The following table outlines medications, concerns about these medications, precautions, and modifications to physical therapy because of the medications that BJ is taking. All information in the table on use, precautions and side effects was obtained from drugs.com.1

**Table 1. Medications BJ is Currently Taking**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Medication** | **Use** | **Precautions** | **Concerns/Side Effects** | **Therapy Modifications** |
| acetaminophen | Pain, muscle aches | Do not take if still in pain after 7 days | Liver damage or death | Take prior to PT for pain |
| Amlodipine besylate | hypertension | Possible hypotension if dehydrated | Could cause dizziness | Monitor for dizziness and hydrate during exercise; falls precautions; monitor vitals |
| Aricept | dementia | Can impair thinking or reactions | Could cause seizures; bloody stools; coughing up blood | Monitor for any of these concerns |
| Centrum Silver multivitamin | Multi vitamin with minerals | none | Headache; unpleasant taste in mouth; stomach upset | No modifications to PT |
| Famotidine | Decrease stomach acid | Should be used in conjunction with changes in diet and lifestyle | Easy bruising/bleeding; pounding heart; confusion | Monitor vital signs and orientation |
| Ferrous Sulfate | Iron deficiency | Do not take within 2 hrs of other vitamins | Constipation; stomach upset | No modifications to PT |
| Glipizide | Control blood sugars along with diet and exercise | hypoglycemia | Bruising; stomach pain; fast/pounding heart; sweating; feels like you may pass out | Monitor vital signs and hydrate; provide info on diet and exercise |
| Norco | Relief of moderate to severe pain | Is a narcotic-avoid alcohol. Can cause liver damage or death | Slow heartbeat; confusion; seizures;  lightheadedness | Monitor vitals, orientation; falls  precautions |
| **Medication** | **Use** | **Precautions** | **Concerns/Side Effects** | **Therapy Modifications** |
| Prevastatin Sodium | Reduction of total and LDL cholesterol | Muscle pain, tenderness or weakness | Chest pain; dizziness | Monitor for chest pain; falls precautions |
| St John’s Wort | Antidepressant; treats insomnia | May cause dizziness; wt gain; tiredness | Dry mouth; stomach fullness; sensitivity to sunlight; restlessness; | Monitor for falls; monitor for fatigue or weight gain |
| Tramadol | Relief of moderate to severe pain | Max dose 300mg/day | Fast heart rate; seizure; loss of coordination; shallow breathing | Monitor vital signs and loss of coordination |
| Tylenol PM | Pain relief and fever | Can cause liver damage or death | Chest pain, fast or uneven heart rate; confusion; seizures; nausea; stomach pain | Monitor vitals and patient orientation |
| Vesicare | Reduces muscle spasms of bladder and urinary tract | Avoid becoming overheated or dehydrated | Hot, dry skin; extreme thirst; severe stomach pain; pain with urination | Monitor for overheating and hydrate during exercise |
| Zoloft | Antidepressant | May impair thinking or reactions | Stiff, rigid muscles; tremors; sweating; confusion, irregular heart beat; shallow breathing; headache; agitation | Monitor vitals; be aware of all these significant side effects |

The above table will be printed out and placed in her physical therapy chart as a quick reference if she does have any adverse symptoms or reactions during therapy treatment time. The above medications BJ is taking have 5 major, 15 moderate and 4 minor drug interactions.1 The use of Tramadol with Aricept, Norco, or Zoloft concurrently can increase the risk of seizures.1 Serotonin syndrome is a rare but potentially fatal condition that can occur when using the following sets of medications concurrently: Zoloft and Tramadol, Zoloft and St. John’s Wort, and St John’s Wort and Tramadol.1 Symptoms of serotonin syndrome may include mental status changes such as irritability, altered consciousness, confusion, hallucination, and coma; autonomic dysfunction such as tachycardia, hyperthermia, diaphoresis, shivering, blood pressure lability, and mydriasis; neuromuscular abnormalities such as hyperreflexia, myoclonus, tremor, rigidity, and ataxia; and gastrointestinal symptoms such as abdominal cramping, nausea, vomiting, and diarrhea.1

