Total Knee Arthroplasty: Gaining Range Through Function

Trent Brown, MOT, OTR/L, ATP, BCG
5 Sections

- **Section 1** – Common Themes and Demographics behind Knee Arthroplasty (TKA)
  - demographics
  - general facts

- **Section 2** – Total Knee Arthroplasty
  - procedures/components
  - cruciate retaining
  - anteromedial vs. subvastus
  - alignment goals
  - computer aided orthopedic surgery (CAOS)
  - research behind TSA
  - specific therapeutic protocol
  - treatment ideas/labs

- **Section 3** – The Resistance to CAOS
  - why?
  - Sim BTKA vs. Staged B TKA
5 Sections (continued)

**Section 4** – Evidence based protocol

- 3 phase protocol
- goals
- precautions
- criteria to advance
- treatment ideas

**Section 5** – Documentation

- documentation ideas “outside of the box” for the TKA client
- long-term care, acute, HH, outpatient, and transitional clients
- case study implementing research and treatment ideas presented in this course for total joint clients
Objectives

1. Understand the current trends and projections regarding total knee arthroplasty

2. Understand current components, surgical procedures, and computer assisted orthopedic surgical strategies for the TKA client based on current evidence and research

3. Understand the role of therapy in functional achievement using evidence and currently researched protocols for the TKA client

4. Understand documentation strategies and language for the TKA client based on information provided in this course to justify therapy services to all payer sources
Section 1- Common Themes

- Let's explore commonalities among knee replacement
  - National Data from 2011 and published 2014 (most current)
    - number of replacements performed
    - future projections
    - gender association
    - general cost comparison
    - common diagnosis and causes
    - general inclusion criteria
## Common Themes (continued)

National Data from 2011 (published in 2014) American Academy of Orthopedic Surgeons (AAOS)

**TKA** (Z96.651, Z 96.652, Z96.659)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Procedures</th>
<th>Male</th>
<th>Female</th>
<th>18-44 yrs</th>
<th>45-64 yrs</th>
<th>65-84 yrs</th>
<th>85+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>282,350</td>
<td>37%</td>
<td>63%</td>
<td>2%</td>
<td>31%</td>
<td>63%</td>
<td>3%</td>
</tr>
<tr>
<td>2005</td>
<td>498,169</td>
<td>36%</td>
<td>64%</td>
<td>2%</td>
<td>38%</td>
<td>57%</td>
<td>3%</td>
</tr>
<tr>
<td>2011</td>
<td>645,062</td>
<td>38%</td>
<td>62%</td>
<td>2%</td>
<td>43%</td>
<td>53%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Common Themes (continued)

- National Data from 2011 (published in 2014) American Academy of Orthopedic Surgeons (AAOS)

  1) TKA’s have more then doubled in the last decade

  2) Currently 4.7 million Americans are living with a TKA

  3) 23% of this increased growth is attributed to obesity and population growth

  4) TKA will increase by 673% (3.48 million) by 2030
Common Themes (continued)

TKA Rate per 1,000 based on Medicare Enrollees: 2000-2010

Average 9.04/1000

<table>
<thead>
<tr>
<th>Highest Rate</th>
<th>Lowest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idaho</td>
<td>12.58/1000 Hawaii 3.42/1000</td>
</tr>
<tr>
<td>South Dakota</td>
<td>12.56/1000 New York 6.29/1000</td>
</tr>
<tr>
<td>Kansas</td>
<td>12.23/1000 New Jersey 6.67/1000</td>
</tr>
</tbody>
</table>
Common Themes (continued)

Costs of TKA based on National Data from 2015 “Health of America” Report

National Average is $31,124

TKA (Z96.651, Z 96.652, Z96.659)

<table>
<thead>
<tr>
<th>Highest Cost Market</th>
<th>Lowest Cost Market</th>
</tr>
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<tbody>
<tr>
<td>New York, NY</td>
<td>Montgomery, AL</td>
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<tr>
<td>$61,266</td>
<td>$16,096</td>
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<tr>
<td>Fort Collins, CO</td>
<td>Fresno, CA</td>
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<tr>
<td>$55,604</td>
<td>$19,653</td>
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<tr>
<td>Anchorage, AK</td>
<td>Pittsburgh, PA</td>
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<tr>
<td>$54,008</td>
<td>$23,751</td>
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</table>
Common Themes (continued)

