TREATMENT AND REHABILITATION: TOTAL HIP REPLACEMENT  
PART 2

Jassin M. Jouria, MD

Dr. Jassin M. Jouria is a medical doctor, professor of academic medicine, and medical author. He graduated from Ross University School of Medicine and has completed his clinical clerkship training in various teaching hospitals throughout New York, including King’s County Hospital Center and Brookdale Medical Center, among others. Dr. Jouria has passed all USMLE medical board exams, and has served as a test prep tutor and instructor for Kaplan. He has developed several medical courses and curricula for a variety of educational institutions. Dr. Jouria has also served on multiple levels in the academic field including faculty member and Department Chair. Dr. Jouria continues to serves as a Subject Matter Expert for several continuing education organizations covering multiple basic medical sciences. He has also developed several continuing medical education courses covering various topics in clinical medicine. Recently, Dr. Jouria has been contracted by the University of Miami/Jackson Memorial Hospital’s Department of Surgery to develop an e-module training series for trauma patient management. Dr. Jouria is currently authoring an academic textbook on Human Anatomy & Physiology.

Abstract

Arthritis, fractures, and repetitive strain can cause significant pain in the hip joint over time, but hip replacement surgery is an option for many patients each year in the United States. Plastic, ceramic, and metal components can be used to wholly replace the ball-and-socket hip joint and restore mobility in patients. Although most patients who undergo total hip replacement surgery are either retired or elderly, it can be useful for any patient who suffers pain that is not relieved by traditional methods. Rehabilitation that is clinic-based or home-based is discussed in terms of expected outcomes of success as well as factors that may limit the patient’s full recovery.
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This educational activity is credited for 3.5 hours. Nurses may only claim credit commensurate with the credit awarded for completion of this course activity. Pharmacology content is 0.5 hours (30 minutes).

Statement of Learning Need

Health clinicians need to know their role and responsibilities in helping patients understand treatment options for hip replacement surgery. Whether in the contemplation phase or having decided to undergo total hip replacement, patients need to be prepared for the benefits and risks of the varied methods of total hip replacement, such as minimally invasive versus traditional methods. Moreover, rehabilitation and what to expect both in hospital and when at home can impact the success and longevity of a hip prosthesis, as well as the patient’s mobility and strength, and ability to function in daily activities.
**Course Purpose**

To provide learning for clinicians interested in total hip replacement and rehabilitation and that will support them to guide and intervene to ensure the best patient care outcomes.

**Target Audience**

Advanced Practice Registered Nurses and Registered Nurses (Interdisciplinary Health Team Members, including Vocational Nurses and Medical Assistants may obtain a *Certificate of Completion*)

**Course Author & Planning Team Conflict of Interest Disclosures**

Jassin M. Jouria, MD, William S. Cook, PhD, Douglas Lawrence, MA, Susan DePasquale, MSN, FPMHNP-BC – all have no disclosures

**Acknowledgement of Commercial Support**

There is no commercial support for this course.

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*Please take time to complete a self-assessment of knowledge, on page 4, sample questions *before* reading the article.*

*Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.*
1. The usual hospital stay for hip replacement is 3 to 5 days, and full recovery typically takes
   a. ten more days.
   b. a year.
   c. 3 to 6 months.
   d. weeks.

2. To protect the hip, a patient will often be asked not to sit
   a. past a 90-degree angle after surgery.
   b. at a 90-degree angle after surgery.
   c. for the first three weeks after surgery.
   d. upright after surgery.

3. On the first day after total hip replacement surgery,
   a. it is common to begin some minor physical therapy while sitting in a chair.
   b. the patient is monitored for pain and is not allowed to begin physical therapy.
   c. the typical patient is discharged.
   d. the patient must remain reclined and not sit up or use a chair for at least three days.

4. True or False: At the time a hip replacement patient is discharged from the hospital, the patient should not be experiencing pain, otherwise the discharge must be postponed.
   a. True
   b. False

5. Hospitals are shortening the amount of time a person remains in the hospital after total hip replacement surgery because
   a. the Affordable Care Act mandates it.
   b. the hospital is a stress-free environment and the patient needs to learn how to deal with stress.
   c. there is always a greater chance of acquiring a Staph infection in the hospital.
   d. reducing the cost of the procedure is the primary concern.
Introduction

When patients have completed total hip surgery, they undergo a recovery process where acute responses are monitored, such as the heart rate, blood pressure, and respiration as well as their pain level. Pain medication will be prescribed depending on the surgeon's plan of care. The goal of inpatient hospital stay following total hip surgery is to prepare the patient for discharge from the hospital. During this period, all the clinicians involved in caring for the patient — the physician, nurse, therapist and case planner — meet regularly to discuss patient progress and discharge planning following total hip replacement.

Rehabilitation Of Total Hip Replacement

The rehabilitation process is one of the most important times for an orthopedic patient. This is because all the expert effort performed by the entire health team can be completely undone because of not following the surgeon’s advice or by one mistake. One of the first things the orthopedic surgeon will do is provide the patient with a post-surgical regime. This must be followed completely. Unfortunately, far too many times shortcuts are taken and the recommended protocol is not followed as set out by the surgeon and therefore patients end up with complications and a poor recovery.
Rehabilitation is comprised of many different components. The most immediate component is that of the time in the hospital itself. The hospital orthopedic team will decide once surgery is complete just how long the patient needs to remain in hospital. There are many factors that will lead to varying durations of patient hospital-stay and course of care. These include the age of the patient, the patient’s overall health, any complications during the surgery, whether the patient has had a prior hip replacement, and the patient’s post-surgical needs. However long individuals remain in hospital, they must adhere to all the protocols set up by the orthopedic health team. Non-compliance is a serious matter and, as mentioned, could lead to hip prosthetic failure.\textsuperscript{1,7,10,29}

**Hospital Course of Care**

The usual hospital stay for hip replacement is 3 to 5 days, and full recovery typically takes 3 to 6 months. To protect the hip, a patient will often be asked not to sit past a 90-degree angle after surgery. If this is the case, they will be provided the necessary tools to assist during this process. The therapist will teach the patient how to dress, how to get out of bed without help, and how to use a walker or crutches. The patient will continue to work to develop strength in preparation to return home. It is important that the patient follow the physician’s directions and proper positioning techniques throughout the rehabilitation period. By the time of discharge from the hospital, the patient should have progressed sufficiently enough to regain mobility and stability.

Postoperatively, if surgical sutures or clips must be removed, staff managing discharge protocol should advise the patient how to follow
up to have them removed. It is not uncommon for patients to still experience some pain upon the time of hospital discharge, and pain management should be included as part of the discharge plan of care.

Many hospitals today are shortening the amount of time a person remains in the hospital. There are several good reasons for this. First, there is always a greater chance of acquiring a staph infection in the hospital. Second, people tend to rest better at home in their own bed. Third, the hospital can be a stressful environment, and people tend to relax better at home where visitors can easily spend time with them and family can tend to them. Surgery itself is a stressful and complicated matter that is emotionally and physically stressful for many patients. The last thing a patient needs is to add stress onto the situation by a long-hospital stay.

Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity. Discussions about the importance of the built environment for the patient's health and wellbeing are not new in the health industry; the provision and support of healthcare has been an evolving discussion extending as far back as 400 B.C. with Hippocrates and to the 19th century with Florence Nightingale. Healthcare facilities are places where patients with health conditions go for treatment provided by medical specialists and other health professionals. In recent years, there is growing interest in the role of technology and the built environment as part of holistic care.

Once the surgery is successfully completed, what happens for the patient? The rehabilitation process begins the day after surgery. This does not mean the patient is up and walking and doing physical
therapy, but the healing process has begun. The person has limited movement immediately after hip replacement surgery. Bed pillows or a special device are usually used to brace the hip in the correct position. The patient may receive fluids through an intravenous (IV) tube to replace fluids lost during surgery. There also may be a surgical tube located near the incision to drain fluid, and a urinary drain system used to measure urine output until the patient can mobilize to the toilet. The physician will prescribe medication for pain or discomfort.

On the day after surgery or sometimes prior to and the day of surgery, therapists will teach some exercises to improve recovery. A respiratory therapist may instruct the patient to breathe deeply, cough, or blow into a simple bedside device that measures lung capacity. These exercises reduce the collection of fluid in the lungs after surgery. Because the new, artificial hip has a more limited range of movement than a natural, healthy hip, the physical therapist also will teach the patient proper techniques for simple activities of daily living, such as bending and sitting, to prevent injury to the new hip.

On the first day after surgery, it is common to begin some minor physical therapy while sitting in a chair. Eventually, rehabilitation incorporates stepping, walking, and climbing. Initially, supportive devices such as a walker or crutches are used. Pain is monitored while exercise takes place. Some degree of discomfort is normal. It is often very gratifying for the patient to notice, possibly early on, substantial relief from the preoperative pain for which the total hip replacement was performed.
Use of Walker, Crutches, Or Cane

The walking aids a person uses after hip replacement are very important tools for a successful recovery from surgery. Whether the person is going to use crutches, cane, or walker, proper fitting is essential for the patient to help get around easier and safer. Walking, sitting down, standing up, bending, going up and down stairs – these are simple activities that must be done safely with the help of walking aids. The person must learn to do these everyday activities without putting more weight on their operated leg than they can tolerate without limping or than allowed by their surgeon.

Simple Steps to Use a Walker:

• Shoes should be worn when using a walker.
• A straight posture when standing is recommended.
• The walker should be positioned in front and partially around the patient.
• Arms should hang by the side with elbows bent slightly. Hand grips applied to the walker should be at wrist level. The walker height should be adjusted if the hand grips are not at wrist level.
• With the height adjusted, both hands should be placed on the walker’s hand grips.

Patients should be instructed to stand straight with the walker in front of and partially around them to follow the following 3 easy steps.

1. The walker should be moved one step length ahead of the patient. All four legs of the walker should be placed on the floor. (This should be done the same way if the walker has two wheels).
2. The patient’s sore leg should be moved forward and then the patient should push down on the walker using both arms.

3. The good leg should be moved forward so that it is even with or slightly ahead of the sore leg.

These steps are to be repeated to continue walking: 1) walker, 2) sore leg, and 3) good leg.

The walker should always be used to move up or down from a single step or a curb. To safely maneuver a step or curbside, the following steps are recommended.

1. Walk as close to the curb or step as possible.
2. Once the patient feels steady, he/she should lift the walker onto the step.
3. The patient should step up, putting the good leg up first.
4. The sore leg should be next raised onto the step.
5. To step down, the walker should be placed down to the bottom edge of the step. Putting the sore leg down first the patient should step down with the good leg.

The patient should never use a walker to go up or down more than a single step, and only put as much weight on the sore leg as tolerable without limping or as allowed by the patient’s physician.

Sitting Down and Standing Up With a Walker:

The patient should first find a steady chair with solid armrests or sides. Then, stand with his/her back to the chair and, with the walker close to them, the following steps are recommended.
1. Place the back of the good leg against the chair.
2. Slide the sore leg forward slightly.
3. Place both hands on the armrests or sides of the chair.
4. Lower gently onto the chair.
5. Slide back in the chair until comfortable. Do the reverse to stand up. Remember to never use an unstable chair or one that is very low and be careful not to put more weight on the sore leg than is tolerable without limping, or as allowed by the physician.

