The "RAW" Deal on Knee Replacements

Are you Ready, Able, Willing?

Selection of ‘Appropriate’ Candidates for Surgery

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Disclosures

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• Salary support from Arthur J.E. Child Chair
Background

• >50,000 primary knee replacements performed in Canada per year; >90% for knee osteoarthritis (OA)
• Total knee arthroplasty (TKA) is highly effective
• Numbers needing TKA rising (longevity, obesity) with greatest increase in rates in those aged 20-59 years
  – Symptom severity at TKA declining
  – Younger age at TKA is a risk factor for prosthesis infection & early revision
• ~ 15-30% TKA recipients report little/no symptom improvement or dissatisfaction with results

Defining Appropriateness for TKA

- Many definitions proposed, none widely accepted
  - prosthesis survival
  - patient-reported pain and disability
  - realization of surgical expectations
  - patient satisfaction

Funders & policy makers want Patient Reported Outcomes Measures (PROMS)
Explicit Criteria for TKA

• Systematic literature review used to develop 624 clinical scenarios with 6 criteria
  – Age
  – Symptoms
  – functional status
  – extent / location of radiographic arthritis
  – knee joint mobility and stability (initially survival)
  – prior surgical and non-surgical treatment

• RAND/UCLA methodology with modified Delphi with two independent panels of specialists (n=11 each)

• Results: 100% scenarios classified as appropriate and 97.9% as inappropriate were classified correctly by the classification tree

## Spanish TKA Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>&lt;55; 55-65; 65+ years</td>
</tr>
<tr>
<td><strong>Prior surgery</strong></td>
<td>None; Arthroscopy; Tibial Osteotomy; Both</td>
</tr>
<tr>
<td><strong>Radiology</strong></td>
<td>Ahlbäck classification slight (Grade I); moderate (Grade II-III); severe (Grade IV-V)</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td>Slight; Moderate; Intense; Severe based on frequency, intensity of pain, daily activity limitations, and use of analgesic medications and walking aids</td>
</tr>
<tr>
<td><strong>Joint mobility</strong></td>
<td>Normal range of motion (0-90°); Limited range of motion (&lt;0-90°)</td>
</tr>
<tr>
<td><strong>Localization</strong></td>
<td>Uni-compartmental not PF; Uni-compartmental with PF; Tri-compartmental</td>
</tr>
</tbody>
</table>

Validation of Spanish Criteria for Surgical Outcomes

• Prospective cohort study (n=1576) with HRQoL before and 6 months afterward
  – Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)
  – Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36)

• Patients judged ‘appropriate’ based on the criteria had largest improvements in WOMAC at 6 months post-surgery while those judged inappropriate had the smallest improvements

• Results support the use of these criteria for clinical guidelines or evaluation purposes.

Potential Limitations of Spanish TKA Criteria

• Relies heavily on measures of “disease’ rather than ‘illness’
• Does not reflect what is important to patients
• Does not reflect current trends
  – Age < 55 ‘inappropriate’
  – Arthroscopy pre TKA
  – Expectations of patients regarding surgery and satisfaction with procedure
Up to 1/3 of Knee Replacements are Inappropriate

15-30% of patients report little or no improvement in pain and function

24% experienced no meaningful change

17% were worse
Knee Replacement is a *Preference-Sensitive Elective Procedure*

- Performed to improve quality of life, not to reduce mortality, thus considered *elective*
  - Patient preferences important in determining provision
  - *Pain* is the main indication for surgery

Thus, defining “appropriate” provision of TJR is difficult
Why are People with Minimal Pain and Disability Asking for and Getting Joint Replacement?

Impact of pain on quality of life in different terms

- Younger (50s and 60s): hobbies, mental health, relationships, enjoyment of life
- Older (70s and up): ability to perform basic activities, e.g. dressing, bathing, housework
Hip and Knee Surgical Wait Times Remain Long

- Joint replacement surgery wait times: National priority area
- National Grade by Wait Time Alliance – Hips = B; Knees = C

**About 4 out of 5 Canadians**

have their procedure done within medically acceptable wait times

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Benchmark</th>
<th>Wait Time</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Replacement</td>
<td>182 days</td>
<td>81%</td>
<td></td>
</tr>
<tr>
<td>Knee Replacement</td>
<td>182 days</td>
<td>77%</td>
<td></td>
</tr>
</tbody>
</table>
Definitions and Context of Appropriateness

• “if expected health benefits exceed the expected negative consequences by a sufficiently wide margin that the procedure is worth doing, exclusive of cost” - RAND Corporation

• We need to consider patient, surgeon and health care system perspectives

Surgeons, Policy Makers & Managers, Patients

STAKEHOLDERS’ PERCEPTIONS OF TKA APPROPRIATENESS
What do Patients Expect from a Knee Replacement?
OA Patients' Perceptions

