Defining Successful Total Joint Replacement

Bert Chesworth, PhD
School of Physical Therapy
University of Western Ontario

Current Orthopaedic & Physiotherapy Concepts Following Joint Arthroplasty
London Health Sciences Centre – University Hospital
June 20, 2008
Objectives

- Background
- Measuring clinically important change
- Purpose
- Methods
- Results
- Summary comments
Question #1

- One year after surgery,

How much ‘better’ would you have to ‘get’ to say your TJR was successful?

- a little
- somewhat
- moderately
- a good deal
- a great deal
- a very great deal
One year after TJR,

What would ‘make’ you say:

“Knowing what I know now, I would not go through that TJR again”
Background

- Ontario Joint Replacement Registry
- prospective study to evaluate relationship between:

  1. How much wait is too long?
  2. How ‘severe’ should you be to warrant queue jumping to front of line?
  3. How to define successful surgery?
  4. Any change from surgery should be a clinically important difference

Post surgical outcome

Wait for surgery

Severity at decision for surgery
How do we measure a clinically important difference (CID)?

Distribution-based methods
- effect size, SEM

Anchor-based methods
Within-patient global ratings of change

1. Transition Ratings of Change
2. Retrospective Ratings
3. Individual change NOT Group
4. Traditional focus: Identify Minimal CID

Since pre-op:
You better, worse or same?

Better or worse:
By how much?

Wyrwich & Wolinsky, J Evaluation in Clinical Practice, 2000
Why is THR/TKR surgery done?

- Clinical perspective?
  - NOT for small improvements
  - IS for BIG change

- Literature show?
  - shows large effects from THR & TKR surgery

- Clinically Important Difference (CID) for TJR
  - should be large
  - not minimal
How transition ratings define a CID

Since you filled out a WOMAC when you went on your surgeon's waiting list, is your pain...

- Better? 
- About the same? 
- Worse?

If you said your pain is better, tell us how much by answering the question below.

1. almost the same 
   hardly any better at all....
2. a little better..............
3. somewhat better............
4. moderately better...........
5. a good deal better.......... 
6. a great deal better.........
7. a very great deal better...

If you said your pain is worse, tell us how much by answering the question below.

1. almost the same 
   hardly any worse at all....
2. a little worse..............
3. somewhat worse............
4. moderately worse...........
5. a good deal worse.......... 
6. a great deal worse.........
7. a very great deal worse...

Jaeschke et al, 1989

Do TJR Surgery to get at least a good deal better
Problems with retrospective ratings of change

- Reliability of transition ratings
  
- Validity of transition ratings
  - Difficulty of making unbiased, retrospective judgments of change in health status

Want consistent ratings

Want ratings of change to correlate with measured change
Purpose

- identify **individual-level** CID from primary THR/TKR
  - using Western Ontario McMaster University OA Disability Index (WOMAC)

- validate:
  - the WOMAC change score that best defines the CID

- estimate reliability:
  - of transition ratings used to identify the CID
Methods

At Decision for surgery

- Decision date for surgery
- WOMAC

IN CLINIC

e.g. age, gender, joint, diagnosis, dependent for ADL

On Day of Surgery

- Surgery date
- WOMAC

Health status:
- ASA-PS score
- More healthy vs Less healthy

At 1 year

- Transition ratings for CID
  - rate change in function
  - rate change in pain

BY MAIL

- Independent change criterion
  - willingness to undergo that specific surgery again (yes, uncertain, no)

- Post-op complication requiring overnight hospital stay (yes/no)

- WO MAC
WOMAC scoring

- **3 domains**
  - 5 pain items
  - 2 stiffness
  - 17 function

- **5-point Likert**
  - None
  - Mild
  - Moderate
  - Severe
  - Extreme

**Alternative scoring**
- Reversed
- Low is worst
- High is best
- Standardized out of 100
- Scale
  0-100
worst-best
Analysis

ROC curves
• change score ‘best’ identifies pain/function “good deal better”

validate CID: ROC curves
• change score ‘best’ identifies “yes, would have sx again”

validate CID:
• change scores: transition ratings vs. willingness to have sx again

reliability of transition ratings
• Cronbach’s alpha: pain and function ratings
Validate transition rating with independent criterion

Transition rating scale

-7 -1 0 1 4 5 6 7

All other responses

Knowing what your hip or knee replacement surgery did for you, if you could go back in time, would you still have undergone this surgery?