Safe Use of a Walker:

- Shoes with good support should be worn. Slippers should not be worn.
- The condition of the rubber tips on the walker should be checked and rubber tips replaced if worn or in poor condition.
- The walker should not be placed too far ahead when walking; place the walker no more than one step length in front.
- Stepping too far into the walker when walking should not be done, because it may cause a loss of balance.
- Leaning on the walker should not be done when getting up or sitting down, as this could cause the walker to tip over.
- Wet surfaces should be avoided, as they can be slippery. Taking small steps is recommended if walking on a wet or slippery surface is unavoidable.
- Loose mats and rugs, electric cords and cables should be avoided. They could cause the patient to trip or slip.
- Avoid using the walker on stairs.

Fitting and Using a Cane

- Apply shoes that will be used when using a cane.
• Standing up straight and relaxing the shoulders is recommended.
• The cane should be held in the hand opposite the sore leg, i.e., in the right hand if the left leg is sore and in the left hand if the right leg is sore.
• The cane should be placed about 10 cm (4 in.) from the side of the good leg. When standing, the patient’s weight should be spread evenly between the feet and cane. No more weight should be placed on the sore leg than can be tolerated without limping or than allowed by the physician.
• The hand being used to hold the cane should be dropped down by the patient’s side with the elbow bent slightly. The hand grip on the cane should be at wrist level. If the hand grip is not at wrist level, the cane’s height can be adjusted by pushing in the button and sliding the tubing in or out (for an adjustable cane) and cutting the cane to the proper length (if it is wooden).

Simple steps to walking with a cane should be used. The patient should begin by standing straight with the cane about 10 cm (4 in.) from the side of the good leg, and he/she should follow the following three steps:

1. With the cane in the hand opposite the sore leg, shift weight to the good leg and move the cane 10 cm in front of the foot.
2. Move sore leg forward so the foot is even with the cane.
3. Shift weight to the sore leg and the cane. Move the good leg forward so the foot is ahead of the cane.

The following steps should be repeated: 1) put cane forward, 2) place sore leg forward and in line with the cane, and 3) put good leg forward ahead of the cane to continue walking. The patient should remember
to be careful not to put more weight on the sore leg than is tolerable without limping, or as allowed by the physician.

Sitting Down With a Cane:

The patient should find a steady chair with solid armrests or sides. Using a cane, the patient should stand with the back of the legs slightly touching the chair, and then take the following steps: 1) Move the cane out from the side and lean it on the chair and reach back with both hands to grab onto the armrests or the seat of the chair. 2) Slide the sore leg forward. 3) Lower gently onto the chair. 4) Move back in the chair until comfortable. Never sit in an unstable chair or one that is very low.

Standing Up With a Cane:

To get out of the chair, the patient should place the cane on the end of the armrest or in the hand. The following steps should follow.

1. Move closer to the edge of the chair seat and move heels close to the base of the chair.
2. Push down on the armrests or seat of the chair and lean forward slightly.
3. Put the sore foot forward slightly and push up with the good leg and arms.
4. Ensure there is steadiness then move the cane’s tip to about 10 cm (4 in.) from the side of the good leg.

Going Up and Down Stairs With a Cane:

To go up the stairs the patient should practice the following steps.
1. Stand close to the bottom step.
2. If there is a handrail, hold onto it after checking that it is solid and safe. Hold the cane in the other hand.
3. Lift the good leg to the first step. Make sure to balance weight between the cane and the handrail.
4. Lift the cane and sore leg to the first step using the handrail to help lift weight. The patient should now be standing on the first step with both legs and cane, and should go up one step at a time this way.

To go down the stairs the patient should practice the following steps.

1. First feel secure and steady, and then stand close to the edge of the first step. If there is a handrail, hold onto it and hold the cane in the other hand.
2. Lower the cane and sore leg onto the first step.
3. Lower the good leg onto the same step. Go down one step at a time, making sure to be steady on the feet for each step.

The patient needs to remember to be careful not to put more weight on the sore leg than is tolerable without limping, or as allowed by the physician.

**Safety Tips to Mobilizing**

The patient should be advised to always wear non-skid shoes with good support. They should not wear open-heeled sandals, clogs or slippers. Additionally, the patient should make sure the cane tip is wearing evenly and is not cracked or torn. Wet surfaces should be avoided, as they can be slippery. The patient should be advised to take small steps if walking on a wet or slippery surface is unavoidable. In
winter months, the patient should attach an ice pick to the end of his/her cane. Loose mats and rugs, electric cords and cables should be removed because they could cause the patient to trip or slip. Patients should be advised to use a cane and to continue to do so until their physician or physical therapist advises it is no longer needed.

**Crutches**

Patients unable to bear any weight on a leg or foot may have to use crutches. If the patient’s injury or surgery requires getting around without putting any weight on a leg or foot, crutches may need to be used. Proper positioning is important with crutch use. The patient should be advised as follows:

- When standing up straight, the top of the crutches should be about 1-2 inches below the armpits.
- The handgrips of the crutches should be even with the top of the hip line.
- Elbows should be slightly bent when holding the handgrips.
- To avoid damage to the nerves and blood vessels in the armpit, the patient’s weight should rest on the hands, not on the underarm supports.

**Walking**

Patients should be advised to lean forward slightly and to put crutches about one foot in front of them when walking. Steps should begin as if the patient were going to use the injured foot or leg but, instead, shift weight to the crutches. Bringing the body forward slowly between the crutches is recommended, and then finishing the step normally with the good leg. When the patient’s good leg is on the ground, he or she
should move the crutches ahead in preparation for the next step. The patient using crutches should be advised to always look forward, not down at the feet.

**Sitting**

While attempting to sit, the patient should back up to a sturdy chair. The patient should place the injured foot in front and hold both crutches in one hand while using the other hand to feel behind for the seat of the chair. The patient should slowly lower to sit on the chair. When seated, crutches should be placed in a nearby spot, being sure to lean them upside down because crutches tend to fall over when they are leaned on their tips. To stand back up, the patient should inch to the front of the chair and hold both crutches in the hand of the injured side, and then push up and stand on the good leg.

**Stairs**

To walk up and down stairs with crutches, a patient needs to be both strong and flexible. Facing the stairway, it is important the patient holds the handrail with one hand and tucks both crutches under the armpit on the other side. When going up stairs, a patient should lead with the good foot, keeping the injured foot raised behind. When going down stairs, a patient should hold the injured foot up in front, and hop down each step on the good foot, taking it one step at a time. A patient may want someone to help when navigating stairs, at least at first. If a stairway is encountered with no handrails, crutches should be used under both arms while hopping up or down each step on the good leg, using more strength.
When a patient feels unsteady, it may be easier to sit on each step and move up or down on the bottom. They should start by sitting on the lowest step with the injured leg out in front, and hold both crutches flat against the stairs in the opposite hand. The patient can then navigate safely by scooting his/her bottom up to the next step, using a free hand and good leg for support. Facing the same direction when going back down stairs can be done in this manner.

**Four to Seven Days After Surgery**

In the first week after surgery there will be the presence of pain although it should begin to lessen over time. All patients must follow their physician’s orders and make sure they follow the protocol for wound care. This is when the patient will likely begin their physical therapy.

Therapy and exercises are crucial to recovery from total hip replacement surgery. Patients need to work with a physical therapist that is experienced with hip replacement surgery protocols. Some patients may need home visits from both nurses and physical therapists. Patients *should not* remain immobile in bed as this will increase the likelihood of risks for blood clots in their legs, and this can be dangerous and even life threatening.

**Rehabilitation Facility And Discharge Home**

Most people are released to go home after hip replacement surgery. Those who are not discharged home generally fall into the category of either quite elderly, or they have specific medical needs, which are best tended to in a hospital setting. People who recover in a rehab
facility generally receive physical therapy four times a week, while those recovering at home probably receive it two to three times per week. It will be the surgeon’s decision as to whether or not the patient is better off at home or in a rehab facility. This section discusses aspects of rehabilitation, before and after the patient leaves the hospital.\(^{29,31-34}\)

The Discharge Summary is obtained from the surgeon before the patient leaves the hospital. It is a summary of the patient’s surgery and care for his or her medical records. It is not an instruction sheet. Written discharge instructions may include special recommendations for diet, activity and care at home. Prescriptions must be obtained for new medication that the patient may need to take. Additionally, instructions for making an appointment with the patient’s surgeon are important, and the patient should make this appointment soon after arriving home.

**Managing Post-operative Pain**

It is normal to have some pain after leaving the hospital. Pain from a surgical incision may last 1 or 2 weeks, but it should get a little better each day. The patient will be given a prescription for pain medicine. At first, the patient may need to take pain medicine frequently to manage pain, and should take the following steps to manage pain:

- Take pain medicine as directed to keep comfortable. Never take more than the safe amount prescribed.
- Take medicine for a moderate amount of pain. This would be for pain level of 4 out of 10 on the hospital's pain rating scale.
• Do not be afraid to take pain medicine. Medicine relieves pain in order to feel better and to get back to doing regular activities.
• Plan to do an activity about half an hour (30 minutes) after taking pain medicine. This gives the medicine time to take effect.
• As pain gets better, take less pain medicine.
• For mild pain, take mild pain medicine such as acetaminophen (Tylenol®). Follow the physician's instructions or the directions on the package.
• Keep a diary or write down how much pain is felt, how much pain medicine is taken and when it is taken.

The patient should obtain help for the following pain issues:

• Pain not controlled by pain medicine or pain that suddenly gets worse; the patient should go to the nearest hospital emergency department right away.
• Pain still occurring 2 weeks after surgery; the patient should be advised to call the family physician. Depending on the type of surgery, the patient may have one long incision or a few small incisions.

How the patient should check the incision:

• On the first day at home, closely inspect the incision.
• It may be preferable to take a picture to remember the way it looked right after surgery.
• Every day for the next 2 weeks, check the incision and the skin around it. Notice any changes. Watch for the 6 signs of infection listed below.
• Do not touch the incision until it has fully healed.
Check the incision each day for these 6 signs of infection:

1. **Fever**: Temperature is 38°C (100.4°F) or higher. Take temperature at least once a day.
2. **Redness**: A red area around the incision that is getting bigger. A little redness around an incision is normal.
3. **Swelling**: The area around the incision feels hard or looks swollen.
4. **Heat**: The area around the incision feels hot.
5. **Drainage**: There is fluid coming from the incision that is green, yellow or bloody. It may smell bad. A little clear or pink fluid is normal.
6. **Pain**: The incision is getting more painful since discharging to home.

Knowing when the incision has healed:

- The skin will heal in 1 to 2 weeks. A healed incision will have no opening, leaking or scabs. After 2 weeks, the incision should be completely closed and dry.
- Healing under the skin takes longer, up to 3 months.
- It is normal for the area around the incision to feel itchy while it is healing.

Showering while Healing:

- The patient may shower while the incision is healing. Let the water run over the incision. Gently pat it dry after showering with a clean wash cloth or towel.
- Do not use soap or body wash directly on the incision. It is fine if some soapy water runs over the incision and gets rinsed off.
• Do not put powder, cream, lotion or any type of ointment on the incision. Do not bathe, swim or use a hot tub until the incision is fully healed. Check with the physician or surgeon about when a bath can be taken.

Activities Allowed while Healing:

• It is important to continue to be active at home. Daily activity will help to improve strength and mobility.
• Being a little more active each day should be attempted.
• Walking is a good way to stay active. Start with a short walk. Each day, walk a bit further.
• If the physiotherapist provides an exercise plan, continue to do these exercises each day.
• Take pain medicine half an hour before activity. With less pain, the patient will be able to move better.
• Activity takes a lot of energy. It is normal to feel tired and have some mild discomfort following activity. Plan some time to rest before and after activity.

Emotions after Surgery:

It is normal to be emotional after surgery. For the first few weeks after surgery, the patient may have times when he or she feels depressed, anxious or alone. Usually these feelings do not last very long. It can help to talk about feelings with someone close by. If patients are still not feeling emotionally at baseline after a few weeks following surgery, they should talk with their physician.