Three medications that BJ takes have significant drug interactions with several of her other medications. Tylenol PM may interact with Zoloft, Norco, Tramadol, Aricept, and St John’s Wort.1 With Vesicare alone, such symptoms as hyperthermia, ileus, heat stroke, tachycardia, constipation, memory loss or disorientation, twitching or jerky movements and seizures could occur.1 The two medications (Tylenol PM and Vesicare) have additive effects and can lead to tardive dyskinesia.1 Three of these medications including Tylenol PM, Norco and Tramadol are for pain control.1 Pain is not a significant complaint that BJ relays as she self- reports it as 4/10. It would be important to discuss this with her physician to see if she could be weaned from any or all of these pain medications. At the very least she might be able to stop taking the narcotics. As she is 6 weeks post-operative, I would expect her pain to be minimal and continuing to diminish although she might report soreness as the intensity of the exercise increases.2 Another drug that BJ takes that interacts with 3 other medications is Vesicare. In addition to interacting with Tylenol PM, it interacts with Norco, Aricept, and St John’s Wort.1 Use of Vesicare and Norco can cause central nervous system depression and gastrointestinal problems.1 Vesicare and Aricept can cause mental status changes.1 This may be another red flag drug to discuss with the physician as BJ has complaints of fatigue and has a degree of dementia which could be worsened. I wonder if a drug holiday from the Aricept would tease out the degree of dementia versus drug side effects? Vesicare and Aricept interact with St. John’s Wort to possibly decrease the plasma level of these two medications.1

Glipizide showed drug interactions with Zoloft and famotidine.1 With both, increases in the risk of hypoglycemia should be monitored.1 Another moderate reaction is between Aricept and amlodipine causing additive effects for bradycardia.1 There have been deaths reported from this drug interaction and patients should be advised to notify their physician if they experience dizziness, lightheadedness, fainting, or irregular heartbeat.1

St John’s Wort is reported to possibly inhibit the absorption of iron which effects both ferrous sulfate and the multivitamin that BJ takes.1 This herb may be another medication to discuss with BJ’s physician. Use of Zoloft and Aricept together may increase the plasma concentration of Aricept.1 In addition to a major reaction reported above, there is a minor interaction reported between Tylenol PM, Norco, and Vesicare as Vesicare may decrease the gastrointestinal absorption of acetaminophen.1

BJ is also taking medications that have interactions with certain foods. When using St John’s Wort for example these foods should be avoided: cheese ( strong, aged or processed cheeses), sour cream, wine (particularly red wine), champagne, beer, pickled herring, anchovies, caviar, shrimp paste, liver (particularly chicken liver), dry sausage, figs, raisins, bananas, avocados, chocolate, soy sauce, bean curd, yogurt, papaya products, meat tenderizers, fava beans, protein extracts, and dietary supplements.1 Caffeine may also precipitate hypertensive crisis so its intake should be minimized as well.1 Eating grapefruit or drinking grapefruit juice should be avoided with Amlodipine and ferrous sulfate should be taken on an empty stomach.1

I checked several different pain medications to see if they were any medications that wouldn’t interact with BJ current regimen. I checked Demerol, Dilaudid and Percocet. These all either had major or moderate interactions with other medications she was already taking.1 The same was true for a change in depression medications to Xanax, Wellbutrin or Elavil.1

With BJ’s blindness and dementia, she relies on others to assist her with her medications. Currently her sister in law fills her mediplanner weekly for her. Although this seems to work, it is unclear if she misses any doses of her medications because she “forgets”. There is a pill box with audible alerts to assist with reminding BJ about taking her medications.3 It also can hold up to 2 weeks supply of medication which would cut in half the number of visits her sister in law has to make monthly. Reminders via phone calls from her sister in law could also assist BJ in taking her medications. If her physician deems it appropriate, BJ may have fewer medications to take which may also change her medication scheduling.