- National Data from 2011 (published in 2014) American Academy of Orthopedic Surgeons (AAOS)

THA (Hemiarthroplasty included) (Z96.641, Z96.642, Z96.649)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Procedures</th>
<th>Male</th>
<th>Female</th>
<th>18-44 yrs</th>
<th>45-64 yrs</th>
<th>65-84 yrs</th>
<th>85+</th>
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</thead>
<tbody>
<tr>
<td>2000</td>
<td>272,706</td>
<td>42%</td>
<td>58%</td>
<td>7%</td>
<td>31%</td>
<td>55%</td>
<td>6%</td>
</tr>
<tr>
<td>2005</td>
<td>345,690</td>
<td>44%</td>
<td>56%</td>
<td>6%</td>
<td>38%</td>
<td>51%</td>
<td>5%</td>
</tr>
<tr>
<td>2011</td>
<td>412,109</td>
<td>44%</td>
<td>56%</td>
<td>5%</td>
<td>42%</td>
<td>48%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Common Themes (continued)

- National Data from 2011 (published in 2014) American Academy of Orthopedic Surgeons (AAOS)

  1) THA’s have increased 166.1% in the last decade

  2) Currently 2.5 million Americans are living with a THA

  3) California, Florida, and Texas have the highest percentages of residents with THA

  4) THA will increase 175% by 2030
Common Themes (continued)

THA Rate per 1,000 based on Medicare Enrollees: 2000-2010

Average 3.91/1000

<table>
<thead>
<tr>
<th>Highest Rate</th>
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<tbody>
<tr>
<td>Idaho</td>
<td>5.81/1000</td>
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<td>Minnesota</td>
<td>5.71/1000</td>
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<tr>
<td>Hawaii</td>
<td>1.45/1000</td>
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<tr>
<td>Louisiana</td>
<td>2.69/1000</td>
</tr>
<tr>
<td>West Virginia</td>
<td>2.84/1000</td>
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</table>
Common Themes (continued)

Costs of THA based on National Data from 2015 “Health of America” Report

National Average is $30,124

THA (Z96.641, Z96.642, Z96.649)

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<thead>
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<tr>
<td>New York, NY</td>
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<td>Fort Collins, CO</td>
<td>Fresno, CA</td>
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<tr>
<td>$55,412</td>
<td>$19,250</td>
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<tr>
<td>Anchorage, AK</td>
<td>Pittsburgh, PA</td>
</tr>
<tr>
<td>$49,555</td>
<td>$22,134</td>
</tr>
</tbody>
</table>
Common Themes (continued)

- National Data from 2011 (published in 2014) American Academy of Orthopedic Surgeons (AAOS)

### TSA (Partial included) (Z96.611-Z96.619)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Procedures</th>
<th>Male</th>
<th>Female</th>
<th>18-44 yrs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>18,621</td>
<td>44%</td>
<td>56%</td>
<td>4%</td>
<td>29%</td>
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<td>5%</td>
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<td>2%</td>
<td>34%</td>
<td>61%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Section 2 - Total Knee Replacement
Total Knee Arthroplasty - Norms

<table>
<thead>
<tr>
<th>Motion</th>
<th>“Normal ROM”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee Flexion</td>
<td>0 – 140*</td>
</tr>
<tr>
<td>Knee Extension</td>
<td>0</td>
</tr>
</tbody>
</table>

The knee joint is the “least complex as far as dynamic range of motion”

(Clarkson, 2000)
## Total Knee Arthroplasty - Norms

What is required for normal function?

