What Total Joint Arthroplasty Outcome Measures are Used by Physiotherapists in British Columbia?

Danielle Balik, Veronica Naing, Drey Voros, Belinda Wagner, Lauren Welch
Overview of osteoarthritis (OA) and total joint arthroplasty (TJA)

Rationale for the total joint arthroplasty outcome measure (TJAOM) survey study

Methods

Results

Discussion

Implications
Osteoarthritis

- Is a painful and disabling disease that involves the progressive development of joint pain, stiffness and decreased range of motion\(^1\)

- Is a major factor in morbidity, disability and health care utilization

  - The risk factors for osteoarthritis include:
    - Heredity (joint alignment)
    - Excess weight
    - Injury
    - Joint damage from another type of arthritis
Osteoarthritis

- Affects more than three million (1 in 10) Canadians, mostly over the age of 45$^2$

  - Between 1991 and 2031:
    - its prevalence in Canada will increase by 46%
    - the number of Canadians with OA will increase 124%$^2$

The progress of the disease can be slowed by exercise, weight loss and medications, but there is no cure
Total Joint Arthroplasty

- In BC over 10,000 TJAs are performed yearly\(^2\) to treat painful and severely degenerated joints
  - Most often total knee arthroplasty (TKA) and total hip arthroplasty (THA)

- TJA is a viable treatment option for end-stage OA when conservative, pharmacological and lifestyle treatments are no longer effective

- Publicly funded physiotherapy-based rehabilitation is available pre- or post-surgery
Rationale

- The lack of standardized outcome measures (OMs) across practice settings and phases (inpatients, outpatients, home/community) may be preventing clinicians from using them to inform clinical decision-making and program evaluation.

- Standardized OM use may facilitate physiotherapists’ (PTs’) rehabilitation and discharge planning on a broader scope, encompassing patients’ activities and participatory roles.
Rationale

- A set of consistent outcome measures benefits:
  - Patients
  - Clinicians
  - Researchers
  - Health insurance companies

- A first step in facilitating OM use in clinical practice in BC is to evaluate the current variability in OM use by PTs treating patients with TJA throughout the province.
Project Overview

- Program Evaluation
- Survey
- Barriers

WHAT
- Ethics

WHY
- Clinicians

How
- Chart Audit

- Administrator
- Mary Pack Arthritis Centre
- LGH
- PHC, VCH
- Private Practice
Team Members – TJAOM Survey Study

**Primary Investigator** – **Dr. Marie Westby**, BSc(PT), PhD - Rehabilitation Sciences, UBC

**Co-investigators**

- **Dr. Darlene Reid** (Supervisor) – BMR(PT), PhD – Professor, UBC Department of Physical Therapy

- **Catherine McAuley**, BSc(PT), MSc (Rehab) – Physical Therapy Practice Coordinator, Vancouver Coastal Health

- **Alison Hoens**, BSc(PT), MSc – Physical Therapy Knowledge Broker, Clinical Associate Professor and Physiotherapy Research, Education and Practice Coordinator, Providence Health Care

- **Danielle Balik, Veronica Naing, Drey Voros, Belinda Wagner, Lauren Welch** – UBC MPT Grad Students
Purpose

The **purpose** of this study is to identify through a survey the types and International Classification of Function (ICF) categories of outcome measures currently or likely to be used by PTs in British Columbia for treating patients with TJA:

- Pre- and post-operative
- Pre- and post-rehabilitation
Methods
Methods - Participants

- 100% of PTs working in areas with <100 registrants: administration, sports medicine, rheumatology, consulting and client service management

- 60% of PTs working in gerontology (164 total registrants)

- 30% of PTs working in orthopaedics and general practice areas (870 total registrants)

694 selected participants; 28.6% of the total eligible number of 2425 PTs registered with CPTBC
Methods – Survey Questionnaire