There are many functional assessment instruments that will be appropriate to use with BJ during examination and evaluation in the outpatient setting. After initially collecting all relevant patient history, I will start with an assessment of her cognition. A mini mental state exam (MMSE) can be used.4 This will help delineate the severity of her dementia and there are aged based normative values for comparison.4 Next I will get a functional measure of her pain. This can be assessed with the pain thermometer which is a good measure for a person with dementia or a visual analog scale.5 Pain could be a limiting factor in her recovery so I will want to monitor it. To get an idea of her endurance a 6 minute walk test will be appropriate.6 Improved endurance will assist her in getting back to her goal of getting back to “doing as much as she can.” Another functional measure I will implement is the Borg Rating of Perceived Exertion.7 This will keep me on task with realizing how effortful the activities and exercises we are doing are to BJ.

Additional functional assessment measurements I will collect, include vital signs- heart rate, respiratory rate and blood pressure. These will be important as her blood pressure already seems high at180/96. This will be another concern for me to address with her physician when I call about her medication concerns. Heart rate and respiratory rate will be important for baseline measurements and will be used to monitor her responses to exercise.

Other functional assessments I will collect include range of motion (ROM) by goniometric measurements, leg length measurement, and strength testing by either manual muscle test or dynamometry. Range of motion will provide information about muscle length and soft tissue flexibility which may have functional importance. Strength testing will be important as BJ is already reporting a decrease in strength of hip musculature. This lack of strength may correlate with gait issues and stability/balance as therapy progresses. She is already reporting an antalgic gait. Leg length should be assessed and possibly discussed with her surgeon as it is likely that her operative lower extremity is slightly shorter. She is reporting an antalgic gait and difficulty with weight shift to the right. A postural assessment may also be appropriate to document initial posture and improvement in postural alignment. A simple grid can be used to perform this measure. She already has documented asymmetry which may affect her gait and balance.

To assess BJ’s self- help and home management and level of independence with ADL’s, the Barthel Index can be used.6 Quality of life measurements will also be important to determine BJ’s psychosocial functioning. She has reported taking medication for depression, so the Geriatric Depression Scale may define the scope of this problem.8 The World Health Organization Quality of Life (WHOQOL-BREF) would be a nice measure as it examines physical, psychological, social, and environmental domains.9 The SF-36 can be used as well to measure health status in eight domains including vitality, physical functioning, bodily functioning, general health perceptions, mental health and physical, emotional and social functioning.10

Balance and gait are two functional problems for BJ and coincide with her goals of being able to move better around her home and not to fall. It will be important to get objective and clinically relevant measures so that progress toward goals can be tracked. There are several great functional assessments to use when assessing balance and gait. I have chosen to use these discussed below as they are easy to perform in the clinic, they are functional, and they are predictive of falls.6 The Berg Balance Scale (BBS) will provide very important functional and environmental management information about balance and gait and BJ’s risk for falling.6 It will be important to know this, as a fall would obviously be very detrimental and falling is also a functional concern and fear of BJ’s. The Tinetti Performance Oriented Mobility Assessment (POMA) will score balance and gait measures and can be predictive of falls.11 The Timed Up & Go (TUG) is another measure which can be predictive of falls.6,12 There will also be some simple measures of gait velocity such as use of the timed 10 meter walk test, step length and stride length will be measured clinically as well.6 Assessing BJ’s assistive device use and attempting to wean her to Lofstrand crutches and eventually no assistive device will also be an appropriate functional assessment.

There are many functional assessments listed above. It may be impractical to use them all. Several have overlapping items and maybe some could be eliminated because of this. Additionally, some of the functional tasks may be difficult for BJ secondary to being blind. It may also take more than one therapy session to collect all of the measurement data.

The Guide to Physical Therapist Practice defines intervention as “the purposeful interaction of the physical therapist with the patient…using various procedures and techniques to produce changes in the condition consistent with the diagnosis and prognosis”.13 The two essential functional problems that I have identified to treat with BJ are gait and balance. Many of the activities chosen to assist in treating BJ will overlap to show improvements in both gait and balance.