<table>
<thead>
<tr>
<th>Activity</th>
<th>ROM needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tie shoe with flat foot on floor</td>
<td>106* flexion</td>
</tr>
<tr>
<td>Independent sitting</td>
<td>93*</td>
</tr>
<tr>
<td>Lifting object from floor</td>
<td>117* (straight back) / bent at hips 71*</td>
</tr>
<tr>
<td>Ascending stairs</td>
<td>83-105*</td>
</tr>
<tr>
<td>Descending stairs</td>
<td>86-107*</td>
</tr>
<tr>
<td>Walking</td>
<td>60*</td>
</tr>
<tr>
<td>Running</td>
<td>103*</td>
</tr>
</tbody>
</table>

(Clarkson, 2000)
What is required for normal function?

-Rutter et al (2008) found that patients with active flexion between 128-132° had the best “overall function”

however

-Meneghini et al (2007) found that patients who achieved 115° knee flexion were “as functional” in “society scores”, “function scores”, and “pain” scores as patients with > 125°

-115° seems to be the best predictor of functional outcomes
Total Knee Arthroplasty - Facts

1) Median Age: 66.4

2) Primary Diagnosis: OA = 95%

3) Varus deformity: 60%

4) Valgus deformity: 24%

5) Anteromedial approach: 87%

(Waddell et al, 2010)
Total Knee Arthroplasty - Facts

Barad and associates compared data from 2009 to 2014.

6) Median LOS: from 2.0 days to 1.3 days
7) Rehab Center from 41% to 21%
8) Home with OP Therapy from 9% to 53%

However, hospital readmission rates within 30 days of TKA have increased according to JAMA from 4.2% to 8.9%.

In addition, readmission for wound infection from 1.4% to 3.0%
Currently there are over 150 knee replacement designs on the market.

The typical TKA contains 3 components:

1) Femoral component
   - metal alloys consisting of titanium or cobalt-chromium
   - 91% femoral components are attached using cement
   - cementless option is available
Currently there are over 150 knee replacement designs on the market.

The typical TKA contains 3 components:

2) Tibial component

- Metal platform for durability
- Polyethylene for motion and some "give"
- Some designs have a polyethylene stem instead of metal (5%)
- 95% TKAs use cement for tibial component
Total Knee Arthroplasty - Materials

Currently there are over 150 knee replacement designs on the market.

The typical TKA contains 3 components:

3) Patellar component

- Dome shaped piece of polyethylene duplicating posterior aspect of patella fitting with the newly replaced femoral component.

- A metal patellar component exists and is used < 10% TKA.
There is a unicompartmental option

these in general are rare

-80% are performed on medial side

usually performed on patients 45-65 years of age

verdict is still out onto the cost-effectiveness and overall functional benefit compared to standard TKA

(AJRR, 2016)
Implant variations

1) cruciate retaining:

a) PCL retaining (PR)

-this implant allows the surgeon to save the PCL. There is a small groove that allows the ligament to provide flexion. The ACL is sacrificed with the PCL retaining method.

-do not have the center and post design (for increased posterior stability)
Total Knee Arthroplasty - Types

Implant variations

2) cruciate retaining:

b) Bi-cruciate retaining (BCR)

- this implant allows the surgeon to save the ACL and PCL. Medial and lateral tibial plateaus are resected and replaced with separate unicondylar trays and inserts.
Total Knee Arthroplasty - Types

Implant variations

3) Posterior-Stabilized design (PS)

-the cushion of the tibial component has a raised surface with an internal post that fits into a bar (cam) in the femoral component

-PCL is cut as the new component stabilizes the femur from anterior sliding during knee flexion
Implant variations

Which implants (cruciate retaining or cruciate sparing) have the best outcomes?

Several studies have been performed to determine this

Vera et al (2015) looked at 20 studies (2,347 TKA’s) and determined

1) 2.4 degrees more flexion with PS design (cruciate sacrificing) compared to cruciate sparing

2) functional scores have no significant difference
There are two types of knee prosthesis

1) Fixed-Bearing:

- In this design the plastic of the tibial component is attached to the implant beneath. The femoral component then rolls on the cushioned surface.
There are two types of knee prosthesis

2) Mobile-Bearing

- These designs provide a few degrees of rotation
- These prostheses allow the plastic insert to rotate a few degrees on the metal tibial tray
- This requires greater surrounding soft tissue support including the MCL and LCL
- 7% of all TKA (2016)
Multiple research articles have shown little difference between Mobile and Fixed bearing surfaces regarding long-term function and pain levels.