An appointment should be made with the physician for the following concerns following surgery if the patient:
• continues to have pain after 2 weeks that is not relieved by pain medicine.
• experiences burning when passing urine or for a strong urge to urinate, but only passing small amounts of urine.
• notices the incision is red, swollen, painful or feels hot.
• notices the incision is leaking pus or fluid that is green, yellow or bloody.
• has not had a bowel movement in 5 days.
• has nausea or vomiting that does not go away.
• has diarrhea that does not go away.

A patient should seek emergency care for the following conditions:
• Abdominal pain that is getting suddenly worse
• Chest pain or shortness of breath (call 911)
• For a temperature of 38 °C (100.4 °F) or higher
• For bloody or black bowel movements
• If the incision opens

It is crucial the patient remember that everyone recovers at their own rate from total hip surgery and some people will recover faster than they might expect while others will recover more slowly. Some people will find they can be active very quickly, while others require more time.

Pain is also a different experience for everyone. Some people have a very high tolerance for pain, while others find coping with pain difficult. Patients should be advised to not judge themselves, but to accept the experience. When having pain, the should not try to
tolerate pain, and accept taking pain medication. It is not healthy for a patient recovering from surgery to be in pain for long periods of time. It is important to encourage patients to accept that healing takes time following total hip replacement. The body always has its own timeline depending on many factors, such as a person’s age, prior surgeries, general health, and other mitigating factors such as the presence of a disability.

**After Discharge Home**

Patients will need guidance on how to prepare for their discharge home. They may want to arrange items in the kitchen and other areas of the home so they can be reached without bending more than 90 degrees. Bed height may need to be adjusted so that the top of the mattress is 5 cm to 10 cm (2 inches to 4 inches) above the knee.

Furniture should be positioned so that there is space to move around safely using a walker or crutches. Loose mats or clutter should be removed that could cause a person to trip or slip. The installation of handrails on stairways is good fall prevention. If installing handrails is not possible, arrangements should be made to have someone assist the patient with going up and down stairs after first arriving home. The right type of furniture, such as chair should be emphasized for ease while getting up and down. If a tub with a shower door is in the home, it is recommended to take off the door and replace it with a shower curtain.

All of the equipment needed for recovery should be in place 1 to 2 weeks before surgery. Having the equipment in place ahead of time will provide the chance to practice with it before surgery to manage
moving about more easily and safely once returning home. Certain chores such as laundry, vacuuming and other heavy work around the house should be done before surgery. Planning for food needs, such as stocking up on groceries and making frozen meals can be very helpful after a patient returns home from hospital.

Further, arranging transportation for blood testing and for follow-up visits with the health team, as well as for a ride home from the hospital after surgery is essential. Discharge from the hospital can happen any time of the day, such as in the morning, afternoon or evening. Plans should be made to have a family member or friend be available to transport the patient from the hospital at any time of the day.

**Outpatient Physical Therapy**

There is probably no process that is more important to recovery from THA than working with a capable physical therapist. The patient should have a list of names of therapists from the surgeon or hospital before entering the hospital for surgery, and have an appointment set up the first few days after returning home. By day three or four post-operative one can begin some exercises and the exercises may become more vigorous over time. Exercise after surgery will help the patient recover and regain movement and strength in the
hip. Exercise helps reduce swelling, improve sleep, prevent blood clots, improve balance, control pain, and increase activity tolerance.\textsuperscript{31-34}

After Total Hip Replacement the patient will need to follow hip precautions for 3 months unless the surgeon advises differently. These precautions help the patient heal and reduce risk of hip dislocation. The patient may have muscle pain as he or she begins new exercises or returns to work. If the increased pain lasts into the next day, the patient should try spending less time standing and reduce exercises. Each person heals differently. The time it takes to meet goals may differ. The patient should talk to the surgeon or physiotherapist if there is a concern.

The patient should follow suggestions to keep pain under control in the early days after surgery. This reduces the chance of long-term pain and helps to move more freely, get enough sleep and maintain regular bowel movements. In the first 3 weeks, exercises focus on hip movement and gradually increasing standing and walking. Physical therapy can assist the person both before and after the surgery.

Before surgery the physical therapist can help educate the person about what to expect from surgery, and give the patient exercises to condition his or her body pre-surgery. In preparation for surgery, the physical therapist may teach the patient flexibility and strengthening exercises for the lower extremities, how to use a walker or crutches for walking and for navigating steps, and any precautions to take after surgery.

After surgery, the physical therapist may tell the person \textit{not to}: 

\textbf{not to:}
• Bend the new hip more than 90 degrees.
• Bend forward more than 90 degrees.
• Cross the leg with the new hip over the other leg.
• Turn the leg with the new hip inward.

The therapist may recommend changes in the home to improve safety and help with recovery, including the use of a raised toilet seat, hand rails on stairs, a bed rail, and a tub seat or grab bars in the shower.

The patient may enquire what kind of physical therapist is needed. All physical therapists are prepared through education and experience to treat a variety of conditions or injuries. The following considerations will be useful for the patient in the selection of a physical therapist.

• A physical therapist who is experienced in treating patients with orthopedic or musculoskeletal conditions.
• A physical therapist who has experience in treating patients after a total joint replacement.
• A physical therapist who is a board-certified specialist in orthopedics.

The patient may use the online search tool Find a PT located on American Physical Therapy Association's website to locate a physical therapist in his/her area. General tips when looking for a physical therapist (or any other health care provider) is outlined below.

• Get recommendations from family and friends or from other health care clinicians.
When contacting a physical therapy clinic for an appointment, ask about the physical therapists' experience with total hip replacement surgery.

During a first visit with the physical therapist, be prepared to describe symptoms in as much detail as possible.

Ask friends or family for advice if they have attended physical therapy in the past.

Research for physical therapy (also known as physiotherapy) after total hip replacement suggests that physiotherapy rehabilitation after first-time total hip or knee replacement surgery is accepted as the standard and essential treatment. The aim is to maximize a person’s functionality and independence and minimize complications such as hip dislocation (for hip replacements), wound infection, deep vein thrombosis, and pulmonary embolism. Outpatient physiotherapy is done either in an outpatient clinic (clinic-based) or in the person’s home (home-based). Home-based physiotherapy may include practicing an exercise program at home with or without supplemental support from a physiotherapist. The World Health Organization (WHO) defines rehabilitation as a progressive, dynamic, goal-oriented and often time-limited process, which enables an individual with impairment to identify and reach his/her optimal mental, physical, cognitive and/or social functional level.

According to a recent study, home-based physiotherapy tends not to be as effective as outpatient physiotherapy. Due to long-standing deconditioning and muscle loss exacerbated by surgery and bed rest, patients following total hip replacement typically have persistent poor physical function that is not adequately corrected by standard
physiotherapy rehabilitation. It is clear that more intense exercise programs are required to address this. The studies reviewed in this section suggest that center-based, but not home-based, exercise rehabilitation is effective in attenuating muscle loss and strength and function deficits in patients during the immediate THA post-surgery phase and that the efficacy of center-based interventions is most likely due to higher training intensity, which is facilitated by supervision and access to specialized equipment and facilities.

When commencement of training is delayed, however, both home- and center-based training programs provide significant improvements in patient strength and function. A pragmatic compromise between economic and practical considerations may be that post-THA patients are encouraged to regularly perform weight-bearing functional exercises at home during the initial post-surgery period with the understanding that even good compliance is unlikely to fully restore function; and, then when mobility is sufficiently recovered, patients are encouraged to undertake, either at home or in a community gym, a higher-intensity program featuring both resistance and aerobic training. For this training, supervision, at least initially, should be sought to ensure that training is conducted safely and workloads are progressed to account for improving fitness.

There is no agreement, however, that physiotherapy is the answer to assist post-operative THA patients with their recovery. In the literature, there is still no consensus on the effectiveness of post-clinical physical therapy. The majority of papers indicate that physical therapy, compared to home-based exercises, does indeed have a positive contribution to the recovery 3 months after surgery and that
this positive effect is no longer present at 12 months postoperatively. One study found improvement in muscle strength and walking speed but not in improvement in quality of life in favor of the physical therapy group.

On the other hand, some other studies suggest that there is no difference in improvement between the groups. One explanation for finding no difference could be that the specific goals of the patients were not taken into account and each patient regardless of individual wants or needs received a standard treatment protocol. Looking at the patient’s goals and consequently adapting the treatment to achieve those goals helps in the evaluation of functional improvement in the aspects of daily living important to the individual patient. There is also evidence in the recent literature that there is loss of muscle strength that begins early after surgery and remains without training. To prevent this, the patients should start with exercises as soon as possible after THA, and research has shown that resistance training is feasible shortly after surgery.

**Self-Directed Physical Therapy**

As the review on outpatient physical therapy indicates above, there is no consensus on the efficacy of home-based versus outpatient physical therapy. Some of the safety precautions, which should be in place for patients who select self-directed therapy, include the following:\(^{31,34}\)

- Always avoid extremes of range of motion
- When seated, the knees should always be lower than the hips
- Do not bend the hip past 90°
- Use a raised toilet seat
• Use a cushion when sitting in a vehicle
• Always sit on a high, firm chair at the level of the knees or higher.
• Do not lean forward from a sitting position to reach for items or put on shoes (if necessary, use a long-handled shoe horn or reacher instead).
• Do not twist the leg or turn the hip or knee.
• Move the feet to turn when standing. Do not twist the trunk.
• Do not sit cross-legged.
• When lying on the side in bed or turning over to do exercises use a large pillow between the legs.
• When lying on the back do not cross the ankles.

Details to consider when choosing a community exercise program include those highlighted below.

• Is the center easy to get to by bus or is parking close by?
• Is the exercise area easy to access?
• Are the costs reasonable?
• Will they let you watch a session before you decide to join?
• Does it have a good selection of equipment that is in good condition?
• Do instructors have training with people with THA?
• Do instructors talk to or share information with local physiotherapists or other rehabilitation professionals?

A highly valuable study in 2014 was conducted recently in Canada, which did agree that the following post-operative exercises and techniques must be reviewed by the patient with a trained physical therapist.
• Therapeutic and functional exercises
• Passive range of movement
• Strength training
• Stretching
• Postural training
• Core stability training
• Static and dynamic balancing
• Neuro-muscular re-education
• Stair climbing
• Rising/lowering to chair
• Rising/lowering to floor
• Transfer in and out of car and bathtub
• Transfer on and off the toilet
• Dressing
• Gait training
• Variable surface training
• Massage for swelling and scar movement
• Passive stretching/exercises
• Joint mobilization education and training
• Safe use of bath and/or shower
• Safe return to recreational activities
• Use of appropriate footwear
• Use of assistive devices
• Use of medications for pain management and non-medication pain management (such as meditation, exercise)
• Long-term joint protection
Medications And Supplements

In this section, both traditional medicine and supplements and alternative medicine are explored. In traditional medicine, physicians will rely on two types of medications: 1) Pain killers, and 2) Anti-inflammatories. Of course, the most important aspect of using medication after a THA is to ensure the effective management of the patient’s post-operative pain. The physical pain after THA is severe and pain medications are absolutely needed. When patients are recovering from THA, intense pain interferes with physical therapy, causing anguish for the patient and slowing down the healing and recovery process. Patients often refuse to walk after surgery because they are afraid to be in a state of pain. Unfortunately, narcotics are addictive, and some patients can be led down a dark pathway to addiction.36-45

After orthopedic surgery, physicians and nurses should make every effort to control patient pain. While the patient should expect to feel some discomfort, advancements in pain control now make it easier for clinicians to manage and relieve pain. Many types of medication are available to help control pain, including opioids, non-steroidal anti-inflammatory drugs (NSAIDs), and local anesthetics. Treating pain with medication can help the patient feel more comfortable, which will help the body heal and recover from surgery faster. When the patient
feels less pain, mobilizing and getting strength back can occur that much sooner.