• Focus groups in 40+ years with moderate hip/knee OA (n=58)
• Assessed appropriateness perceptions, including ideal candidate
• Results:
  – Appropriateness = surgical candidacy
  – Key criterion: pain experience (intensity, impact on quality of life, ability to cope) is inadequately evaluated

- Frankel et al, Osteoarthritis Cartilage, 2012
Orthopaedic Surgeons’ Perspectives

- Semi-structured telephone interviews of arthroplasty surgeons in 3 Canadian Provinces assessed their criteria for TJA appropriateness
- 14 surgeons interviewed (12 males; 7 <50 years; 5 academic; 8 urban practice)
- **Key criteria**: pain/pain impact (QoL & function)
- Difficult to assess & not always congruent with structural changes
- **Other Criteria**: Patient expectations, Ability to cope, Readiness for surgery

Orthopaedic Surgeons’ Perspectives

- Potential value of a TJA decision-support tool
  - May assist standardized assessment of appropriateness criteria, but ultimate decision must be left to surgeon & patient
  - Not supportive of a tool that yielded an absolute score / cut-point for appropriateness (clinical judgment should always be used)
Perspectives of Decision-Makers

• Semi-structured interviews (n=15) in a convenience sample (4 provinces)
  – 9 provincial/regional policy makers
  – 8 institutional managers / leaders

• Results:
  • Increased transparency regarding how TKA decisions are made would be of value
  • Role is optimizing resource allocation, efficient service delivery, not deciding who receives TKA

- Clavel N et al Healthcare Policy, 2016
Appropriateness Themes
(Surgeons and Patients)

- Identified 11 unique themes (domains, constructs)
- Face & content validity (member checking):
  - 15 arthroplasty surgeons indicated level of agreement with each theme using electronic voting
    - If ≤70% agreed or disagreed, the criterion was discussed and revised, and re-voting occurred
    - 4 revised themes with subthemes
  - 36/58 OA patients completed standardized telephone interviews to indicate their level of agreement with the revised themes

- Hawker et al Arthritis Rheumatol. 2015
Appropriateness Criteria: Concept Map
“Ready, Able and Willing”

- **PAIN/ FUNCTION**
- **CO-MORBIDITIES** (Include mental health)
- **PRE-OP MANAGEMENT**
- **SOCIAL CIRCUMSTANCES** (support current and post-op)
- **COPING** (Patients: related to pain, difference by age)
- **PATIENT EXPECTATIONS** (rehab and and post-op)
- **"READINESS"/ MOTIVATION**
- **JOINT CONDITION**

**Patient reported**

**Surgeon/Clinician reported**

**SURGICAL RISK**

**CAPACITY TO BENEFIT**
### Appropriateness Themes

<table>
<thead>
<tr>
<th><strong>DEMONSTRATED NEED FOR TJA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis on examination of joint being considered for surgery</td>
</tr>
<tr>
<td>Arthritis symptoms negatively impacting patient’s quality of life</td>
</tr>
<tr>
<td>Appropriate* trial of non-surgical treatment has been provided</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PATIENT IS READY, WILLING AND ABLE TO UNDERGO TJA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medically stable</td>
</tr>
<tr>
<td>Deemed able to adhere to post-operative rehabilitation requirements</td>
</tr>
</tbody>
</table>

| **PATIENT HAS REALISTIC EXPECTATIONS OF TJA** |

| **BENEFIT OUTWEIGH POTENTIAL RISKS** |

* Surgeons noted that some patients are referred for TJA with end-stage arthritis, when non-surgical therapies unlikely to benefit and thus NOT appropriate to provide

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Hawker et al Arthritis Rheumatol. 2015
Summary on Stakeholder Perspectives

• Decision makers want increased transparency re when TKA appropriate

• Surgeons agreed tool would enable such transparency (better they develop than leave to government)

• Qualitative research elucidated constructs that patients / surgeons identify as most important in considering a patients’ appropriateness for TKA
  – Checklist for surgeons or explicit tool?