Gender specific?

-Zimmer and Biomet market “gender-specific” prostheses to account for anatomical differences between men and women.

-no conclusive evidence that these knees are more effective.
Total Knee Arthroplasty - Types

There are multiple reputable brands and types

<table>
<thead>
<tr>
<th>Reputable FDA approved Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomet</td>
</tr>
<tr>
<td>Zimmer</td>
</tr>
<tr>
<td>Wright</td>
</tr>
<tr>
<td>Smith &amp; Nephew</td>
</tr>
<tr>
<td>DePuy</td>
</tr>
</tbody>
</table>
Total Knee Arthroplasty - Procedure

1) Incision

-Anteromedial incisions (parapatellar or midvastus)

-87% of incisions are with this approach

-portion of quadriceps is separated from VMO (depending on amount of exposure needed)

-3 to 5 mm of quad tendon left attached to VMO for later repair
1) Incision

-Anteromedial incisions (parapatellar or midvastus)

-The incision then proceeds distally curving around the medial aspect of the patella through the medial knee retinaculum (a few mm of retinaculum are left attached to the patella for later repair)

-The incision then proceeds around the inferior/medial portion of the patella to the patellar tendon and extends to the anterior tibial cortex 5 mm medial to the tubercle
Total Knee Arthroplasty - Procedure

1) Incision

- Anteromedial incisions (parapatellar or midvastus)

  - Midvastus approach resulted in less post-operative pain and faster time to straight leg raise

  - VMO is retracted anterolaterally and incised by the surgeon

  - The patella is dislocated laterally

Long term outcomes were identical
Total Knee Arthroplasty - Procedure

1) Incision

-Subvastus or “quad sparing approach”

-7% of TKA incisions

-no advantage between the two approaches long-term

(Young, 2009)
Total Knee Arthroplasty - Procedure

1) Incision

-Which approach is best?

<table>
<thead>
<tr>
<th>APPROACH</th>
<th>ADVANTAGE</th>
<th>DISADVANTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial parapatellar</td>
<td>Extensile</td>
<td>Detachment of VMO</td>
</tr>
<tr>
<td></td>
<td>Easy</td>
<td>Interruption of patellar vascular supply&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Reproducible</td>
<td></td>
</tr>
<tr>
<td>Midvastus approach</td>
<td>VMO insertion on patella preserved</td>
<td>Less extensile</td>
</tr>
<tr>
<td></td>
<td>Avoid quadriceps tendon incision</td>
<td>Exposure more difficult in large patients with contractures</td>
</tr>
<tr>
<td></td>
<td>Patella blood supply less interrupted</td>
<td></td>
</tr>
<tr>
<td>Subvastus approach</td>
<td>Anatomic exposure</td>
<td>Not extensile</td>
</tr>
<tr>
<td></td>
<td>Extensor mechanism not violated</td>
<td>Potential for neurovascular injury</td>
</tr>
</tbody>
</table>

Lateral parapatellar approach exists mainly for severe genu valgus
2) Bone Resection and measurement

-Precise measurements are taken of the tibia, femur, and patellar bone and the damaged areas are cut away.

-The surgeon will attempt to spare as much natural bone as possible.

-between 3mm (resurface) and 19mm can be resected.