In 1997, Shumway –Cook et al reported that exercise could improve balance and mobility function and reduce the likelihood of falls in the elderly.14 In a randomized controlled trial Binder et al reported improvement in gait speed and balance in patients with hip fracture following intensive progressive resistive exercises compared to low intensity exercises.15 Gmitter et al reported improvements in gait speed and balance in a case report of a 97 year old that sustained a hip fracture and underwent high intensity lower extremity training twice a week with balance and endurance training interposed.2 A systematic review of hip fracture rehabilitation techniques in the elderly showed, in the outpatient setting, combined aerobic and progressive resistance training along with functional training leading to improvements in ambulatory outcomes.16 A meta- analysis by Chou et al reported exercise improved gait, balance and ADL’s in frail older adults.17

The literature provides little information on protocols to improve outcomes following total hip arthroplasty.18 Many studies cited looked at hip fracture versus arthroplasty or at frail elderly.14-17 Results from many studies seem to vary in intensity, dosage, and specificity in exercise to improve physical functioning. I have extrapolated information to design a program. My exercise intervention program will be in 3 phases. As BJ has already been receiving physical therapy at home, I will make the assumption that she will be able to perform at a basic level of strengthening, balance, and flexibility, and I will also assume that all exercises will be mindful of any hip precautions following arthroplasty. Initially, to start my intervention, I will have BJ work on weight bearing exercises such as sit to stand, heel raises, partial knee bends, unilateral standing balance, side and back leg raises in standing, knee raises with alternating arm raises, and unilateral pelvic raises and lowering in standing. These exercises were shown to improve muscle strength, postural stability and self -perceived function compared to isometric and active range of motion exercises.1920 Additionally, exercises focusing on figure of 8 walking, stair climbing and side stepping have been shown to improve TUG and 6MWT in a group of 11 subjects status post total hip arthroplasty.19 This first phase will also work on balance activities as described here and below. Use of a recumbent bike or bike ergometer for strength and endurance and a treadmill will also be used. Speed and resistance will be adjusted as appropriate. This phase will last approximately 3-4 weeks depending on BJ’s progress. This will allow time for improving strength, balance and beginning work on gait. It will also allow more healing time.

The second phase will include progressive resistance training.15 I will obtain 1 repetition max ( 1RM) voluntary strength measurements for upper and lower extremity muscle groups for strength training. I will choose hip flexion, extension and abduction in addition to knee flexion and extension for the lower extremities. I will integrate shoulder flex and elbow flexion and extension for the upper extremities as well. BJ will perform exercises on various weight lifting machines with 2 sets of 6-8 repetitions of all exercises at 65% of 1RM.15 This work will be concurrent with balance activities and exercises from phase 1.15 After 3-4 weeks the exercises will be progressed to 3 sets of 8-12 repetitions at 85% to 100% of 1RM.15 The 1RM may need to be adjusted as BJ is getting stronger.

In a 2011 study, Nitz et al showed improvement on the TUG in the elderly following balance training.21In a Cochrane Review of exercises for improving balance in the elderly, there is evidence that some types of exercise are moderately effective in improving clinical balance outcomes.22 The author does reference the fact that is difficult to determine which exercises actually improve balance in the elderly.22 In my treatment of BJ, balance exercises/activities are at times integrated with gait activities. 23

These will include activities such as working on functional balance by stair climbing, walking uneven terrains and obstacles, sideways and backwards walking, sit to stand and stand to sit from a chair with no arms, single limb stance, standing with feet together, semi tandem and tandem, turning a circle, standing unsupported, turning head to look over shoulder, reaching forward.2,15,16

Duration of my intervention would be 12-16 weeks at a frequency of two to three times per week.15 Each session would be 60 to 75 minutes. This is within the range estimates of the Guide to Physical Therapist Practice which estimates between 12-60 therapy visits per episode of care.13 At discharge in addition to a home exercise program to continue strengthening and walking, I would recommend Tai Chi classes as a review of multiple studies on Tai Chi showed improved balance and a reduction in the number of falls in the elderly,2425 and aquatic therapy exercises for her to continue to improve her strength, gait and balance.26 I realize BJ may need some special accommodations for these activities because of her age and her blindness.

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Pledge: *I have neither given nor received unauthorized aid on this assignment.*