A combined approach to pain management is often the best option because it allows the surgeon to tailor pain control methods to each individual patient. In order to effectively manage pain, the surgeon will take into account several factors that are unique to the patient’s situation. That is why it is important for the patient to openly discuss existing fears and expectations, as well as past experiences with pain control, with the orthopedic health team.

The primary goal of pain management is to reduce pain at both the central and the peripheral levels in combination with preemptive analgesia using a multimodal protocol. This strategy should enhance restoration of function by allowing patients to participate in the rehabilitation programs. The goals of the postoperative pain protocol include administration of a variety of agents with different mechanisms of action which exert local and systemic effects, use of agents with combined anti-inflammatory and analgesic properties, early conversion of parenteral to oral agents with prolonged effect, use of baseline analgesia to provide more uniform pain control, and minimization of parenteral narcotics and associated adverse effects.

Traditional nonsteroidal anti-inflammatory drugs (NSAIDs) and selective cyclo-oxygenase-2 (COX-2) inhibitors are widely used for bone fracture and orthopedic postoperative pain. Prostaglandins play an important role in the regulation of osteoblast and osteoclast functions and, based on animal models, the inhibition of prostaglandin production by NSAIDs or COX-2 inhibitors retards bone formation.
However, further investigation is needed to characterize patients at greatest risk for NSAID-induced delayed fracture healing. Other NSAIDs, including naproxen and diclofenac, are as effective as indomethacin and may be considered alternative first-line treatments. Celecoxib is also equally efficacious as indomethacin but, although it is associated with significantly fewer gastrointestinal side effects, serious concerns were raised over the safety of selective COX-2 inhibitors for the cardiovascular system; therefore, celecoxib should be used cautiously. The different medications and how they work are outlined below.

**Non-narcotics**

**Acetaminophen**

- Works by reducing pain signals traveling through the pain fibers
- Used to treat fever
- Does not have an anti-inflammatory effect
- Dosing: 325 -1000 mg every 4-6 hours as needed
- Side effects: may include nausea, liver problems (uncommon)
  CAUTION: Do not exceed 4000 mg per day.
- The patient’s physician should review use of acetaminophen with the regular consumption of alcohol.

**Non-Steroidal Anti-inflammatory Drugs (NSAIDS)**

- Prostaglandins increase inflammation and may cause pain.
  NSAIDS work by reducing prostaglandin production, thereby reducing pain.
- Can be used to treat fever.
• Side effects: may cause dizziness, kidney problems, stomach upset
• Dosing: varies with the different NSAIDS
• The patient’s physician should know if he or she has a history of stomach ulcers, heart failure or kidney disease.

**Narcotics (Opioids)**

Opioids work by blocking the signal transmitted by the pain fibers and the dosing depends on the patient’s requirements to reach adequate pain control. Side effects include nausea, vomiting, sedation, dry mouth, constipation.

Opioids are one of the medications the surgeon may choose for a patient depending on the level of pain, and other management strategies. Although each medical facility has different policies, procedures, and pain control options available, in most cases the patient can expect surgery pain to be controlled by oral, intramuscular, or intravenous opioids. Upon discharge from hospital the patient should review their prescription with the hospital pharmacist or nursing and use of opioids combined with regular alcohol use, should the patient opt to return to using, needs to be openly discussed with the physician.

Natural opioids are among the world's oldest known drugs and are made from the dried ‘milk’ of the opium poppy plant. There are also other types of opioids that are made artificially in a laboratory. These types are called synthetic or semi-synthetic opioids.
How Opioids Work

Whether natural or synthetic, all opioids work by binding to opioid receptors in the brain, spinal cord, and gastrointestinal tract. When these drugs attach to certain opioid receptors, they block the transmission of pain messages to the brain. Opioids can do this because they look just like the body's natural painkillers, called endorphins. This similarity in structure fools receptors and allows the drug to activate the nerve cells, flooding the area with dopamine, which produces the opioid effect.

Advantages and Disadvantages of Opioids

Opioids work rapidly to block pain and change the way the brain perceives pain. The pain relief opioids provide allows the patient to be more active during the day and to get more rest at night. Opioids are effective when given through a variety or routes, such as orally, topically (skin), sublingually or under the tongue, and directly into the bloodstream by IV route. They do not cause bleeding in the stomach or other parts of the body. Disadvantages to using opioids include that they may interfere with breathing or urination. In addition, they may cause: drowsiness, confusion, nausea, constipation, and itching.

Analgesic Drugs

Combining different classes of analgesic drugs is important to facilitate rehabilitation after hip surgery. Analgesia is not an end-point in itself but is necessary to allow patients to mobilize as rapidly and effectively as possible. This can be achieved using a multi-modal analgesic technique. Continuous peripheral nerve blocks and low dose intrathecal opioids are the cornerstone of this approach. Regular oral
analgesics also have an important role. Routine prescribing of regular paracetamol and a long-acting oral opioid (i.e., sustained release oxycodone) are particularly useful.

The use of either single shot or continuous peripheral nerve blocks is becoming increasingly popular for post-operative analgesia following hip and lower limb surgery. Current evidence supports earlier and improved rehabilitation when peripheral nerve blocks are used to provide post-operative analgesia. They can provide excellent analgesia with minimal motor block. This facilitates early and more effective joint mobilization and physiotherapy, while limiting reflex muscle spasm. In addition, they avoid the systemic side effects associated with continuous epidural analgesia (side effects of hypotension and urinary retention) and patient-controlled administration (PCA) morphine (side effects of sedation and post-operative nausea and vomiting).

However, it should be noted that a single shot, low volume femoral nerve block is not useful after hip arthroplasty as this approach is too distal to provide clinically useful anaesthesia or analgesia of the hip. Complete lumbar plexus block has been shown to occur in only 35% of patients after larger volume 3-in-1 block. The obturator and lateral cutaneous nerve of the thigh are inconsistently blocked with this technique therefore the name 3-in-1 should be abandoned.

The use of a single shot femoral technique appears to offer little advantage over more conventional PCA morphine for total hip arthroplasty. In contrast, continuous femoral nerve block has been shown to provide equivalent analgesia following total hip arthroplasty when compared with PCA morphine and epidural analgesia. Its
advantages are the low incidence of side effects and lack of technical problems when compared with PCA morphine or continuous epidural analgesia. However, the catheter may impinge on the surgical field.

**Natural Supplements**

There are many types of medications and natural supplements that can assist with post-operative care. However, all patients should understand that in the use of supplements, one should *always* check in with the physician first. Even though something is ‘naturally based’ it does not mean that it cannot be harmful, and natural remedies or supplements can, in fact, interact with one’s medications.

In choosing supplements or natural medication, there are some considerations. The terms *holistic medicine, alternative medicine and complementary medicine* have often been used interchangeably. In fact, *alternative medicine* and *complementary medicine* are different and holistic medicine is a term that tends to embrace the larger definition of a system of treatment and that includes clinicians who do not work within the system of conventional medicine.

A more precise definition of the term is that holism is a *philosophy* that focuses on treating the whole person and in the integration of mind, body and spirit. Holism promotes the belief that these three elements of a human being must be treated together to achieve any notion of healing rather than simply treating a person for a specific illness or injury. In the holistic belief system, illness and injury are often the result of disharmony in the mind-body-spirit, which they see as one. The disharmony can often come about from a dysfunction in any one
of these areas. But, holistic medicine believes that a dysfunction in one area affects the whole person and not just that one area of the body. These three forms of medicine have existed for thousands of years. In fact, many of modern medicines originally existed in herbal form. For example, willow bark is the natural form of aspirin, and devil’s claw is the natural form of Advil or an anti-inflammatory. Until modern pharmaceuticals came into existence in the 20th century, natural medicines continued to be popular.

**Blood Thinners**

When a blood vessel is injured, the blood cells bond together to form a blood clot. The blood clot helps to stop bleeding. Blood clots are made of a combination of blood cells, platelets (small sticky cells that speed up the clot-making process), and fibrin (protein that forms a thread-like mesh to trap cells). Physicians call this kind of blood clot a *thrombus*. Blood clots are good when they help seal a cut to stop bleeding. But sometimes, a blood clot can form when it is not needed. This type of blood clot can cause health problems or even death. However, the use of blood thinners to prevent these clots is not without controversy. A blood thinner commonly prescribed to prevent blood clots after hip replacement is associated with an increased risk of post-surgery bleeding or infection, according to a study conducted by orthopedic researchers at the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS). Blood thinning medications (anticoagulants) often are given to patients just before or after a total hip replacement to reduce the risk of blood clots following surgery. Two frequently used medications are warfarin (Coumadin) and low-molecular weight heparin (LMWH), also known as Lovenox. Warfarin is taken in the form of a pill, but the patient is required to
undergo blood tests and monitoring while taking it, whereas LMWH, administered via an injection, requires no monitoring or blood tests according to research.

Previous, single-site studies have suggested that there may be an association between preventive anticoagulant use and post-surgery infections or other problems. An initial multi-site study addressing the problem of post-operative complications related to warfarin or LMWH indicated that anticoagulant use must be balanced with the need to avoid excessive post-operative bleeding, which can lead to complications and delay wound healing. Medical researchers at the NIAMS Clinical and Investigative Orthopedics Surgery Unit in the Intramural Research Program reviewed the effects of warfarin and LMWH to determine whether they were associated with a higher risk of post-operative problems.

Medical researchers have examined data, including outcomes of surgery, to determine which type of blood clot prevention the patient was prescribed. Researchers reviewed medical records from a large cohort of patients who had undergone hip surgery in the United States and were prescribed warfarin and LMWH. Most patients in both groups also received elastic or compression stockings after surgery. Within a 90-day follow-up period, 6.2% of the LMWH group experienced bleeding, compared to 2.1% who took warfarin. In addition, 29% of the LMWH group underwent a blood transfusion after surgery compared to 22% of the warfarin group. Moreover, 2.4% of the LMWH group needed a second surgery compared to 1.3% of the warfarin group. Finally, 1.6% of the LMWH group experienced a surgical site infection, compared to just 0.6% of the warfarin group. Although the
data are compelling and national in scope, it is important to note that the warfarin group differed from the LMWH group clinically and demographically, as noted below, making it difficult to directly compare the two groups.

Patients treated with LMWH tended to be older, whereas those taking warfarin tended to have more pre-existing conditions. However, when investigators have used statistical methods to adjust the data and compensate for the differences, those taking LMWH still fared worse than those taking warfarin. The position of researchers is that clinicians need to consider all factors when choosing a prevention strategy for blood clots. The following discussion highlights the guidelines regarding the use of anticoagulants according to The American Academy of Orthopaedic Surgeons.