(average = 9mm)
3) Trial components & fixture

-Trial tibial, femoral, and patellar components are fitted with a ROM test conducted

-If the trial components are found appropriate the final components are cemented (or “press-fit”) into place
4) Tissue repair

- The deeper layers of tissue are stitched together using dissolving stitches

- The skin is sewn together using:
  - staples
  - sutures
  - dermabond (super glue) with steri-strips

- Skin closure is about long-term cosmetics and surgeon preference
Total Knee Arthroplasty - Procedure

Alignment Goals

- 90 degrees posterior slope
- 10 degrees valgus
- 90 degrees
Total Knee Arthroplasty - Procedure

Alignment Goals

- best results are within 3° of these goals
- no greater than 15° of preoperative angles (patient specific) however
Total Knee Arthroplasty - Procedure

Computer Aided Orthopedic Surgery (CAOS)

A controversy among TKA surgeons!
(3% of all TKA are used with CAS system) (Germany = 30%) (Picard et al. 2014)

The longevity of total knee prostheses depends mainly on the correct alignment (frontal, sagittal) of the components, tissue balancing, and the axis of the lower limb. (Haritinian, 2013).

CAS uses imaging in 4 ways

1) preoperative image-based (CT scans)
2) Intraoperative image-based (flouroscopy)
3) image-free (bony landmarks found intra-operatively)
4) individual templating
Total Knee Arthroplasty - Procedure
Mason et al. looked at 29 studies and reached the conclusion that a significant improvement in component orientation was obtained in CAS compared to conventional technique.

So why aren’t more surgeons using this?
Total Knee Arthroplasty - Procedure

Computer Aided Orthopedic Surgery (CAOS)

In addition, MacDessi et al. (2019) studied 308 patients and their surgeons regarding soft tissue balance and proper angles who found the following:

- accuracy of 63% at 10*
- accuracy of 57.5% at 45 *
- accuracy of 63.8% at 90*

So why aren’t more surgeons using this?

Ergonomics and Economics
Section 3: The Resistance to CAOS
Total Knee Arthroplasty - Procedure

computer Aided Orthopedic Surgery (CAOS)

- TKA have great outcomes and patient satisfaction so why change?

- Surgeon Age: Many surgeons are in their 50’s and using “newer technology” is unfamiliar

- Operation Time: CAS will add 10-20 minutes in OR (after 6 surgeries an extra 1-2 hours will limit the number of surgeries performed) (increased infection risk?)

- Ergonomics: User friendliness, excessive information, poor design and handling probes/tools, discomfort of surgical area.

- Economics: $120,000 navigation system = increased cost per knee while implants cost 10 times more (specific implants and tools created per patient)

- Learning curve: Surgeons need 20-30 surgeries to effectively use CAS (2-6 month learning curve)

(Picard et al. 2014)
Simultaneous (simBTKA) vs Staged Bilateral Total Knee Arthroplasty

561 patients used with data gathered from a single hospital (2013-2016)

Objective: Compare hospital costs and complication rates between two groups

- simBTKA were younger (61-68), lower BMI, and required more in-patient therapy

- no significant difference to total hospital costs (sim = $24,596 vs staged = $24,915)

- complication rates were higher with sim (DVT 5.4% vs 1.4%) and blood transfusions (15.8% vs 6.2%)

- multiple studies indicate short and long term function/ROM demonstrate no significant difference

(Sobh et al. 2018)
Total Knee Arthroplasty - Procedure

Same Day Surgery Compared with Inpatient Stay

177,818 identified and 1,236 underwent same day surgery

-in-patient stays had higher rate of DVT

-same day patients had a higher rate of revision/reoperation

-Increased readmission rates for individuals with diabetes, BMI > 35 kg/m, and age >85

Despite the “same day surgery” group being “healthier” pre-surgery, the “in-patient” group did as well long-term with reduced revision rates and hospital re-admission post 90 days

(Basques et al. 2017)
Total Knee Arthroplasty - Procedure

Why Revision?

1) Loosening and Wear
   - high-impact activity
   - excessive body weight
   - plastic wear between metal

Osteolysis (Plastic particles accumulate around the joint and are attacked by the body's immune system. This attack also attacks the healthy bone around the implant.)
Total Knee Arthroplasty - Procedure

Why Revision?

2) Infection

- Debridement

- Staged surgery
  - spacer
  - new prosthesis
Total Knee Arthroplasty - Procedure

Why Revision?

3) Instability
Total Knee Arthroplasty - Procedure

Why Revision?

