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Occupational Therapy Role in Joint Replacement

Manisha Sheth OTD, OTR/L

Learning Objectives

After this course participants will be able to

- Describe the importance of pre-operative OT assessment and intervention for elective joint replacement surgery.
- Recognize the role of occupational therapy in various practice settings after joint replacement surgery.
- Identify new technology, different surgical options and future directions of OT practice
Hip and Knee Replacement

- An artificial hip or knee → More than a **million** people a year.
- With an aging but still active population, the number of joint replacement surgeries is expected to grow dramatically, to some **4 million**, in less than 20 years. More than half will be **younger than 65**.

(American Joint Replacement Registry, 2016)

![Hip Joint Replacement and Knee Joint Replacement](image)

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**Annual Report -2016**

![Graph: Hospital Enrollment 2011-2015](image)

©2016 American Joint Replacement Registry
AnnualReport -2016

Table 1: 2015 Average Procedural Volume for Participating Surgeons (N=3,168)

<table>
<thead>
<tr>
<th></th>
<th>Total Surgeons</th>
<th>Total Procedures</th>
<th>Per Surgeon Mean</th>
<th>Per Surgeon Median</th>
<th>Interquartile Range</th>
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<tbody>
<tr>
<td>HIP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2,572</td>
<td>57,672</td>
<td>22.4</td>
<td>8</td>
<td>25</td>
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<tr>
<td>Revision</td>
<td>1,101</td>
<td>4,680</td>
<td>6.1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>KNEE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2,281</td>
<td>87,593</td>
<td>38.4</td>
<td>20</td>
<td>43</td>
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<tr>
<td>Revision</td>
<td>1,538</td>
<td>9,056</td>
<td>5.9</td>
<td>3</td>
<td>6</td>
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</tbody>
</table>

©2016 American Joint Replacement Registry

American Joint Replacement Registry, 2016

Annual report -2016

Figure 9: Distribution of Procedures (N=427,181)

See Appendix D for the complete list of procedure codes included in each category.

©2016 American Joint Replacement Registry

American Joint Replacement Registry, 2016
Hip Joint Anatomy

- One of the body's largest joints.
- It is a **ball-and-socket** joint.
- Bands of tissue called ligaments (the hip capsule) connect the ball to the socket and provide stability to the joint.

Indications of Hip Replacements

- Osteoarthritis
- Rheumatoid arthritis
- Post-traumatic arthritis
- Avascular necrosis
- Childhood hip disease

(AAOS, 2014)
Contraindication of Hip Replacement

- Infection
- Nicotine
- Osteoporosis
- Other factors such as dementia

(AAOS, 2014)

Complications of Hip Replacements

<table>
<thead>
<tr>
<th>Early Complications</th>
<th>Immediate Complications</th>
<th>Late Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component malpositioning</td>
<td>Infection</td>
<td>Dislocation</td>
</tr>
<tr>
<td>Fracture of the adjacent bone</td>
<td>Fracture of the adjacent bone</td>
<td>Implant loosening</td>
</tr>
<tr>
<td>Neurovascular damage</td>
<td>Neurovascular damage</td>
<td>Joint stiffness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Muscle weakness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persistent infection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joint debris due to wear and tear of implant</td>
</tr>
</tbody>
</table>

(Singh, n.d.)
Types of Hip Replacements

- Total hip arthroplasty
- Partial arthroplasty (Hemi arthroplasty)

Components of Total Hip Arthroplasty

- **Acetabular component (socket):** This piece is usually made of metal but is occasionally made of ceramic or a combination of plastic and metal.
- **Acetabular line:** This piece is usually made of high-quality plastic.
- **Femoral head (ball):** These are made of durable metal, plastic, ceramic, or a combination of materials.
- **Femoral stem**

(Peerwell, 2017)
Different Types of Total Arthroplasty

(Peerwell, 2017)