- Demographic information

- The OMs were divided into three sections:
  1. Patient-reported OMs (PROM)
  2. Performance-based OMs
  3. Prognostic factors/indicators

- A fourth section referred to outcomes considered but not recommended by PRAG
<table>
<thead>
<tr>
<th>Performance-Based Measures</th>
<th>Indicators for Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sit To Stand Test</td>
<td>• BMI</td>
</tr>
<tr>
<td>• Walking Speed</td>
<td>• Waist Circumference</td>
</tr>
<tr>
<td>• Timed Up and Go (TUG)</td>
<td></td>
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<tr>
<td>• 6 Minute Walk Test</td>
<td></td>
</tr>
<tr>
<td>• Tinetti Mobility Test</td>
<td></td>
</tr>
<tr>
<td>• Timed Stair Climb</td>
<td></td>
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<tr>
<td>• Single Leg Stance</td>
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</tbody>
</table>

### Patient-Reported Outcome Measures

- Arthritis Self-Efficacy Scale
- Self-Management Behaviours Exercise
- Numeric Pain Rating Scale
- Pain Visual Numeric Scale
- Lower Extremity Function Scale (LEFS)
- Oxford Hip Score (OHS)
- Oxford Knee Score (OKS)
- EuroQOL (EQ-5D)
- Knee Injury & Osteoarthritis Outcome Score (KOOS)
- Hip Injury & Osteoarthritis Outcome Score (HOOS)
Measures Considered
But Not Included

• Western Ontario McMaster Universities Osteoarthritis Index (WOMAC)
• Global Impact Item (GI) – of the Arthritis Impact Measurement Scale (AIMS)
• Client Satisfaction Questionnaire
• Harris Hip Score
• Submaximal VO₂
Methods – Survey Questionnaire

• **4-point ordinal scale:**
  ① Not familiar
  ② Familiar with measure but no clinical experience with it or do not use it
  ③ Some experience
  ④ Considerable experience using it in TJA population

• Data collapsed into two categories for ease of analysis:
  1. Not experienced with the OM (options 1 and 2 combined)
  2. Experienced with the OM (options 3 and 4 combined)
## Methods – Timeline

<table>
<thead>
<tr>
<th>Dates</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 8, 2010</td>
<td>Electronic ‘e-blasts’ sent out to raise awareness</td>
</tr>
<tr>
<td>June 15, 2010</td>
<td>Questionnaires mailed to a sample of 694 PTs</td>
</tr>
<tr>
<td>June 22, 2010</td>
<td>Reminder postcards sent out</td>
</tr>
<tr>
<td>September - November 2010</td>
<td>Data entry</td>
</tr>
<tr>
<td>November 10, 2010</td>
<td>Data collection discontinued</td>
</tr>
<tr>
<td>December 2010 - January 2011</td>
<td>Data Analysis</td>
</tr>
</tbody>
</table>
Methods – Data Entry

Survey participants were grouped into three categories:

1. *Complete responders* – completed all or most of the survey
2. *Partial responders* – responded but completed only the first page (demographic info)
3. *Non-responders* – did not in any way respond
Methods – Procedures

Data Collection Methods & Analysis

Data Collection

• Surveys received at the Muscle Biophysics Laboratory

Data Input

• Coding Legend created
• Data input into an Excel data sheet by UBC MPT Students

Data Analysis

• Statistical Analysis questions developed
• Statistical Analysis performed by Statistician
• Descriptive Statistics were used to describe demographic characteristics
• OM’s were grouped according to type and ICF categories
Results
RESULTS

Of the 694 survey packets mailed:

298: Returned (42.9%)

172: Completed (57.7%)

126: Partially Completed (42.3%)

- 74% of PTs did not work with TJA patients
- 25% did work with TJA patients but were not interested in filling out the questionnaire
- 1% did not give a reason for not completing
# Results - Demographics