No
Uncertain
Yes

Good deal, better or more
## Results (n = 2,709)

<table>
<thead>
<tr>
<th></th>
<th>THR 1,131</th>
<th>TKR 1,578</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (% F)</td>
<td>57</td>
<td>62</td>
</tr>
<tr>
<td>Health Status (ASA: % more healthy)</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>Employment (% retired)</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>Depend Someone for ADL (% yes)</td>
<td>24</td>
<td>16</td>
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<tr>
<td>Would still have had the surgery (%)</td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>96</td>
<td>90</td>
</tr>
<tr>
<td>Uncertain</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>4</td>
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</table>
THR: what WOMAC change best predicts a CID?

<table>
<thead>
<tr>
<th>CID definition</th>
<th>Construct</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pain</td>
</tr>
<tr>
<td>“Good Deal Better” or more</td>
<td>≥ 41</td>
</tr>
<tr>
<td></td>
<td>Different</td>
</tr>
<tr>
<td></td>
<td>Reveals bias</td>
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<tr>
<td>“Yes- Would have surgery again”</td>
<td>≥ 36</td>
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</table>
TKR: what WOMAC change best predicts a CID?

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<tr>
<th>CID definition</th>
<th>Pain</th>
<th>Function</th>
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<tbody>
<tr>
<td>“Good Deal Better” or more</td>
<td>≥ 36</td>
<td>≥ 33</td>
</tr>
<tr>
<td>“Yes- Would have surgery again”</td>
<td>≥ 31</td>
<td>≥ 26</td>
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</tbody>
</table>

Construct

- Different
- Reveals bias
Validating WOMAC change (n = 2,709)

Mean Total WOMAC Change Scores with 99% CI

At group level: good deal better valid threshold for CID
Validity and reliability

- Valid transition ratings
  - rating of change & WOMAC change
  - \( r = 0.59 \) to \( 0.63 \)

- Reliable transition ratings
  - Internal consistency of pain & function ratings
  - Cronbach’s alpha = 0.86

Acceptable correlation between WOMAC change and rated change
Acceptable consistency of pain and function transition ratings
Complications inversely related to ratings of improved function

\[ p < 0.0001 \]
Summary

- THR CID
  - pain: ≥ 41
  - function: ≥ 34

- TKR CID
  - pain: ≥ 36
  - function: ≥ 33

- “good deal better” aligns well with willingness to re-do sx

Reasonable to define successful surgery with these values

- post-op complications affect judgments about outcome
Thank you

- Study team members
  - Nizar N. Mahomed, MD
  - Robert B. Bourne, MD
  - Aileen M. Davis, PhD
  - OJRR Study Group

Publication available:
Willingness to go through surgery again validated the WOMAC clinically important difference from THR/TKR surgery. *Journal of Clinical Epidemiology* In press, corrected proof available on-line first: February 14, 2008.

Funded by the
Ontario Ministry of Health and Long Term Care
CID using raw scoring method

<table>
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<th>Construct</th>
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<tbody>
<tr>
<td></td>
<td>Pain</td>
<td>Function</td>
<td></td>
</tr>
<tr>
<td>THR</td>
<td>≥ 8/20</td>
<td>≥ 23/68</td>
<td></td>
</tr>
<tr>
<td>TKR</td>
<td>≥ 7/20</td>
<td>≥ 22/68</td>
<td></td>
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