Different Surgical Options For Hip Replacement

Anterior Lateral Posterior
Anterior Approach

- The direct anterior (Smith-Peterson) and anterior lateral (Watson Jones) approach have the advantage of not violating the posterior muscles (Gluteus Maximus).
- There is often less damage to the posterior capsule as well.
- Position of hip stability:
  - Flexion, abduction to neutral and internal rotation
- Position of hip instability
  - Adduction, external rotation and excessive hypertension

(Desai & Higuera-Rueda, 2014)

Posterior Approach

- The posterior approach is probably the most popular approach for a total hip replacement today.
- The disadvantage of the posterior approach is that the posterior capsule and muscles are cut during the approach.
- Position of hip stability
  - Flexion (within limitation of precautions), abduction and external rotation
- Position of hip instability
  - Adduction, internal rotation and flexion greater than limitation of precautions.

(Grandic, 2015)
Comparison of Anterior Versus Posterior Approach

<table>
<thead>
<tr>
<th></th>
<th>Posterior approach (lateral decubitus position)</th>
<th>Anterior approach (supine position)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of femoral fracture during surgery</td>
<td>1%-2%</td>
<td>2%-4%</td>
</tr>
<tr>
<td>Lateral cutaneous femoral nerve symptoms</td>
<td>&lt; 1%</td>
<td>2%-20%</td>
</tr>
<tr>
<td>Risk of dislocation in the first year</td>
<td>3-4%</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Functional outcomes</td>
<td>Lower in the first 3 months; similar at 12 months</td>
<td>Higher up to 3 months after surgery</td>
</tr>
<tr>
<td>Mean hospital stay (days)</td>
<td>4</td>
<td>2.9</td>
</tr>
<tr>
<td>Discharge to home vs. rehab facility</td>
<td>84%</td>
<td>97%</td>
</tr>
</tbody>
</table>

(Knee Joint)

- Hinge Joint
- Bones- Femur, Tibia and Patella
- The menisci → C shaped wedges → between the femur and tibia → act as “shock absorbers”
- Large ligaments → provide stability.

(Normal Knee Joint)
Indication of knee replacement

- Osteoarthritis
- Rheumatoid arthritis
- Post-traumatic arthritis

Contraindication

- Smoking
- Infection
Types of knee Arthroplasty

- Total knee replacement
- Partial (Unicompartmental) replacement
- Kneecap replacement (Patellofemoral arthroplasty)

Components of Knee Replacement

- Stem
- Patellar component
- Metal femoral component
- Tibial component
- Plastic Spacer

(Peerwell, 2017)
Complications after Knee Replacement

- Infection
- Blood Clot (PE, DVT)
- Implant loosening
- Stiff knee (Limited ROM)
- Scaring
- Continued Pain
- Neurovascular Injury

(Singh, n.d)

Advancements in Hip replacement Surgery
Super-path Approach

- The Super-Path hip approach allows the surgeon to preform a hip replacement without dislocating the hip joint and without twisting or contorting the leg resulting in a quicker recovery and less chance of a post operative hip dislocation.

(Kurtz, 2017)
Direct Hip Anterior Approach

- The direct anterior hip replacement approaches the hip joint through the shortest route, between muscle planes, and without cutting any muscles. A special operating table is typically used to position the leg during surgery.

(Kurtz, 2017)

Navigation
MAKOplasty

- MAKOplasty is an innovative total hip replacement (arthroplasty) procedure that is performed using a highly advanced, surgeon-controlled robotic arm system.

(Kurtz, 2017)
Knee Replacement
Patient Specific (Custom) Implants

- A knee replacement can now be manufactured according to the exact shape of your knee. A CT scan of the patient's arthritic knee is used to digitally construct a computer generated 3 dimensional model of the knee joint.

(Kurtz, 2017)

Gender specific knee replacements

(Kurtz, 2017)
Makoplasty

- MAKOplasty uses a robotic arm to assist the surgeon with making the bony cuts around the knee or hip joint. It requires a pre-operative CT or MRI scan and intra-operative navigation.
- The purposed benefit of MAKOplasty is that it improves implant positioning.