Thromboembolic disease encompasses two conditions: deep vein thrombosis (DVT), or formation of a blood clot in a deep vein such as in the thigh or calf, and pulmonary embolism (PE). In the relatively uncommon event of a PE, pieces of a clot break free and travel through the vein to the lung, where they can lodge in an artery. PE typically causes no symptoms, however possible symptoms include shortness of breath, chest pain, light headedness or chest congestion. In very rare cases, PE can be fatal. Likewise, in many patients, DVT causes no symptoms. However, in some patients, DVT can lead to symptoms such as leg swelling and pain that can necessitate further treatment or re-hospitalization. The goal of treatment is to prevent, as much as possible, the occurrence of PE and DVT following total hip replacement.
According to the guideline, in the absence of prophylaxis, DVT occurs in about 37 percent of patients, as detected by imaging. The majority of those patients will remain asymptomatic and will require no further treatment. Recent studies in Denmark revealed that only 0.7% of hip replacement patients required hospitalization because of DVT in the first three months after surgery. Based on study findings, researchers recommended guidelines to prevent blood clot formation. Among the preventive measures the experts analyzed for safety and effectiveness were mechanical compression devices, designed to improve blood flow in the legs after surgery, as well as drug therapy. Drug therapy involves anticoagulants (blood thinners), and aspirin which interferes with blood clotting by acting on platelets.

Researchers have also outlined suggestions for future research to fill in the evidence gaps apparent through an exhaustive and systematic review of the medical literature. Further research is deemed critical to develop the optimum strategies to prevent venous thromboembolic disease in the safest and most effective manner; however, from the existing evidence reviewed, the following recommendations for physicians treating patients before hip replacement have been made.

- Patients should stop taking antiplatelet medications (a type of anticoagulant), such as aspirin and clopidogrel (Plavix), because of the increased risk of blood loss during surgery with these drugs.
- Patients should discuss the timing of stopping any medication with their physician.
- A prior DVT or PE is an additional risk factor for thromboembolic disease and it is important that patients discuss any such event with their surgeon. There is insufficient evidence to recommend for
or against routinely assessing patients for other possible risk factors.

- Patients may want to have the surgery performed under regional anesthesia, such as epidural or spinal, rather than general anesthesia. Although evidence suggests that these regional approaches do not affect the occurrence of DVT or PE, they do limit blood loss.

Further recommendations for care after hip replacement are as follows:

- Hip replacement patients should not have routine postoperative screening for thromboembolic disease with duplex ultrasonography (an ultrasound test that shows how blood moves through the arteries and veins). Screening with this test does not significantly reduce the rate of symptomatic DVT or PE or the rate of fatal PE.

- Patients should receive anticoagulant therapy (unless they have a medical reason for not being able to use these drugs, such as a bleeding disorder or active liver disease) and/or mechanical compression devices after a hip replacement surgery. There is, however, insufficient evidence to recommend any particular preventive strategy or the duration of these treatments. Patients should discuss the duration and type of preventive treatment with their physician.

- After hip replacement, patients should get up and walk as soon as safely possible. Although there is insufficient evidence that early mobilization reduces DVT rates.

Newer guidelines have now been offered by The American Academy of Neurology. Generally, people who have had a stroke often take blood
thinners such as aspirin or warfarin to prevent another stroke. Blood thinners, or anticlotting drugs, are also used to prevent a first stroke in people with atrial fibrillation. Blood thinners can prevent blood clots from forming that can cause strokes. However, these drugs also can increase the risk of bleeding. Increased bleeding is especially a concern when someone is having a procedure or operation. Patients should decide with their physicians whether anticlotting drugs need to be continued to prevent stroke or temporarily stopped during a procedure to reduce the risk of bleeding.

The risk of bleeding varies depending on the procedure. For many minor procedures, including dental procedures, the bleeding risk from continuing blood thinners is fairly small. For some other procedures, the risk of bleeding may be higher when blood thinners are continued, such as for hip surgery. Surgeons will need to discuss the benefits and risks of continuing blood thinner medication during an operative procedure. Most of the studies on bleeding risks from blood thinners during procedures focus on aspirin and warfarin. More studies are needed to understand the bleeding risks of other blood thinners, such as clopidogrel and aspirin plus dipyridamole, as well as new anticoagulants such as dabigatran, rivaroxaban or apixaban, during or before procedures.

**Osteoporosis, Calcium and Vitamin D**

Osteoporosis is a disease affecting many millions of people around the world. It is characterized by low bone mass and deterioration of bone tissue, leading to bone fragility and a consequent increase in risk of fracture. The incidence of vertebral and hip fractures increases exponentially with advancing age, while other types of fracture, i.e.,
wrist fracture, levels off after the age of sixty. Osteoporosis fractures are a major cause of morbidity and disability in older people and, in the case of hip fractures, can lead to premature death. Such fractures impose a considerable economic burden on health services worldwide.

The skeletal disease of bone thinning and compromised bone strength involved in osteoporosis continues to be a major public health issue as the population ages. This disease is characterized by bone fragility and an increased susceptibility to fractures, especially of the spine and hip, although any bone can be affected. It is estimated that over 10 million Americans over the age of 50 have osteoporosis. Risk for osteoporosis has been reported in people of all ethnic backgrounds. An additional 34 million have reduced bone mass, called osteopenia, which puts them at higher risk for fractures later in life.

The risk of fracture from osteoporosis increases with age. There are approximately 1.5 million osteoporotic fractures per year reported in women and men in the U.S., including over 300,000 hip fractures. As the population ages, this number will probably increase. The U.S. Surgeon General estimates that one out of every two women over the age of 50 will have an osteoporosis-related fracture in their lifetime. In addition, 20% of those affected by osteoporosis are men with 6% of white males over the age of 50 suffering a hip fracture. It has been estimated that the national direct care costs for osteoporotic fractures is $12.2 to $17.9 billion per year with costs rising. This cost is comparable to the Medicare expense for coronary heart disease ($11.6 billion).
Since bone loss occurs without symptoms, osteoporosis is often considered a ‘silent disease’. As deterioration of bone tissue mounts and disruption of bone architecture occurs, the bone becomes so weak that a relatively minor bump or fall causes a fracture or vertebrae to collapse. The resulting fracture may lead to loss of mobility and independence, with 25% requiring long-term care. Fractures caused by either osteoporosis or low bone mass can lead to chronic pain, disability, as well as psychological symptoms, including depression. A woman’s risk of hip fracture is equal to her combined risk of breast, uterine and ovarian cancer. Unfortunately, approximately 24% of patients with hip fractures over the age of 50 will die in the year following the fracture.

Calcium and vitamin D have long been recognized as important and required nutrients for bone health and maintenance. The continuation of calcium and vitamin D in a patient with bone loss is critical for optimal care. Unfortunately, 90% of women may not be getting enough calcium and over 50% of women treated for bone loss have inadequate vitamin D levels. Currently, there are a number of pharmacologic treatments for osteoporosis which provide improvements in bone mass and reduction in fracture risk. These treatments have been studied where adequate calcium and vitamin D supplementation had been achieved. Therefore, their use is predicated on proper calcium and vitamin D therapy.

Calcium is an essential element in the human body and is necessary to many cell functions. Calcium is not only important to bone health, but it is also essential for neuromuscular activity, blood coagulation, and normal cardiac function. It is a vital component of bone architecture.
and is required for deposition of bone mineral throughout life. Although the body stores more than 99% of its calcium in the bones and teeth, it is also found in the extracellular fluid or plasma. It is the levels of plasma calcium that dictate calcium balance. If the plasma level decreases, bone resorption increases to restore plasma levels. Adequate intake of calcium is necessary to maintain this balance. Calcium is absorbed in the small intestines with the aid of vitamin D. Excretion of calcium is primarily through the kidneys, although there is minor fecal loss.

The best way to meet the daily dietary requirement is through the intake of high calcium containing foods. Dairy products are the best sources of calcium due to their high elemental calcium content, high absorptive rate, and relative low cost. Dietary sources of calcium include dairy products (milk, cheese, yogurt) and some green vegetables. Each daily dairy serving consumed contains approximately 300 milligrams. A serving size of dairy equals one cup (8 ounces) of milk, one cup of yogurt or one to 1.5 ounces of cheese. Therefore, each daily dairy serving multiplied by 300 mg would provide estimated total elemental calcium consumption. Mineral waters enriched with calcium are another source of dietary calcium. A recent study showed that high-calcium mineral waters had absorbability equal to milk calcium or slightly better and may provide useful quantities of bio-available calcium.

The individuals who do not obtain enough calcium from foods should take a supplement to meet these guidelines. Evidence suggests that the average American does not meet the lower end of the recommended daily calcium intake. The average women over the age
of 40 has a calcium intake of less than half the amount recommended for postmenopausal women. In one study, 82% of patients with osteoporosis were taking less than the recommended 1000 mg daily. This highlights the need for calcium supplementation in all patient populations. In fact, patients with osteoporosis are more likely to have a history of inadequate dietary calcium intake.

In order to assure adequate calcium intake, a number of calcium supplements are readily available. The two most common and well-studied calcium supplements are calcium carbonate and calcium citrate. Both supplements have been shown to be equally well absorbed when taken with food. In the past, it was assumed that gastric acid secretion and gastric acidity played a critical role in the intestinal absorption of calcium. A randomized crossover trial demonstrated that the proton pump inhibitor, omeprazole, markedly decreased fractional calcium absorption from calcium carbonate when ingested by elderly women after an overnight fast on an empty stomach. In addition, a case control study reported that long-term proton pump inhibitor therapy, particularly at high doses, was associated with an increased risk of hip fracture.

Research appears to support that calcium absorption can be ensured by ingestion with food. Research has reported normal absorption of calcium carbonate supplements when taken with a meal, even in achlorhydric patients. A study to evaluate the role of gastric acid on calcium absorption reported that a large dose of cimetidine, which reduced gastric acid secretion, had no effect on calcium absorption from carbonate or citrate sources. In addition, calcium carbonate
absorption was the same whether gastric contents were maintained at a pH of 7.4 or 3.0.

Calcium carbonate supplements have the highest percentage of elemental calcium among the calcium salts. Calcium carbonate contains 40% elemental calcium compared to 21% found in calcium citrate, 13% found in calcium lactate, and 9% found in calcium gluconate and from a patient perspective, this translates into fewer calcium carbonate tablets required to achieve optimal intake on a daily basis. Quality calcium products should come from a reputable manufacturer who can provide adequate absorbability and bioavailability data. Given equivalent bioavailability of carbonate and citrate supplements, the cost benefit analysis favors the less expensive carbonate products. In fact, a leading calcium citrate product (Citracal) was reported to cost 1.5–1.8 times a leading calcium carbonate (OsCal) product when comparing grams of elemental calcium.

Calcium supplements have the potential to interact with several prescriptions, and over the counter medications. Calcium supplements may decrease levels of the drug digoxin. The interaction between calcium and vitamin D supplements and digoxin may also increase the risk of hypercalcemia. Calcium supplements also interact with fluoroquinolones, levothyroxine, antibiotics in the tetracycline family, and phenytoin. In all of these cases, calcium supplements decrease the absorption of these drugs when the two are taken at the same time.

Hip fractures are associated with chronic pain and disability, loss of independence, decreased quality of life, and increased mortality. One-
half of all postmenopausal women will have an osteoporosis-related fracture during their lifetime. There is ongoing research and new information on the key issues related to the intake of calcium and Vitamin D and the prevention of fractures. Appropriate intake of vitamin D and calcium is generally understood to be essential to overall health. The Institute of Medicine has published recommended dietary allowances, however, the benefits and risks of daily supplementation with greater than 400 IU of vitamin D$_3$ and greater than 1,000 mg of calcium to prevent fractures are not clearly understood.

In pre-menopausal women and in men, there is inadequate evidence to determine the effect of combined vitamin D and calcium supplementation on the incidence of fractures. In postmenopausal women, there is adequate evidence that daily supplementation with 400 IU of vitamin D$_3$ combined with 1,000 mg of calcium has no effect on the incidence of fractures. However, there is inadequate evidence about the effect of higher doses of combined vitamin D and calcium supplementation on fracture incidence in noninstitutionalized postmenopausal women; supplementation of vitamin D$_3$ 400 IU or less and calcium 1,000 mg or less increases the incidence of renal stones. The USPSTF assessed the magnitude of this harm as small.