- Hawker et al Arthritis Rheumatol. 2015
Surgeon Checklist Feasibility

• Each criterion represented by a statement – yes/no response
• 11 surgeons reviewed / discussed the ‘checklist’

• 10/11 felt criteria covered what they already do in practice – no added benefit but good ‘face validity’
• Some criteria difficult to assess:
  • Patient’s readiness
  • Patients expectations
  • Likelihood of net benefit

• Surgeons found the simple checklist unsuitable – recommended explicit measures for each statement

- Bohm et al, Under Review
Measuring Appropriateness Constructs

• Comprehensive search for reliable, valid, self-complete questionnaires to evaluate each appropriateness construct (multiple measures per construct)

• Selected those that were:
  – Brief
  – Suitable for use in knee OA patients
  – Psychometrically tested in knee OA patients & ideally in TKA setting
Defining ‘Benefit’ from TKA

• Composite outcome:
  – Patient-reported improvement in knee pain + satisfaction with surgical results

• Insufficient consistent evidence regarding the following:
  – Predictive validity of each appropriateness construct
  – Redundancy of criteria?
  – Optimal measure of each construct for use in clinical care
Towards Better Surgical Outcomes through Improved Decision Making for TKA in OA

Best Evidence for Surgical Treatment for Total Knee Arthroplasty
BEST-Knee Research Aims

• Primary Aim:
  – To assess predictive validity of appropriateness constructs, *evaluated pre-TKA*, for TKA ‘benefit’ (pt-reported improvement in knee pain *and* satisfaction with results at 1 year post TKA - yes/no)

• Secondary Aims:
  – TKA appropriateness criteria *pre-consultation* and surgeon recommendation
  – TKA expectations by patient age or gender
  – TKA appropriateness *at TKA* and changes in health resource use after TKA
BEST-Knee Study Design

• Prospective cohort study of knee OA patients

• Patient questionnaires:
  – Pre-consultation (all patients)
  – Pre-TKA and 6 and 12 months post-operatively

• Surgeon questionnaire post-consult
  – Does the patient have primary knee OA (yes/no)?
  – Do you recommend TKA – Yes – which knee? or No - why not?
    • If Yes, are the patients’ expectations of TKA realistic?

• Data linkage with provincial health administrative data
  – TKA complications to 2 years
  – Pre-post TKA change in arthritis-attributable health resource use
• Recruiting participants from Alberta’s two largest joint arthroplasty clinics

Edmonton Bone and Joint Centre

Calgary Gulf Canada Centre
BEST-Knee Eligibility Criteria

- Aged 30+ years
- Being seen in consultation for primary, elective TKA for primary knee OA
- Able to read and comprehend English
- Excluded bilateral TKA in the same admission, but prior TKA on the contra-lateral knee ok
2360 pre-consult questionnaires (85.3%)

68 did not see surgeon (death, health, moved, ineligible, other)

2312 surgeon consults

1598 recommended single primary TKA (69%)

1016 TKAs performed to date

636 completed 6 months visits
288 completed 12 month visits
Characteristics of Participants at Surgeon Consultation (first 1462 recruits)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Full Sample N= 1462</th>
<th>TKA Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes N=1061</td>
</tr>
<tr>
<td>Age (years) – mean (SD)</td>
<td>65.4 (9.1)</td>
<td>65.8 (8.9)</td>
</tr>
<tr>
<td>% Female</td>
<td>58.1</td>
<td>58.2</td>
</tr>
<tr>
<td>% Caucasian</td>
<td>90.2</td>
<td>89.6</td>
</tr>
<tr>
<td>% Married / Partner</td>
<td>72.8</td>
<td>72.9</td>
</tr>
<tr>
<td>% Working</td>
<td>36.4</td>
<td>34.2</td>
</tr>
<tr>
<td>% Post-sec. education</td>
<td>56.1</td>
<td>54.2</td>
</tr>
</tbody>
</table>

- Hawker et al. OARSI 2017
**TKA Appropriateness at Consultation**

<table>
<thead>
<tr>
<th>Appropriateness Domains</th>
<th>Full Sample N = 1462</th>
<th>TKA recommended N = 1061</th>
<th>TKA not recommended N = 401</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrable TKA Need</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOMAC pain / 20</td>
<td>11.6 (3.7)</td>
<td>12.0 (3.5)</td>
<td>10.5 (3.8)</td>
</tr>
<tr>
<td>ICOAP intermittent / 24</td>
<td>14.1 (5.7)</td>
<td>14.5 (5.7)</td>
<td>13.1 (5.5)</td>
</tr>
<tr>
<td>ICOAP constant / 20</td>
<td>10.4 (5.5)</td>
<td>11.0 (5.4)</td>
<td>8.9 (5.6)</td>
</tr>
<tr>
<td>KOOS function / 100 (lower better)</td>
<td>56.1 (17.8)</td>
<td>58.1 (17.9)</td>
<td>51.2 (16.8)</td>
</tr>
<tr>
<td>PASS (% unacceptable symptom state)</td>
<td>71.7%</td>
<td>76.2%</td>
<td>60.0%</td>
</tr>
<tr>
<td>Non-surgical treatment tried = yes</td>
<td>61.0%</td>
<td>61.5%</td>
<td>59.6%</td>
</tr>
<tr>
<td>Patient willing to have TKA*</td>
<td>93.2%</td>
<td>96.7%</td>
<td>84.9%</td>
</tr>
<tr>
<td>Pain Catastrophizing Scale (higher worse)</td>
<td>22.7 (14.3)</td>
<td>23.8 (14.4)</td>
<td>19.6 (13.6)</td>
</tr>
<tr>
<td>% Expectations realistic (surgeon)*</td>
<td>94.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean BMI (SD)</td>
<td>32.5 (6.8)</td>
<td>32.6 (6.7)</td>
<td>32.2 (7.0)</td>
</tr>
<tr>
<td>% 2+ Comorbid conditions</td>
<td>36.3%</td>
<td>37.9%</td>
<td>32.0%</td>
</tr>
<tr>
<td>Smoking – % never smoked</td>
<td>44.3%</td>
<td>71.7%</td>
<td>45.9%</td>
</tr>
</tbody>
</table>