Makoplasty Knee

(Kurtz, 2017)
Makoplasty

(Kurtz, 2017)

Incision Appearances
Closed & Healed

(Kurtz, 2017)
Importance of Pre-op OT Assessment

- **Better understanding** of the upcoming procedure
- **Reduce anxiety and fear**
- **Increase compliance** post surgery
- **Avoidance of complications**
- **Enhance knowledge** to improve occupational performance post surgery.
- Determination of appropriate **equipment needs**
- Occupational therapy assessment and education can **decrease length of stay**

(Gentile, 2017).

Pre-op OT Assessment

Preoperative occupational therapy assessment addresses:
- Occupational history and prior level of function
- Cognitive, emotional and social factors that may affect the surgical outcomes.
- Need for durable medical equipment
- Fall risk
- Architectural barriers at the home

(Gentile, 2017).
Preoperative Occupational Therapy Education

Preoperative occupational therapy education includes the following:
- Exercises for upper and lower body strength, range of motion and endurance
- Diet and nutrition
- Alcohol and smoking use
- Certain medications

(Gentile, 2017)

Preoperative Occupational Therapy Education
- Post-surgery precautions and limitations
- Mind and body relaxation techniques for pain management
- ADL/IADL and mobility training
- Use of adaptive devices
- Home safety Preparation
- Discharge planning and homecare services.
Post-operative role of Occupational therapy in various practice settings

- Acute Care
- Acute Rehab Care
- Sub-acute Rehab care
- Homecare Services
- Outpatient Services

Role of OT in acute/acute rehab care after surgery

- Holistic approach → Integrate occupation-based activity
- Client-centered evaluation, intervention, and task modification → to facilitate progress toward performance-based goals.
- An analysis of pre-hospitalization roles and the patient’s likelihood of resuming them.

(AOTA, 2017)
Role of OT in Acute Care/Acute Rehab After Surgery

- **Training based on postsurgical orthopedic protocols includes**
  - Appropriate weight bearing and/or precautions during activities of daily living (ADLs).
  - Use of adaptive equipment for ADL/IADL performance
  - Teaching specific techniques for functional mobility (e.g., safe car transfers, tub/shower transfer and bed mobility) using appropriate adaptive equipment
  - Developing home programs.
- **Assessment of discharge destination**

  (AOTA, 2017)

Sub-Acute Care (SNF)

**Primary focus** includes training in
- Self-care skills
- Use of adaptive equipment
- Compensatory techniques
- Environmental modifications.

OT interventions can include
- Remediating instrumental activities of daily living (IADLs) related to the patient’s discharge environment, such as preparing a meal or managing one’s home or finances

American Occupational Therapy Association (2017)
Sub-Acute Care (SNF)

- Training in functional mobility, such as how to prepare a meal while using an ambulatory device
- Preparing the client and family for community reintegration (as appropriate for the client’s discharge site) with activities such as public dining or emergency response management
- Assessing the need for and recommending potential home modifications and safety equipment to reduce barriers and promote safe functioning upon discharge

Sub-Acute Care (SNF)

- Exploring adaptations and compensatory strategies for return to volunteer or paid employment
- Assessing current leisure skills to determine whether modifications are needed to continue participation and/or assisting with exploring new leisure pursuits
Homecare

- Individuals who discharge home from the hospital after surgery may discover that their home environment impedes optimal performance.
- Typically, home evaluations help therapists identify potential environmental changes that would enable increased safety and efficiency of daily occupations and activities (proper placement of grab bars, stair rails, other environmental modifications).

(AOTA, 2017)

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Homecare

- Occupational therapy practitioners offer strategies for patients to manage daily activities while reducing the risk of injury or further decline.
- Occupational therapy practitioners find the right fit between patients' abilities, needed and desired activities, and their home environment so patients can manage safely and productively at home.

(AOTA, 2017)
Goals

- ADL/IADL independence
- Medicine management
- To address architectural barriers and make recommendations for safety at home.
- Community reintegration
- Fall prevention
- Aging in place
Outpatient Occupational Therapy

- During outpatient occupational therapy, the therapist assists patients to develop and refine additional skills that will enhance their level of performance at home and in the community.