Another recent report has been issued on this topic by Statistics Canada in its journal *Health Reports*, which indicated that osteoporosis is a disease characterized not only by a loss of bone mass, but also by increased bone fragility and risk of fracture. The condition primarily affects older people, particularly women, and is associated with 80% of fractures in people older than age 60. Those fractures can result in
reduced quality of life, long hospital stays, institutionalization and higher mortality. The cost is high for the individuals involved and for the health care system.

The prevention and treatment of osteoporosis usually entails special attention to the intake of two nutrients: calcium, which is essential for bone health, and vitamin D, which improves the absorption of calcium. Dairy products are the main dietary source of calcium, although it is also found in some fruits, vegetables and grain products. Very few foods provide concentrated Vitamin D. It is added to milk, which is the largest dietary source. The human body also creates vitamin D through sun exposure. Both calcium and vitamin D can be taken in the form of supplements.

In 2010, the Institute of Medicine (IOM) released new dietary reference intakes for calcium and vitamin D. For calcium, the estimated average requirement (EAR) for men aged 50 to 70 is 800 mg a day. The EAR is higher for women aged 50 or older and for men aged 71 or older; they required 1,000 mg a day. The prevalence of inadequate intake can be estimated using the EAR as a cut-point. At age 50 or older, the tolerable upper intake level (UL), above which the potential of adverse effects exists, is 2,000 mg a day. The EAR for vitamin D at age 50 or older is 10 mg a day, and the UL is 100 mg a day.

Clinical practice guidelines recommend that those with osteoporosis consume sufficient calcium and vitamin D. Therefore, it is no surprise that in existing research people with osteoporosis were more likely than those without it to have taken supplements and to have derived
larger amounts of calcium and vitamin D from supplements. In fact, those with osteoporosis had the same dietary calcium intake as people without the condition. Moreover, men with osteoporosis actually obtained less vitamin D from dietary sources alone. Taking supplements offset the difference in vitamin D intake among men and gave those with osteoporosis an advantage in calcium intake.

Australian research supports both the views of American and Canadian studies on this topic. This research indicated that osteoporosis affects 1.2 million Australian men and women. It is a condition that can occur when bones lose minerals, such as calcium, faster than the body can replace them. This may lead to a loss of bone thickness (also known as reduced bone density or reduced bone mass) and a greater-than-normal risk of fracture. Calcium is essential for building and maintaining bones, and has other functions too. If individuals do not take in enough calcium (for example from the diet), the body will start to use up the calcium from the bones. After a while, this can lead to reduced bone density.

An adequate daily intake of vitamin D is also important for bone health. Vitamin D helps the body to absorb calcium, supports growth and maintenance of bones, and also regulates calcium levels in the blood. Studies have shown that fracture risk is higher in women being treated for postmenopausal osteoporosis who are vitamin D deficient. If women have osteoporosis, their health clinician will prescribe medication, such as a bisphosphonate to help strengthen bones. Bisphosphonates help to slow bone loss, improve bone mineral density and reduce fracture rates. Health clinicians may ask questions to
ensure women are getting enough calcium from their diet and may also test the blood to make sure they have enough vitamin D. Ensuring an adequate intake of calcium is important at any age, and is particularly important if patients have osteoporosis. Australian guidelines recommend 1300 mg per day for people with osteoporosis. Having osteoporosis does not mean a patient necessarily needs calcium or vitamin D supplements, but it is a trigger to check whether the patient might benefit from one or both of them. If a blood test shows that the vitamin D level is below that recommended for people with osteoporosis, health clinicians should prescribe vitamin D supplements.

There has been controversy in recent years as to whether high doses of calcium affect arteries and cause heart problems. Clinical evidence regarding this is mixed and more studies are needed. Current Australian guidelines indicate that diet is the preferred source of calcium, although supplements may be needed when the recommended daily intake cannot be met through diet alone. If a patient has osteoporosis, a daily intake of 1300 mg calcium is recommended, but only 500–600 mg should come from calcium supplements. Dietary calcium is therefore still essential.

There is health research related to seniors emanating from geriatric-related studies. For seniors, the recommendation for 1,000 mg to 1,200 mg of calcium per day is far from universal. Britain's National Health Service recommends adults get 700 mg of calcium per day, and individuals in Nordic countries are also within the 800 mg to 900 mg range. A European Food Safety Authority report in May 2015 recommended 950 mg/day for adults over the age of 25. The World
Health Organization has also reported on diet, nutrition, and the prevention of chronic disease and recommended a minimum of 400 mg to 500 mg of calcium intake to prevent osteoporosis in countries with a high fracture rate, which is far below U.S. recommendations.

The necessary levels of calcium and vitamin D intake are not the only unsettled issue. Studies questioning the effectiveness of the U.S. calcium recommendations for protecting bone health include data suggesting that calcium intake from the diet or through supplementation involve similar outcomes of one-off increases in bone density of 1-2%. The increases do not build up over time and are too small to produce significant reductions in the chance of having a fracture. Calcium intake is not associated with the risk of having a fracture in multiple cohort studies. Also in clinical trials, calcium supplements have only small inconsistent benefits on preventing fractures, with no effect of fractures seen in the highest quality trials.

While the above findings are compelling, in 2016 a meta-analysis from the National Osteoporosis Foundation reached the opposite conclusion. This analysis by Weaver, et al., published in Osteoporosis International showed a significant reduction in total fractures with calcium plus vitamin D supplementation, and concluded that the use of calcium plus vitamin D supplements to reduce fracture risk was supported in both community-dwelling and institutionalized older adults.

A number of factors contribute to the conflicting conclusions in calcium research, including the type and quality of the studies being analyzed, but the key issues appear to be variation in vitamin D status and
calcium intake at baseline, lack of consistency in doses studied, high dropout rates, and poor compliance. People who already get enough calcium or whose vitamin D levels are adequate may have very different outcomes from supplementation from people who are deficient. The same may be true for people already suffering from osteoporosis or osteopenia versus a healthy population. Comparing these populations in a study or a meta-analysis could produce invalid results.

Further, the issue of compliance exists in population based studies producing yet another variable in the research where community-based clinical trials led to differing outcomes than institutional-based studies relative to compliance to use calcium and vitamin D supplements. Individuals studied in an institution where compliance was ensured through medication administration showed significant benefits as compared to those residing in community where compliance was less leading to negative outcomes.

In addition to questions about the effectiveness of calcium on bone health, studies have also raised concerns about the safety of using supplements to reach the current recommendations. Some researchers reported that calcium supplements can cause kidney stones, hypercalcemia, acute gastrointestinal symptoms leading to hospitalization, and even increased risk for cardiovascular disease (CVD). With regard to calcium supplementation and CVD results from the EPIC-Heidelberg study noted calcium supplements might increase the risk of heart attacks. The mixed messages on calcium recommendations and concerns about supplement safety are confusing to patients and clinicians alike. For now, the consensus advice is to
continue encouraging calcium and vitamin D at recommended levels but to shift the focus to dietary intake over supplementation whenever possible.

*Vitamin D Action on Calcium Metabolism*

Against a general assumption, osteoarthritis (OA) does not seem to protect from generalized primary osteoporosis. The majority (74%) of the female hip OA patients were osteopenic or osteoporotic with signs of increased bone turnover. The observed prevalence of reduced BMD corresponds with the published data of age-matched population. Osteoporosis and osteoarthritis are not mutually exclusive conditions, and many patients undergoing hip replacement also have unrecognized osteoporosis or deficiency of vitamin D.

Vitamin D, through its action on calcium metabolism, is essential for bone physiology. It is also required in a wide range of biological systems to act modulating the proliferation Vitamin D deficiency can impact muscle function and increases fall risk in elderly, while severe vitamin D deficiency (< 30 nmol/L) is common in patients with fragility fractures. Vitamin D and calcium supplementation, in addition to antiosteoporosis treatment after surgery or conservative treatment, can ensure optimal recovery and survival, especially in hip fractured patients.

Vitamin D (both D2 and D3) can be obtained through the intake of foods or dietary supplements as Vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). However, about 80% of human vitamin D is made through skin exposure to ultraviolet light that converts cutaneous provitamin D3 to pre-vitamin D3, which isomerizes into
vitamin D3 and translocates into the circulation. Vitamin D is biologically inert and must undergo two successive hydroxylations in the liver and kidney to become the biologically active 1,25-dihydroxyvitamin D \([1,25(OH)2D]\). Its main biological effect is to maintain the plasma calcium concentrations within the normal range. If the plasma becomes less than saturated with respect to calcium and phosphate, the mineralization fails, which results in rickets among children and osteomalacia among adults.

The vitamin D increases serum calcium concentrations through three different activities. It induces the synthesis of proteins involved in active intestinal calcium absorption, and furthermore, stimulates active intestinal absorption of phosphate. The second activity of vitamin D consists to make possible the mobilization of calcium in the absence of calcium coming from the environment in a condition of no-calcium diet. Vitamin D stimulates osteoblasts to produce RANKL, that stimulates osteoclastogenesis and activates resting osteoclasts for bone resorption. Both vitamin D and parathyroid hormone are required to realize calcium mobilization from bone. Vitamin D, finally, interacting with PTH, stimulates the reabsorption of the last 1% of the filtered load of calcium in the distal renal tubule and this represents a major contribution to the calcium pool.

Furthermore, Vitamin D exerts its genomic effects through a nuclear gene transcription factor, the vitamin D receptor (VDR). VDR is, classically, present in the organs involved in calcium homeostasis, including the intestine, bone, kidney, and the parathyroid glands. Recently, VDR was found also in many other non-classical tissues and cell types. This may explain, the action of 1,25D in these non-classical
tissues associated with a diverse range of biological systems such as modulation of immune function, inhibition of cell growth, and induction of cell differentiation.

Recently it has been reported that in patients with a hip fracture, 80% of patients had secondary causes of bone loss, mainly related to disturbed calcium and vitamin D homeostasis. Despite this, only few patients receive evaluation and treatment for osteoporosis following a hip fracture. Vitamin D deficiency can impact on falls and bone mass. Severe vitamin D deficiency (< 30 nmol/L) is common in hip fracture patients.

Even if the vitamin D hormone system is considered essential for calcium homeostasis there is no general consensus about vitamin D efficacy and safety in relation to bone health. Researchers recently found inconsistent evidence of an association between serum 25(OH)-D concentration (the accepted marker for vitamin D nutritional status) and bone mineral content in infants, and fair evidence of an association with bone mineral content or density in older children and older adults.

Furthermore, there is inconsistent evidence of an association between serum 25(OH)-D concentration and some clinical outcomes (fractures, performance measures) in postmenopausal women and older men. Researchers have pointed out that there is inaccuracy and imprecision on the different assays for measuring 25(OH)-D and, moreover, it is difficult to define an overall 25(OH)-D threshold for vitamin deficiency or insufficiency. It has been well documented that higher levels of 25-(OH)-D are correlated with the better lower-extremities function in
subjects older than 60 years old, whether they are active or not. Simonelli, et al., proved that the 97% of patients with a history of falls and minimal trauma fractures had serum 25(OH)-D levels inferior to 30 ng/ml, and the 72.5% of them had levels even lower to 20 ng/ml. Vitamin D supplementation is very important if there is low serum concentration of 25-(OH)-D, which represent a measurable and reliable marker to quantify vitamin D activity. According to several studies, 40 to 100% of U.S. and European elderly men and women still living in the community (not in nursing homes) are deficient in vitamin D. More than 50% of postmenopausal women taking medication for osteoporosis had suboptimal levels of 25-(OH)-D below 30 ng/ml (75 nmol/L). In Europe, where very few foods are fortified with vitamin D, children and adults would appear to be at especially high risk.

