<td>0.68</td>
</tr>
<tr>
<td>Sweden</td>
<td>1979-2007</td>
<td>0.72</td>
</tr>
<tr>
<td>Australia</td>
<td>1999-2007</td>
<td>0.81</td>
</tr>
<tr>
<td>Norway</td>
<td>1987-2007</td>
<td>1.61</td>
</tr>
<tr>
<td>Denmark</td>
<td>1996-2005</td>
<td>3.35</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1999-2006</td>
<td>3.76</td>
</tr>
<tr>
<td>Finland</td>
<td>1997-2006</td>
<td>4.06</td>
</tr>
</tbody>
</table>

Data Capture

SmartForm Implementation

- Implemented in HI, NCAL, SCAL
- Scheduled for 2014 in NW
- Implants
  - TKA: tibial tray, tibial insert patella, screws, cement, femoral component
  - THA: stem, femoral head, cup, liner, cement, screws, post, cables
- Attributes: material, size, fixation, modularity, coating

Quarterly Quality Report - THA

<table>
<thead>
<tr>
<th>Facility</th>
<th>PRIMARY CASES</th>
<th>PRIMARY CASES</th>
<th>Mortality Rate</th>
<th>PRIMARY CASES</th>
<th>PRIMARY CASES</th>
<th>PRIMARY CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deep Infection Rate</td>
<td>DVT Rate</td>
<td>PE Rate</td>
<td>90-Day Mortality Rate</td>
<td>30-Day Unplanned Inpatient Readmission Rate</td>
<td>Emergency Visit Rate</td>
</tr>
<tr>
<td>ALL</td>
<td>&lt;= 1.0%</td>
<td>&lt;= 1.5%</td>
<td>&lt;= 1.0%</td>
<td>&lt;= 0.5%</td>
<td>&lt;= 5.0%</td>
<td>&lt;= 10.0%</td>
</tr>
<tr>
<td>REGION</td>
<td>0.52%</td>
<td>0.65%</td>
<td>0.43%</td>
<td>0.23%</td>
<td>2.45%</td>
<td>8.17%</td>
</tr>
<tr>
<td>FACILITY A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACILITY B</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Outcomes

- Revision
- 90-day deep surgical site infection
- 90-day deep vein thrombosis
- 90-day pulmonary embolism
- Myocardial infarction (by ICD-9 code)
- Mortality
- Inpatient readmissions
- Emergency visits
2013-2014 Publications


Bisphosphonates in TKA

- All-case revision
  - In age and gender adjusted models risk was 0.29 (95% CI 0.22-0.38) lower for bisphosphonate users than non-users
  - Lower risk was observed in all categories except for patients taking bisphosphonate <65 years old with normal DEXA scan results (HR=0.48, 95% CI 0.12-1.94) or no DEXA test (HR=0.23, 95% CI 0.04-1.41).
- Aseptic revision
  - In age and gender adjusted models risk was lower in bisphosphonate users than non-users (HR=0.37, 95% CI 0.26-0.52)
  - In all models where enough numbers existed for estimations the risk of aseptic revision was lower in bisphosphonate users compared to non-users, except in patients with normal DEXA scan.
- Higher risk of peri-prosthetic fractures was found in TKA patients who used bisphosphonates
Bisphosphonates in THA

- Bisphosphonate use was associated with a lower risk for all cause and aseptic revision in patients undergoing primary THA for OA
  - This lower risk was most pronounced in the older and more osteoporotic patients
- Bisphosphonates were associated with a higher risk of peri-prosthetic fractures in younger patients with normal bone mineral density
- Evaluation of prospective THA patients with DEXA scan and appropriate treatment with bisphosphonates may be associated with a lower risk of revision surgery
- Care must be taken in the young (<65) patient with normal bone mineral density.

Outcomes of Total Knee Revision

- In 1,154 TKAs revised for aseptic causes, the re-revision rate was 10% and the mean time to revision was 4 years
- In multivariable analysis, the use of antibiotic cement was the only variable statistically protective of revision
- The use of a hinged device was not associated with a higher risk of re-revision
- However, the surgeon’s cumulative experience had a small but significant negative impact on the re-revision risk and bears further study

Increased Risk of Revision for High Flexion TKA with Thicker Tibial Liners

- Results
  - 64000 TKAs 4/2001-12/2010
  - Revision density
    - Non-high flex varied little between thick or thin tibial liners (HR=0.37 vs. 0.44)
    - High flex more than doubled with thick vs. thin tibial liners (HR=1.45 vs. 0.64)
  - High flexion components were observed to have a higher risk of revision compared to conventional implants
  - High flexion Zimmer knee implants were more vulnerable to revision surgery when thicker polyethylene liners were used
  - Liner thickness >14 mm was associated with an 8 times higher risk of revision when used with the Nexgen high flexion GSF fixed PS implant and 9 times greater risk when used with the Zimmer Nexgen high flexion fixed CR vs. the non-high flexion fixed PS

THA Re-revision Risk Factors

- The risk of re-revision of a revised THA at 2 year follow up is approximately 10%
- Surgeon experience: HR of 0.93 (95%CI: 0.86-0.99) for every 5 unit increase in the number of revision surgeries performed by the surgeon
- Fixation: Cemented femurs were associated with an increased re-revision rate (HR 3.19, 95%CI: 1.22-8.38)
- Bearing Surface:
  - Ceramic on XLPE was associated with a reduced rate of re-revision by a HR of 0.32 (95%CI: 0.11-0.96)
  - Metal on Constrained Liners increases the HR relative to metal on XLPE by a factor of 3.32 (95%CI: 1.16 -9.48)
- Age: every 10 years increasing age had a HR of 0.72 (95%CI: 0.58-0.90)
- Gender, race, BMI and ASA, femoral head size, surgeon volume were not associated with re-revision
Thirty Day Readmission Rates for 2 vs. 3 Days Length of Stay Are Not Inferior in 23,635 Unilateral Primary TKAs

- A LOS of 2 days is not inferior to 3 days with respect to 30 day readmission rates
- Patient risk factors associated with risk of 30 day readmission were
  - Male gender (OR=0.63, 95%CI 0.54, 0.72)
  - Having diabetes (OR=1.32, 95%CI 1.14, 1.54)
  - Having an ASA Score >=3 compared to <3 (OR=1.39, 95%CI 1.20, 1.61)
  - Age ≤80
  - Being discharged to a skilled nursing facility (OR=2.16, 95%CI 1.85, 2.53) compared to going home
  - Having a non-surgical complication (OR=3.49, 95%CI 1.84, 6.64)
- Patients in these categories may benefit from closer observation following discharge

Looking Ahead

- Patient optimization
- Drug and device interactions
- Continuum of care/virtual visits in Southern California
- Signal detection
- Consumer outreach
- Quality reporting
- Collaboration with other registries for enhanced Implant surveillance

Resources for Surgeons

- Individual surgeon profiles with comparison to medical center, region, and national
- Risk calculators
- Customized reports
  - Performance of specific implants
  - Patient lists (Complications, surgical type, implants)
- Registry websites
  - Internal: http://implantregistries.kp.org
  - List of recalls; brochures about registry for patients
  - External: http://www.kpimplantregistries.org/
- Clinical findings webinars
  - Next scheduled for February 28, 2014, 12:30-1:30 pm PT
- Newsletters

Thank You