(AOTA, 2017)

Outpatient Therapy

- OT intervention includes activities
  - To restore current level of independence
  - To prevent occupational dysfunction secondary to aging
  - To improve activity tolerance and work capacity
  - Aerobic exercises
  - Mind-body relaxation technics to relieve stress and anxiety
  - Proper body mechanics to prevent any injury or dislocation
Acute Care

Case Study #1

- Mrs. S is an 78 year old female patient lives with her husband in a 2 level home, has tub in the bathroom.
- (I) PTA with self-care, meal preparation and home making. She enjoys gardening, walking and playing cards with her friends. She volunteers as a judge for the flower shows in the community. Her increased pain in right hip has limited her daily activities and must take frequent rest during the day.
- She was diagnosed with degenerative arthritis in her Right hip 4 months ago, now was referred to OT s/p elective Right THR.
- She attended the pre-op meeting
  - Bought hip kit, commode and rolling walker
  - Installed grab bars, non-skid mats in the bathroom
- Would like to go home after discharge from the hospital

Case Study #1

- OT evaluation includes
- Assessment of
  - Pain
  - Strength of UE and trunk
  - Posture
  - Cognition and perception (Memory, judgment, safety awareness, retention and recall of information)
  - ADL/IADL, functional mobility and transfers
  - Home layout and accessibility
  - Support at home
Case Study # 1

- Problem List
  - Pain
  - Limited independence due to pain
  - Anxiety about recovery and dependence on others
  - Inability to ambulate without assistive device
  - ADL dependence
  - Limited endurance
  - Limited leisure activities
  - Sleep deprivation

Treatment goals

- Education about THR restrictions and weight-bearing.
- Pain management while performing self-care
- Proper positioning while sitting, standing and lying in bed
- Bed mobility and functional transfers
- Self-care: Dressing using hip kit
- Use of assistive device and training of compensatory technics to safely perform
  - Toilet t/f
  - Tub t/f
  - Car t/f
- Caregiver training
- Work simplification and energy conservation training
- Safety at home
- Transition to home with homecare
Homecare Goals (post-op day 3 – 2 weeks)

- Continue ADL/I ADL training
- UE and LE strengthening activities
- Home safety
- Functional activities for standing tolerance and balance
  - Meal preparation
  - Kitchen activities
- Grocery shopping activities
- Teaching compensatory technics to modify leisure activities for example
- How to modify gardening activity without bending to far forward, use of a stool to sit.
- Practicing safe walking with a walker in the neighborhood, how to maneuver obstacles and uneven surfaces.

Acute Rehab care

Case Study #2

- Mr. P is a 52 year old male patient lives with wife and children in 3 story home. Mr. P works as computer programmer in a private company who travels frequently for work. He enjoys going to gym 5-7 x/week, plays tennis and goes hiking with his family.
- He suffered sports related injury when he was in college, now had significant increased pain in both his knee.
- He was not able to hike this summer as walking on inclination and on uneven surfaces would exaggerate his pain.
- Mr. P underwent bilateral knee replacement at the Fast track joint replacement center.
- He was admitted to acute rehab setting in the hospital for continuation of rehab.
Case Study # 2

- Problem List
  - Pain
  - Postural Hypotension
  - Blood loss → Poor activity tolerance
  - Limited independence due to pain
  - Anxiety about recovery and dependence on others
  - Inability to ambulate without assistive device
  - ADL dependence
  - Limited endurance
  - Limited leisure activities
  - Sleep deprivation

Treatment goals

- Pain management while performing self-care
- Education about TKR restrictions and weight-bearing
- Management of orthostatic BP
- Proper positioning while sitting, standing and lying in bed
- Bed mobility and functional transfers using leg lifter
- Self-care: Dressing using hip kit
- Use of assistive device and training of compensatory technics to safely perform
  - Toilet t/f
  - Tub t/f
  - Car t/f
Treatment goals continued

- Caregiver training
- UE and LE strengthening and Stretching Exercises
- Dynamic standing balance activities
- Light athletic activity training
- ADL/IADL training
- Work simplification and energy conservation training
- Safety at home
- Transition to outpatient services.