The aim of vitamin D supplementation is to bring serum concentration of 25-(OH)-D above 30 ng/ml. Experts have identified as the minimum acceptable a concentration of 28-32 ng/ml (70-80 nmol/ml) of 25-(OH)-D. This concentration should be reached with a dietary intake of 800-1000 IU of vitamin D in elderly people. A certain quantity of vitamin D is present in foods such as salmon, eggs, milk, cheese, and above all in animal fats. Sunlight usually covers 80% of vitamin D needed.

**Homeopathic Medicine**

The growing popularity of alternative medicine is due in large part to the growth of homeopathy. The German doctor and biologist, Dr. Samuel Hahnemann, developed this 250-year-old science in the late 18th century. One of the primary principles in homeopathy is the Law
of Similars. The premise suggests that a substance produces symptoms of illness in a well person when administered in large doses. If the same substance is administered in minute quantities, it will cure the disease in a sick person.

Hahnemann had very different ideas about the body than his colleagues who practiced conventional medicine. He believed in the concept of the ‘constitution’, the notion that the body must be treated as a whole and that the right remedy would literally ‘kick start’ the system into healing itself at the most basic level. In this way, homeopathy would not treat disease; it would heal the body. The second principle is the Law of Infintesimals, which states that substances become more potent when diluted.

Herbal Medicine

Herbal medicine may have been humanity’s first attempt at a synthesis of conditions and corresponding treatments. Thousands of years ago, humanity was in its infancy and so was medical treatment. The very first treatments were likely the herbs and flowers that people found in their immediate surroundings. However, herbal medicine has come a long way since those early days of human civilization. In fact, the words ‘herbal’ and ‘natural’ seem to be everywhere. People in western countries are flocking to the stores to buy lotions with
lavender, tea with chamomile and even cleaning products are being infused with natural and herbal elements.

Today’s herbalists engage in training and they must be certified to practice. Although much advancement has been made in our understanding of what herbs can do and our preparations of herbal remedies, there are still concerns about the safety of these remedies.

*Traditional Chinese Medicine*

Traditional Chinese Medicine (TCM) may be one of the world’s oldest medical systems. It was developed over 2000 years ago, and has only recently become popular in western cultures. One of the key concepts in TCM is the notion of *qi* (pronounced “chi”) or *life force*. In some ways, this notion of a life force is similar to the notion of the vital force in homeopathy but they are understood and treated differently.

There is no doubt that TCM is fundamentally different from western medicine in many essential ways. As well, even with a small similarity to homeopathy, it is also distinctly different from any other form of medical treatment. It’s important to take into account that TCM is a reflection of a specific culture, like Ayurvedic medicine, which was developed in India. Some of the components that are essential to TCM include: personal observations of the physician, a subjective basis for diagnosis, healing as a way to balance the body’s processes, measuring the outcomes of treatment qualitatively (versus quantitatively) and gearing the treatment to the individual and not the condition.
Some people with arthritis have found relief with herbal salves, cremes and the Homeopathic remedy known as Rhus Toxicodendron. This does not imply, however, that all people with arthritis will find relief there. While the use of alternative or complementary medicine is increasing, there are warnings people should take seriously.

- Just because a remedy is natural does not mean it can’t be harmful. Even natural remedies can be used too frequently and in doses that are too high, even dangerous. Do not assume a person can self-treat or self-medicate.
- Homeopathic remedies and TCM generally do not interact well.
- If a person is going to use one of these three systems, it is best to go to a Certified Practitioner. In that way, it can be known that proper care is being received.
- Do not mix remedies without consulting a practitioner.
- Do not get lulled into believing outlandish claims by the producers of some ‘natural remedies.’ They are not miracle remedies, but rather remedies from natural sources.
- Identify all the possible risk associated with a particular remedy.
- Do not use a natural remedy when taking a pharmaceutical prescription or medication without first consulting a physician and the alternative medicine clinician. This can be dangerous.

Many people are using natural or alternative medicines because they believe them to be safer than conventional medications. In some cases, this is true, but it is not true in all cases. Natural remedies can also be harmful and one should always take great care with their use.
Summary

A key aspect of total hip replacement is that of post-operative care. There is research to suggest that physical therapy can be of benefit to the post-operative patient, however the research is not yet conclusive. There is definitive research to suggest that specific precautions and strategies must be used to ensure the long-term success of hip surgery. Those strategies include the surgeon’s protocols for each individual patient. There needs to be a period of rest, then mobilization, light exercises, and then directed exercises to strengthen the hip muscle and increase range of motion. Exercise is an important component of the person’s wellbeing, as it helps to maintain prosthetic function over the long-term. Non-compliance can lead to prosthetic failure and the inability to replace it. Therefore, patients must closely heed their surgeon’s advice and follow it completely.

Please take time to help NurseCe4Less.com course planners evaluate the nursing knowledge needs met by completing the self-assessment of Knowledge Questions after reading the article, and providing feedback in the online course evaluation. Completing the study questions is optional and is NOT a course requirement.
1. The usual hospital stay for hip replacement is 3 to 5 days, and full recovery typically takes
   a. ten more days.
   b. a year.
   c. 3 to 6 months.
   d. weeks.

2. To protect the hip, a patient will often be asked not to sit
   a. past a 90-degree angle after surgery.
   b. at a 90-degree angle after surgery.
   c. for the first three weeks after surgery.
   d. upright after surgery.

3. On the first day after total hip replacement surgery,
   a. it is common to begin some minor physical therapy while sitting in a chair.
   b. the patient is monitored for pain and is not allowed to begin physical therapy.
   c. the typical patient is discharged.
   d. the patient must remain reclined and not sit up or use a chair for at least three days.

4. True or False: At the time a hip replacement patient is discharged from the hospital, the patient should not be experiencing pain, otherwise the discharge must be postponed.
   a. True
   b. False

5. Hospitals are shortening the amount of time a person remains in the hospital after total hip replacement surgery because
   a. the Affordable Care Act mandates it.
   b. the hospital is a stress-free environment and the patient needs to learn how to deal with stress.
   c. there is always a greater chance of acquiring a Staph infection in the hospital.
   d. reducing the cost of the procedure is the primary concern.
6. Which of the following is included in the proper use of a walker?

a. adjust the walker height so it is above wrist level.
b. keep your arms out in front not by your sides.
c. never stand upright (lean forward).
d. the hand grips on your walker should be at wrist level.

7. The proper use of a walker includes

a. moving your good leg forward first.
b. tilting the walker on 2 legs (without wheels) if it has wheels.
c. always keeping the good leg slightly behind the sore leg.
d. putting all four legs of the walker on the floor.

8. When using a walker to get up or sit down, the patient should know that leaning on the walker

a. is proper when getting up.
b. is proper when sitting down.
c. is proper if the patient is leaning to take weight off the sore leg.
d. should not be done.

9. When using a cane, hold the cane in the hand

a. that is most comfortable for you.
b. opposite to your sore leg.
c. opposite to your good leg.
d. opposite to your good leg only if the hand grip is below wrist level.

10. Which of the following is the proper use of a cane when a patient wants to sit down in a chair?

a. Hold the cane in your hand opposite the good leg while lowering into the chair.
b. Slide your good leg forward while lowering into the chair.
c. Lean the cane on the chair and reach back with both hands to grab onto the armrests or the seat of the chair before sitting.
d. All of the above
11. True or False: Never use a walker to go up or down more than a single step.
   a. True
   b. False

12. To get out of the chair when using a cane, place your cane on the end of the armrest or in your hand and
   a. move closer to the edge of the chair seat and move your heels close to the base of the chair.
   b. push down on the armrests or seat of the chair and lean forward slightly.
   c. put your sore foot forward slightly and push yourself up with your good leg and arms.
   d. All of the above

13. When using a cane in inclement weather, the following rule(s) apply:
   a. In winter months, the patient should attach an ice pick to the end of the cane.
   b. The patient should be advised to take larger, more deliberate steps.
   c. Loose mats and rugs are useful when the weather is bad.
   d. Never use a cane on wet surfaces.

14. True or False: If the hand grip of a wooden cane is not at wrist level, adjust the cane’s height by cutting the cane to the proper length.
   a. True
   b. False

15. Proper positioning is important with crutch use. The patient should be advised that when standing up straight, the top of the crutches should be
   a. about 1-2 inches below the armpits.
   b. just touching the armpits.
   c. about 6 inches below the armpits.
   d. firmly set in the armpits for stability.
16. A patient walking with crutches should be advised to ______________________ shift weight to the crutches.
   a. remain upright and
   b. finish the step with the injured limb, then
   c. begin as if using the injured foot or leg but instead,
   d. look down at the feet, then

17. When going down stairs, a patient should hold the injured foot ____________, and hop down each step on the good foot, taking it one step at a time.
   a. raised behind
   b. lightly on the next step
   c. up in front
   d. lowered behind

18. Which of the following is a sign that an incision may be infected?
   a. The area around the incision feels hard or looks swollen
   b. There is a little redness around an incision
   c. There is a little clear or pink fluid coming from the incision
   d. Low body temperature

19. A patient may take a shower while an incision is healing but should
   a. not allow water run over the incision.
   b. use soap directly on the incision to clean it.
   c. pat the incision dry after showering with a clean towel.
   d. use powder to dry the incision.

20. True or False: Home-based physiotherapy tends not to be as effective as outpatient physiotherapy.
   a. True
   b. False
21. Non-Steroidal Anti-inflammatory Drugs (NSAIDS) work by ____________________________, thereby reducing pain.

   a. blocking the signal transmitted by the pain fibers
   b. reducing prostaglandin production
   c. reducing pain signals
   d. numbing pain fibers

22. Recommendations for care after hip or knee replacement INCLUDE

   a. no routine, postoperative screening for thromboembolic disease.
   b. withholding anticoagulant therapy due to the risk of bleeding.
   c. avoiding "early mobilization."
   d. routine duplex ultrasonography to screen for thromboembolisms.

23. A patient should make an appointment with the physician for the following issue:

   a. Abdominal pain that is getting suddenly worse.
   b. For a temperature of 38 °C (100.4 °F) or higher.
   c. If the incision is red, swollen, painful or feels hot.
   d. For bloody or black bowel movements.

24. One of the side effects of Non-Steroidal Anti-inflammatory Drugs (NSAIDS) is

   a. kidney problems.
   b. fever.
   c. sedation.
   d. vomiting.

25. True or False: Approximately one quarter of patients with hip fractures over the age of 50 will die in the year following a fracture.

   a. True
   b. False

26. A patient should seek emergency care for the following condition:
a. If the patient has nausea or vomiting that does not go away
b. For a temperature of 38 °C (100.4 °F) or higher.
c. If the incision is red, swollen, painful or feels hot.
d. If the incision is leaking pus that is green, yellow or bloody.

27. One of the side effects of opioids is

a. kidney problems.
b. fever.
c. diarrhea.
d. dry mouth.

28. Long-term ______________________, particularly at high
doses, was associated with an increased risk of hip
fracture.

a. use of digoxin
b. use of fluoroquinolones
c. proton pump inhibitor therapy
d. antibiotic treatment in the tetracycline family

29. The idea that a substance produces symptoms of illness in
a well person when administered in large doses is known
as

a. the Law of Infintesimals.
b. the notion of the vital force, or qi.
c. the Law of Similars.
d. the homeopathic effect.