## Table 3 - Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Respondents (n = 298)</th>
<th>Completers (n = 172)</th>
<th>P-values (respondents vs. completers)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Authorities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancouver Coastal Health</td>
<td>110 (36.9%)</td>
<td>62 (36.0%)</td>
<td>0.45</td>
</tr>
<tr>
<td>Vancouver Island Health</td>
<td>59 (19.8%)</td>
<td>32 (18.6%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Fraser Health</td>
<td>56 (18.8%)</td>
<td>35 (20.3%)</td>
<td>0.57</td>
</tr>
<tr>
<td>Interior Health</td>
<td>58 (19.5%)</td>
<td>39 (22.7%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Northern Health</td>
<td>9 (3.0%)</td>
<td>5 (2.9%)</td>
<td>0.82</td>
</tr>
<tr>
<td>Other</td>
<td>2 (0.7%)</td>
<td>1 (0.6%)</td>
<td>0.79</td>
</tr>
<tr>
<td><strong>Sector</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>137 (46.0%)</td>
<td>92 (53.5%)</td>
<td>0.18</td>
</tr>
<tr>
<td>Private</td>
<td>122 (41.0%)</td>
<td>72 (41.9%)</td>
<td></td>
</tr>
<tr>
<td><strong>Area of Practice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Patient</td>
<td>52 (17.4%)</td>
<td>27 (15.7%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Home/Community Care</td>
<td>34 (11.4%)</td>
<td>22 (12.8%)</td>
<td></td>
</tr>
<tr>
<td>Outpatient</td>
<td>173 (58.1%)</td>
<td>115 (66.9%)</td>
<td></td>
</tr>
<tr>
<td><strong>Years since graduation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 years ago</td>
<td>56 (18.8%)</td>
<td>43 (25.0%)</td>
<td>0.008</td>
</tr>
<tr>
<td>10-19 years ago</td>
<td>75 (25.2%)</td>
<td>52 (30.2%)</td>
<td></td>
</tr>
<tr>
<td>20+ years ago</td>
<td>135 (45.3%)</td>
<td>74 (43.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Practice Setting</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>181 (60.7%)</td>
<td>96 (55.8%)</td>
<td>0.036</td>
</tr>
<tr>
<td>Rural</td>
<td>77 (25.8%)</td>
<td>53 (30.8%)</td>
<td></td>
</tr>
<tr>
<td>Mixed urban/rural</td>
<td>28 (9.4%)</td>
<td>19 (11.0%)</td>
<td></td>
</tr>
</tbody>
</table>
Results - Demographics

- Respondents worked in the expected clinical areas of physiotherapy
  - rheumatology
  - sports medicine
  - gerontology
  - orthopaedics
  - general practice

- % Respondents working in each care phase:
  - pre-operative (54.4%)
  - post-operative (74.9%)
  - rehab (66.1%)
  - post-rehab (40.9%)
Results – Average use of OMs in each survey category

<table>
<thead>
<tr>
<th>Survey Category Types</th>
<th>Patient Reported Measures</th>
<th>Performance Based Measures</th>
<th>Prognostic Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Reported Measures</td>
<td>Arthritis Self Efficacy Scale</td>
<td>Sit To Stand (STS)</td>
<td>Waist Circumference</td>
</tr>
<tr>
<td></td>
<td>Self-Management Behaviours Exercise</td>
<td>Walking Speed</td>
<td>Body Mass Index (BMI)</td>
</tr>
<tr>
<td></td>
<td>Numeric Pain Rating Scale</td>
<td>6 (or 2, 3, 12) Minute Walk Test</td>
<td></td>
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<tr>
<td></td>
<td>Pain Visual Numeric Scale</td>
<td>Timed Up and Go (TUG)</td>
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<td>Lower Extremity Functional Scale (LEFS)</td>
<td>Timed Stair Climb</td>
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<td></td>
<td>Oxford Hip Score (OHS)</td>
<td>Tinetti Mobility Test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxford Knee Score (OKS)</td>
<td>Single Leg Balance (SLB)</td>
<td></td>
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<tr>
<td></td>
<td>EuroQOL (EQ-5D)</td>
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<tr>
<td></td>
<td>Knee Injury &amp; Osteoarthritis Outcome Score (KOOS)</td>
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</tr>
<tr>
<td></td>
<td>Hip Injury &amp; Osteoarthritis Outcome Score (HOOS)</td>
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</tr>
</tbody>
</table>
Results – Percentage of PTs reporting some/good experience with the current use of OMs for clinical decision making within the general survey categories