Out patient

- Continued high level ADL/ IADL training
- Work place simplifications and modifications
- Driving adaptations
- UE and LE strengthening and Stretching Exercises
- Recommendation of appropriate use of Adaptive device (RW, cane) for functional mobility
- Teaching compensatory technics to modify leisure activities
Sub – Acute Setting
Case study # 3

- Mrs. Jan is 64 year old widow who lives alone in an apartment, has 12 steps to enter her home. Has walk in shower. Works part time as a librarian in a local library.
- Takes care of her 5 and 7 year old grandchildren after school 3 days week.
- Underwent Left knee replacement and now is admitted to skilled nursing facility on post-op day 4 for rehab.

OT Goals.

- Education about TKR restrictions and weight-bearing.
- Pain management while performing self-care
- Proper positioning while sitting, standing and lying in bed
- Bed mobility and functional transfers
- Self-care
- Recommendation of appropriate use of Adaptive device (RW, cane) for functional mobility
- Use of assistive device and training of compensatory technics to safely perform
  - Toilet t/f
  - Shower t/f
  - Car t/f
Cont. sub-acute goals.

- UE and LE strengthening and Stretching Exercises
- Dynamic standing balance activities
- IADL: Home management activities such as
  - Light meal preparation training
  - Laundry
  - House cleaning training
  - Grocery shopping
  - Driving
- Work place simplification and adaptation
- Safety at home and work
- Transition to outpatient services.

Future of OT Practice

- Fast track joint replacement surgeries versus conservatory surgery
- Same day outpatient surgery
- Medicare v/s commercial reimbursement
- Bundle payment
What Is Fast
Track Joint Replacement Surgery?

<table>
<thead>
<tr>
<th>Pre-op information and education</th>
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<tbody>
<tr>
<td>• Surgical procedure</td>
</tr>
<tr>
<td>• Expected length of stay</td>
</tr>
<tr>
<td>• Pain management</td>
</tr>
<tr>
<td>• Exercises</td>
</tr>
<tr>
<td>• Nutrition</td>
</tr>
<tr>
<td>• Role of OT and PT</td>
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<table>
<thead>
<tr>
<th>Management in hospital</th>
</tr>
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<tbody>
<tr>
<td>• Multimodal opioid sparing analgesia (IV Tylenol, NSAID)</td>
</tr>
<tr>
<td>• Spinal anesthesia and nerve block</td>
</tr>
<tr>
<td>• Several daily mobilization sessions</td>
</tr>
<tr>
<td>• No drains, catheter and so forth.</td>
</tr>
<tr>
<td>• No Benzodiazepines</td>
</tr>
<tr>
<td>• Functional discharge criteria</td>
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</table>

<table>
<thead>
<tr>
<th>Post-op management at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Analgesic regimes continue as necessary</td>
</tr>
<tr>
<td>• Daily home care rehabilitation services</td>
</tr>
</tbody>
</table>

(Krenk, Jennum, & Kehlet, 2013)

Outpatient Total Joint Arthroplasty

Select centers on select patients who are healthy enough to be candidates for this pathway.
• At an ambulatory surgery center or an inpatient hospital.
• The advantages
  – Reduced hospital stay
  – Reduced chance for hospital acquired infections
  – Possibility of increased patient satisfaction.
  – Potential for reduced cost to the health care system.
• The disadvantages
  – Chance of having a complication at home,
  – Difficulty with pain management,
  – Chance for readmission to the hospital.
Future of Occupational Therapy

- Role of Occupational therapy in outpatient TJA
  - Pre-op OT assessment and interventions
  - Acute Care
  - Homecare OT

- Healthcare reform implementation and Bundle payment system may lead to increase contribution of occupational therapy services in primary care settings.

Conclusion

- Best OT practice is evidence-based, occupation focused and highly dependent on client satisfaction outcomes.
- Whether you work in a acute care hospital or you’re a practice owner, there is something out there a piece of technology, a marketing tactic, or perhaps an educational opportunity that can help advance your practice.
Contact Information

- Email: msheth32@gmail.com

- Questions/Answers
References


References