4) Stiffness

- manipulation under anesthesia is considered a “revision”
Total Knee Arthroplasty - Procedure

Why Revision?

5) Fractures

-periprosthetic fracture
Why Revision?

Often, longer stems may be required to fit more securely into bones to increase stability.
Total Knee Arthroplasty

Section 4: Evidence Based Protocol
Total Knee Arthroplasty - Therapy

What is the national standard/protocol for clinical treatment?

- this does not exist

There are hundreds of surgeon specific protocols in existence

After reviewing dozens of these, several researchers have analyzed, combined, and developed a 3 phase protocol similar to the shoulder and hip

*this does not necessarily trump your surgeons personal protocol or orders
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3
Goals:

1) ambulate with AD 25-100’
2) ascending/descending stairs
3) 80° P/AROM flexion
4) knee extension to -10° or less
4) independently perform SLR
5) perform bed mobility and transfers with SBA-Mod level
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3
Precautions:

1) WBAT with assistive device (unless otherwise noted by surgeon)

2) monitor wound healing

3) no exercise with weights or resistance

4) avoid torque or twisting forces on the knee (particularly in closed chain activity)

5) monitor for signs of DVT, PE, and nerve damage
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3

Criteria to advance to phase II:

1) quad contraction and/or ability to perform SLR
2) knee AROM -10° to 80°
3) minimal pain and inflammation
4) SBA to Mod I with transfers
5) ambulation at least 100’ with AD
3 Phase Protocol

Phase 1: Day 0 – 3

Treatment: (remember- intensive ther-ex early may lead to a less than optimal ROM- flexibility is the key initially)

1) A/AA/PROM activity/ex (seated and supine)

2) soft-tissue massage

3) isometric quad, hamstring, and glut exercises
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3

Treatment:

4) SLR

5) closed chain activity
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3

Treatment:

5) closed chain activity (continued)
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3

Treatment: WB with PNF object transportation

5) closed chain activity (continued)
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 1: Day 0 – 3

Treatment: half standing with increased WB production

5) closed chain activity (continued)
3 Phase Protocol

Phase 1: Day 0 – 3

Treatment:

6) gait training on flat surfaces and on stairs

7) transfer training

8) ice/cryotherapy 5 x day and 20 minutes before and after ROM or exercise
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase) Day 3 – week 6

Goals:
1) increase AROM to > or = 0-110°

2) increase strength to knee flexor & extensor groups

3) increase body spatial awareness with operative extremity during ADL’s

4) gait: d/c assistive devices when appropriate

5) independence with ADL’s and functional mobility
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase) Day 3 – week 6

Precautions:

1) monitor for increased edema and continue with ice as needed

2) monitor wound and consult with MD regarding signs or symptoms of potential infection

3) use AD for ambulation to minimize compensatory gait
3 Phase Protocol

Phase 2: (Motion Phase) Day 3 – week 6

criteria to advance to phase III:

1) AROM 0-110°

2) excellent voluntary quadriceps control as exhibited during closed chain activity

3) independent with ambulation community distances without AD (800’)

4) minimal pain and inflammation
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase)

Treatment: Day 3 – week 4

1) A/AA/PROM, stretching (< 90° ?) & extension

2) Stationary Bicycle (begin with partial revolutions)
   (several research articles claim early & frequent use of a bicycle yield greater functional outcomes & ROM compared to any other single activity)

3) patellar joint mobilization (is this in your practice act?)
   -use thumb and forefinger, move patella in all 4 directions (hold for 15-30 seconds or continuous slow progression)
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase)

Treatment: Day 3 – week 4

4) continue isometric exercises as before

5) supine heel slides and seated LAQ

6) SLR in all planes

7) NMES for quads if poor quad contraction exists
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase)
Treatment: Day 3 – week 4

8) gait training with improved quality (wean off assistive device if possible after week 2)

9) re-education for functional activities
**3 Phase Protocol**

**Phase 2: (Motion Phase)**

Treatment: Weeks 4 – 6

1) continue above ex/activity

2) patellar mobilization as needed

3) front and lateral step up and step down (shower & tub transfers should be performed in frontal plane using lateral step over method)
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 2: (Motion Phase)