* Definitely or probably yes
## Non-Surgical Treatment of OA

<table>
<thead>
<tr>
<th>Non-surgical treatments</th>
<th>Current</th>
<th>Ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>51.3%</td>
<td>76.7%</td>
</tr>
<tr>
<td>Physical therapy</td>
<td>13.9%</td>
<td>47.9%</td>
</tr>
<tr>
<td>Walking aid</td>
<td>28.3%</td>
<td>38.4%</td>
</tr>
<tr>
<td>Pharmacotherapy for pain</td>
<td>62.8%</td>
<td>97.3%</td>
</tr>
<tr>
<td>IA injection, acetaminophen, NSAIDs, opioids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss</td>
<td>46.5%</td>
<td>67.8%</td>
</tr>
<tr>
<td><strong>Comprehensive OA treatment</strong></td>
<td>29.9%</td>
<td>61.0%</td>
</tr>
</tbody>
</table>

*Exercise and/or PT + analgesia + weight loss (if BMI >25)

- King LK et al. OARSI 2017
HSS TKA Expectations Questionnaire

• 17 items, e.g. pain relief, ability to walk
• For each item, respondent indicates level of importance to them to achieve:
  – very important, somewhat important, a little important, I do not expect this, or this does not apply to me
• Total summary score – indicates greater number of expectations
• Subscale scores – importance of each item

<table>
<thead>
<tr>
<th>TKA Expectation</th>
<th>% very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve walking</td>
<td>94.8%</td>
</tr>
<tr>
<td>Pain relief</td>
<td>90.0%</td>
</tr>
<tr>
<td>Go down/up stairs</td>
<td>87.7% / 86.1%</td>
</tr>
<tr>
<td>Perform daily activities</td>
<td>81.4%</td>
</tr>
<tr>
<td>Perform recreational activities</td>
<td>76.0%</td>
</tr>
<tr>
<td>Ability to kneel</td>
<td>69.8%</td>
</tr>
<tr>
<td>Participate in sports</td>
<td>66.7%</td>
</tr>
<tr>
<td>Interact with others</td>
<td>65.9%</td>
</tr>
<tr>
<td>Improve mental well-being</td>
<td>64.1%</td>
</tr>
<tr>
<td>Remove need for walking aid</td>
<td>46.6%</td>
</tr>
<tr>
<td>Ability to use public transport</td>
<td>46.1%</td>
</tr>
<tr>
<td>Improve sexual activity</td>
<td>33.4%</td>
</tr>
<tr>
<td>Ability to work for pay</td>
<td>26.0%</td>
</tr>
</tbody>
</table>

(50.7% wanted most pain relieved; 45.4% wanted complete pain relief)

Rank order of TKA expectations considered ‘very important’ to achieve
TKA Expectations by Sex

More important for women
More important for men
No sex difference

- Hawker et al. OARSI 2017
TKA Expectations by Age

- No age differences
- Declines in importance with age
- Increases in importance with age

- Hawker et al. OARSI 2017
Surgeons’ Opinion re Patient Expectations Realistic (Recommended for TKA)

- Hawker et al. OARSI 2017
BEST-Knee Summary

• Among individuals referred for consideration of TKA, only 61% had received prior non-surgical therapy
  – Prior Rx appeared not to factor into surgeon decision

• TKA Expectations
  – Vary by sex and age, but those considered ‘very important’ (walking, pain relief, stairs, ADLs) similar for all groups and largely realistic
  – Expectations appear to influence surgeon recommendation
  – Most surgeons felt patients’ expectations realistic (95%)
In Conclusion...

• Appropriateness is a complex concept
• Need to consider patient, surgeon and health care system perspectives
• Key concepts:
  – Ready
  – Able
  – Willing
• Overall, benefits outweigh harms

What are your expectations?
Acknowledgements

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Clinic Staff & Surgeons

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