30. The interaction between calcium and vitamin D
supplements and __________ may also increase the risk of
hypercalcemia.

a. levothyroxine
b. tetracycline
c. warfarin
d. digoxin

CORRECT ANSWERS:
1. The usual hospital stay for hip replacement is 3 to 5 days, and full recovery typically takes
   c. 3 to 6 months.
   "The usual hospital stay for hip replacement is 3 to 5 days, and full recovery typically takes 3 to 6 months."

2. To protect the hip, a patient will often be asked not to sit
   a. past a 90-degree angle after surgery.
   "To protect the hip, a patient will often be asked not to sit past a 90-degree angle after surgery. If this is the case, they will be provided the necessary tools to assist during this process."

3. On the first day after total hip replacement surgery,
   a. it is common to begin some minor physical therapy while sitting in a chair.
   "On the first day after surgery, it is common to begin some minor physical therapy while sitting in a chair."

4. True or False: At the time a hip replacement patient is discharged from the hospital, the patient should not be experiencing pain, otherwise the discharge must be postponed.
   b. False
   "It is not uncommon for patients to still experience some pain upon the time of hospital discharge, and pain management should be included as part of the discharge plan of care."

5. Hospitals are shortening the amount of time a person remains in the hospital after total hip replacement surgery because
c. there is always a greater chance of acquiring a Staph infection in the hospital.

“Many hospitals today are shortening the amount of time a person remains in the hospital. There are several good reasons for this. First, there is always a greater chance of acquiring a Staph infection in the hospital. Second, people tend to rest better at home in their own bed. Third, the hospital can be a stressful environment, and people tend to relax better at home where visitors can easily spend time with them and family can tend to them. Surgery itself is a stressful and complicated matter that is emotionally and physically stressful for many patients. The last thing a patient needs is to add stress onto the situation by a long-hospital stay.”

6. Which of the following is included in the proper use of a walker?

d. the hand grips on your walker should be at wrist level.

“Simple Steps To Use A Walker: Put on the shoes to be worn when using the walker; Stand up straight; Put walker in front of and partially around... let arms hang by sides with elbows bent slightly. The hand grips on walker should be at wrist level. Adjust the height of the walker if the hand grips are not at wrist level; With the height adjusted, put both hands on the walker’s hand grips.”

7. The proper use of a walker includes

d. putting all four legs of the walker on the floor.

“Standing straight with the walker in front of and partially around, follow these 3 easy steps: 1. Move the walker one step length ahead. Put all four legs of the walker on the floor. (Do this the same way if the walker has two wheels). 2. Move sore leg forward and push down on the walker using the arms. 3. Move good leg forward so that it is even with or slightly ahead of the sore leg.”

8. When using a walker to get up or sit down, the patient should know that leaning on the walker

d. should not be done.
“Do not lean on the walker when getting up or sitting down. Leaning on the walker could cause it to tip over.”

9. **When using a cane, hold the cane in the hand**
   
b. opposite to your sore leg.

   “Hold the cane in the hand opposite the sore leg – in the right hand if the left leg is sore; in the left hand if the right leg is sore.... The hand grip on the cane should be at wrist level. If the hand grip is not at wrist level ...”

10. **Which of the following is the proper use of a cane when a patient wants to sit down in a chair?**
   
c. Lean the cane on the chair and reach back with both hands to grab onto the armrests or the seat of the chair before sitting.

   “Find a steady chair with solid armrests or sides. Using the cane, stand with the back of the legs lightly touching the chair. 1. Move the cane out from the side – lean it on the chair and reach back with both hands to grab onto the armrests or the seat of the chair. 2. Slide the sore leg forward. 3. Lower gently onto the chair. Move back in the chair until comfortable. Never sit in an unstable chair or one that is very low.”

11. **True or False: Never use a walker to go up or down more than a single step.**
   
a. True

   “Never use a walker to go up or down more than a single step, and put only as much weight on the sore leg as tolerable without limping or as allowed by one’s physician.”

12. **To get out of the chair when using a cane, place your cane on the end of the armrest or in your hand and**
   
a. move closer to the edge of the chair seat and move your heels close to the base of the chair.
b. push down on the armrests or seat of the chair and lean forward slightly.
c. put your sore foot forward slightly and push yourself up with your good leg and arms.
d. All of the above [correct answer]

“To get out of the chair, place the cane on the end of the armrest or in the hand. 1. Move closer to the edge of the chair seat and move the heels close to the base of the chair. 2. Push down on the armrests or seat of the chair and lean forward slightly. 3. Put the sore foot forward slightly and push up with the good leg and arms. 4. Steady self. Move the cane’s tip to about 10 cm (4 in.) from the side of the good leg.”

13. When using a cane in inclement weather, the following rule(s) apply:

   a. In winter months, the patient should attach an ice pick to the end of the cane.

   “Wet surfaces should be avoided, as they can be slippery. The patient should be advised to take small steps if walking on a wet or slippery surface is unavoidable. In winter months, the patient should attach an ice pick to the end of his/her cane. Loose mats and rugs, electric cords and cables should be removed because they could cause the patient to trip or slip. Patients advised to use a cane should continue to do so until their medical clinician or physical therapist advises it is no longer needed.”

14. True or False: If the hand grip of a wooden cane is not at wrist level, adjust the cane’s height by cutting the cane to the proper length.

   a. True

   “If the hand grip is not at wrist level, adjust the cane’s height by: … Cutting the cane to the proper length if it is wooden.”

15. Proper positioning is important with crutch use. The patient should be advised that when standing up straight, the top of the crutches should be

   a. about 1-2 inches below the armpits.
“Proper positioning is important with crutch use. The patient should be advised that: When standing up straight, the top of the crutches should be about 1-2 inches below the armpits.”

16. A patient walking with crutches should be advised to ______________________________ shift weight to the crutches.

c. begin as if using the injured foot or leg but instead,

“Patients should be advised to lean forward slightly and to put crutches about one foot in front of them when walking. Steps should begin as if the patient were going to use the injured foot or leg but, instead, shift weight to the crutches. Bringing the body forward slowly between the crutches is recommended, and then finishing the step normally with the good leg. When the patient’s good leg is on the ground, he or she should move the crutches ahead in preparation for the next step. The patient using crutches should be advised to always look forward, not down at the feet.”

17. When going down stairs, a patient should hold the injured foot ______________, and hop down each step on the good foot, taking it one step at a time.

c. up in front

“To walk up and down stairs with crutches, a patient needs to be both strong and flexible. Facing the stairway, it is important the patient holds the handrail with one hand and tucks both crutches under the armpit on the other side. When going up stairs, a patient should lead with the good foot, keeping the injured foot raised behind. When going down stairs, a patient should hold the injured foot up in front, and hop down each step on the good foot, taking it one step at a time. A patient may want someone to help when navigating stairs, at least at first. If a stairway is encountered with no handrails, crutches should be used under both arms while hopping up or down each step on the good leg, using more strength.”

18. Which of the following is a sign that an incision may be infected?

a. The area around the incision feels hard or looks swollen
“Check the incision each day for these 6 signs of infection: 1. Fever: Temperature is 38°C (100.4°F) or higher. Take temperature at least once a day. 2. Redness: A red area around the incision that is getting bigger. A little redness around an incision is normal. 3. Swelling: The area around the incision feels hard or looks swollen. 4. Heat: The area around the incision feels hot. 5. Drainage: There is fluid coming from the incision that is green, yellow or bloody. It may smell bad. A little clear or pink fluid is normal. 6. Pain: The incision is getting more painful since discharging to home.”

19. A patient may take a shower while an incision is healing but should

   c. pat the incision dry after showering with a clean towel.

   “Can the patient take a shower while healing? The patient may shower while the incision is healing. Let the water run over the incision. Gently pat it dry after showering with a clean wash cloth or towel. Do not use soap or body wash directly on the incision. It is fine if some soapy water runs over the incision and gets rinsed off. Do not put powder, cream, lotion or any type of ointment on the incision. Do not bathe, swim or use a hot tub until the incision is fully healed. Check with the physician or surgeon about when a bath can be taken.”

20. True or False: Home-based physiotherapy tends not to be as effective as outpatient physiotherapy.

   a. True

   “According to a recent study, home-based physiotherapy tends not to be as effective as outpatient physiotherapy.”

21. Non-Steroidal Anti-inflammatory Drugs (NSAIDS) work by ____________________________, thereby reducing pain.

   b. reducing prostaglandin production
“Non-Steroidal Anti-inflammatory Drugs (NSAIDS): Prostaglandins increase inflammation and may cause pain. NSAIDS work by reducing prostaglandin production, thereby reducing pain.”

22. Recommendations for care after hip or knee replacement

INCLUDE

a. no routine, postoperative screening for thromboembolic disease.

“Hip and knee replacement patients should not have routine postoperative screening for thromboembolic disease with duplex ultrasonography (an ultrasound test that shows how blood moves through the arteries and veins). Screening with this test does not significantly reduce the rate of symptomatic DVT or PE or the rate of fatal PE. Patients should receive anticoagulant therapy (unless they have a medical reason for not being able to use these drugs, such as a bleeding disorder or active liver disease) and/or mechanical compression devices after a hip or knee replacement surgery. There is, however, insufficient evidence to recommend any particular preventive strategy or the duration of these treatments. Patients should discuss the duration and type of preventive treatment with their physician. After hip or knee replacement, patients should get up and walk as soon as safely possible. Although there is insufficient evidence that "early mobilization" reduces DVT rates, early mobilization is low cost, of minimal risk and consistent with current practice.”

23. A patient should make an appointment with the physician for the following issue:

c. If the incision is red, swollen, painful or feels hot.

The patient should make an appointment with the physician for the following issues: ... If the incision is red, swollen, painful or feels hot.”

24. One of the side effects of Non-Steroidal Anti-inflammatory Drugs (NSAIDS) is

a. kidney problems.
“Non-Steroidal Anti-inflammatory Drugs (NSAIDS) ... Can be used to treat fever. Side effects: may cause dizziness, kidney problems, stomach upset.”

25. True or False: Approximately one quarter of patients with hip fractures over the age of 50 will die in the year following a fracture.
   
a. True
   
   “… approximately 24% of patients with hip fractures over the age of 50 will die in the year following the fracture.”

26. A patient should seek emergency care for the following condition:
   
b. For a temperature of 38 °C (100.4 °F) or higher.
   
   “The patient should seek emergency care for the following conditions: ... For a temperature of 38 °C (100.4 °F) or higher.”

27. One of the side effects of opioids is
   
d. dry mouth.
   
   “Narcotics (Opioids): Side effects: nausea, vomiting, sedation, dry mouth, constipation.”

28. Long-term _________________________, particularly at high doses, was associated with an increased risk of hip fracture.
   
c. proton pump inhibitor therapy
“A randomized crossover trial demonstrated that the proton pump inhibitor, omeprazole, markedly decreased fractional calcium absorption from calcium carbonate when ingested by elderly women after an overnight fast on an empty stomach. In addition, a case control study reported that long-term proton pump inhibitor therapy, particularly at high doses, was associated with an increased risk of hip fracture.”

29. The idea that a substance produces symptoms of illness in a well person when administered in large doses is known as

c. the Law of Similars.

“One of the primary principles in homeopathy is the Law of Similars. The premise suggests that a substance produces symptoms of illness in a well person when administered in large doses. If the same substance is administered in minute quantities, it will cure the disease in a sick person.”

30. The interaction between calcium and vitamin D supplements and _________ may also increase the risk of hypercalcemia.

d. digoxin

“The interaction between calcium and vitamin D supplements and digoxin may also increase the risk of hypercalcemia.”

References Section

The References below include published works and in-text citations of published works that are intended as helpful material for your further reading.


https://www.nice.org.uk/guidance/ta304/chapter/3-The-technologies


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