Treatment: Weeks 4 – 6

4) ¼ front lunge (with weight)  
- add a dynamic surface if appropriate

5) use sit-stand and bending retrieval tasks to implement functional tasks

6) continue stationary bicycle
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 3: week 7 – 12

Goals:

1) maximize post-op ROM (0 – 115* minimum)

2) strength of surgical extremity >/= 80% opposite extremity

3) begin light recreational activity (walking, swimming, etc.)
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 3: week 7 – 12

Criteria for d/c:

1) AROM without pain (or minimal pain)
2) 4+/5 strength based on MMT
3) minimal to no swelling
4) independent gait
5) normal step over step stair climbing
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 3: week 7 – 12

No standard precautions for this phase

-keep in mind the protocol or orders given by the surgeon you are working with
Total Knee Arthroplasty - Therapy

3 Phase Protocol

Phase 3: week 7 – 12

Treatment: Stable Chops or Mobile Chops

1) continue advancing closed chain activity
3 Phase Protocol

Phase 3: week 7 – 12

Treatment:

2) continue joint mobilization if needed

3) initiate endurance program

4) progress balance and proprioceptive activity
   -the most effective way to do this is in natural environments (grass, gravel, parking lot, tile, deep carpet, etc.)

5) discontinue NMES of quads
3 Phase Protocol

Phase 3: week 7 – 12

Treatment:

6) Return to normal recreation activities
   - golf, doubles tennis, biking, etc.
   (do you address this in your practice?)

7) increase resistance based exercise
Total Knee Arthroplasty - Facts

- Mortality rate is 1.6% post 1 year

- Survivor rate (no revision required) of 94% at 15 years

- Survivor rate of 85% at 21 to 23 years (limited research beyond 20 years due to mortality rate)

- 92% patients post-TKA claim good or excellent with overall outcome (1.6% fair / 6.5% poor)

- 66% report their knee felt “normal”

- Patients under age 55 have a survivorship rate of 96% at 10 years and 90% at 18 years

- 24% of young population regularly participate in tennis, skiing, bicycling, or strenuous farm or construction work

(withholding knee replacement based on age may not be warranted)

(2016) (Williams, 2010)
Total Knee Arthroplasty

Section 5: Documentation
Examples- I will give you a few examples of skilled documentation using treatment strategies, ideas, and protocol from this course.

-always address:

1) what limitation or dysfunction does the patient exhibit

2) what specific intervention/skill did you provide?
   - manual, verbal cue, hand over hand, mobilization, education, etc.

3) what motion, movement, activity, or occupation did the patient do or do you want them to accomplish?

4) how was or will this be implemented into a functional movement, mobility, activity, or occupation?

5) what if any carry-over occurred?
P.T. completed PROM to L knee to 105° with pt. pain at 5/10

vs.

P.T. completed grade (2 or 3) patellar joint mobilization to reduce subdermal scarring and increase natural superior/inferior glide during knee flexion. Pt. then increased from 0-98° PROM of L knee to 0-105° flexion to facilitate independence with step over step stairs as needed for home environment.
Pt. required min A to don socks seated EOB

vs.

During AM ADL routine pt. required Min A to don socks seated EOB 2* reduced L knee flexion and ability to reach floor. Therapist provided closed chain WB’ing task on dynamic surface with L knee flexion emphasis and stabilization. Pt. then exhibited increased knee flexion & ability to reach L LE to doff sock with Mod I. Therapist provided education to patient to complete sit-stand closed chain activity x 5 prior to attempting LB dressing and reaching tasks early AM.
Objectives

1. Understand the current trends and projections regarding total knee arthroplasty

2. Understand current components, surgical procedures, and computer assisted orthopedic surgical strategies for the TKA client based on current evidence and research

3. Understand the role of therapy in functional achievement using evidence and currently researched protocols for the TKA client

4. Understand documentation strategies and language for the TKA client based on information provided in this course to justify therapy services to all payer sources
Questions & Discussion