<table>
<thead>
<tr>
<th>Patient Reported Outcome Measures</th>
<th>Performance Measures</th>
<th>Prognostic Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Pain Rating Scale</td>
<td>TUG</td>
<td>BMI</td>
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<tr>
<td>Pain Visual Numeric Scale</td>
<td>Walking Speed</td>
<td>27%</td>
</tr>
<tr>
<td>LEFS</td>
<td>GMWT</td>
<td></td>
</tr>
<tr>
<td>OHS</td>
<td>Timed Stair Climb</td>
<td></td>
</tr>
<tr>
<td>OKS</td>
<td>Tract Mobility Test</td>
<td></td>
</tr>
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<td>Arthritis Self Efficacy Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Management Behaviours Exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KOOS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOOS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Numeric Pain Rating Scale: 98%
- Pain Visual Numeric Scale: 84%
- LEFS: 59%
- OHS: 75%
- OKS: 49%
- Arthritis Self Efficacy Scale: 4%
- Self Management Behaviours Exercise: 4%
- KOOS: 5%
- HOOS: 27%
### International Classification of Function (ICF) Survey Categories

<table>
<thead>
<tr>
<th>Body Structure/Function</th>
<th>Activity/Participation</th>
<th>Personal Contextual Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Pain Rating Scale</td>
<td>Lower Extremity Functional Scale (LEFS)</td>
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<td></td>
<td>Tinetti Mobility Test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single Leg Balance</td>
<td></td>
</tr>
</tbody>
</table>
Results – Percentage of PTs reporting some/good experience with the current use of OMs for clinical decision making within the ICF categories

- Numeric Pain Rating Scale: 98%
- Pain Visual Numeric Scale: 84%
- TUG: 75%
- SLB: 5%
- STS: 4%
- Walking Speed: 75%
- LeFS: 49%
- 6MWT: 27%

The graph shows the percentage of individuals that had some/good experience using the OM, categorized by Body structure/Function and Activity/Participation factors.
Discussion
Discussion – Primary Findings

- Two most highly used OMs
  - Numeric Pain Rating Scale (NPRS) 97.7%
  - Pain Visual Numeric Scale (PVNS) 83.7%

- Patient-reported OMs (PROMs)

- ICF category of body structure/function
  - Considered to be measurements of impairment
Discussion – NRPS & PVNS

Why are pain scales frequently used?

- Main symptom/complaint of arthritis
- Highly related to function
- Considered a major outcome for fitness
- Primary OM in arthritic care\(^{33}\)

Pain scales are also free and considered to be reliable, valid, and easy to administer\(^{33}\)
Discussion – LEFS

- Third highest used patient-reported OM
  - Lower Extremity Function Scale (LEFS) 59.1%

- Why is the LEFS frequently used?
  - Single page, quick (less than 5 min)
  - Often cited in scientific journals\(^{32}\)
  - Widely used in many areas of physiotherapy
  - High test-retest reliability\(^{37}\)

Considered to be reliable, valid and responsive when used with THA and TKA patients\(^{33}\)
Discussion – Body Mass Index

- Almost half the responders used Body Mass Index (BMI) as an OM at 48.8%
- Prognostic Measure
- ICF category of personal contextual factors
Why is BMI used?

- High correlation between body weight and its effect on arthritic joints
- Obesity is a risk factor for OA
- Just a one pound weight increase can add four pounds of force through the joints
- Weight loss is a key general recommendation for OA management
Two least used OMs
- Hip Injury & Osteoarthritis Outcome Score (HOOS) 3.5%
- Knee Injury & Osteoarthritis Outcome Score (KOOS) 4.7%

Patient-reported OMs (PROMs)

ICF category of activity & participation
- Body structure/function (pain, symptoms)
- Activity (activities of daily living)
- Participation (function, sports and recreational activities)
Discussion – HOOS & KOOS

Why are HOOS & KOOS NOT frequently used?

- Both contain 42 items to score which may seem overwhelming to complete\textsuperscript{14}
- Traditionally used to evaluate younger population and may be perceived as not relevant for older population\textsuperscript{36}

Greater than 50\% of complete responders reported no familiarity with either the HOOS or KOOS
Discussion – HOOS & KOOS

Why **SHOULD** we use HOOS & KOOS?

- Designed for easy evaluation of knee and hip OA or in TJA
- Easy to score within each section and as a total
- Take less than 10 minutes to complete

Are reliable and responsive in TJA and have good content and criterion validity\(^14,36\)
Discussion – HOOS & KOOS

Why SHOULD we use HOOS & KOOS?

- Roos et al. 2003 study found KOOS was applicable to a more senior population
  - Expectations of younger subjects with OA are the same as those of more elderly subjects with OA

KOOS is valid and responsive for both the aged and younger populations\(^\text{14}\)
Discussion – Generality

>50% responders indicated using performance-based OMs

- Sit To Stand (STS)
- Walking Speed
- Timed Stair Climb
- 6 (or 2, 3, 12) Minute Walk Test (6MWT)
- Timed Up and Go (TUG)
- Tinetti Mobility Test
- Single Leg Balance (SLB)

ICF category of activity & participation

Performance-based OMs may be superior to PROMs when testing for change in physical functioning\textsuperscript{33}
Discussion – Generality

- General health OMs used and recognized by more PTs than those more specific to OA and/or TJA

- Pain scales & TUG
  - Most used and are considered general

- HOOS & KOOS
  - Least used and are considered specific
Discussion – Generality

Why use more general measures?

- Measurement of co-morbidities/other complications not directly related to disease\textsuperscript{38}
- May be more cost-effective\textsuperscript{38}
- Fewer tools/more widely usable over many areas of physiotherapy\textsuperscript{38}
- Familiarity could allow for a shorter time for completion and ease of use

Not as sensitive and specific to TJA rehabilitation, but allow for a single tool to cover multiple areas
Conclusion
Findings suggest that PTs in BC are most experienced with measures of performance and impairment

- Not always the most sensitive and specific to TJA rehabilitation

Lack of consistent OMs for use in TJA rehabilitation\textsuperscript{19, 30, 32}
Implementing standardized OMs for TJA in clinical settings could:

- Encourage use of more appropriate OMs for TJA rehabilitation
- Facilitate clinical decision-making, planning, evaluation
- Allow for better cross-over of information for PTs and patients across care
- Achieve consistency of use among practitioners
Implications

- Part of an integrated knowledge transfer
- Ministry of Health-funded initiative for orthopaedic surgeons in the Vancouver Island Health Authority (VIHA)
References


References


THANK YOU!

Questions?
Discussion - Limitations

- Survey results specific to BC and may have limited external validity for PTs in the rest of Canada or internationally.

- Respondents may misinterpret the questions or have varying levels of motivation or bias about the study and subsequently over- or under-report OMs use leading to inaccurate data.

- There is also a chance of non-response bias – those who do not reply to the survey are likely to be those who do not use OMs.
Discussion - Limitations

- There is also a tendency in those self-reporting to report a better picture in response to a questionnaire than what actually occurs. If this is the case, their reported use of OMs could be higher than their actual use.

- This limitation will be considered and evaluated against the chart review portion of the overall study that will describe what is common practice for the use of OMs.