

Geriatric case scenario 2

Patient is an 83 year old female referred to **outpatient** physical therapy for gait training and balance intervention to reduce falls risk. Family members reported patient with multiple falls in the tub and while stepping up onto the curbs in the streets of her city. Patient experienced a left wrist fracture as a result of this most recent fall two weeks ago.

PMH: Significant for osteoporosis, old vertebral compression fractures at T-6 and T-10, thoracic kyphosis, osteopenia, COPD and HTN. Closed reduction L wrist fracture 2 weeks ago. Fitted with a weight bearing forearm cast.

Home Situation: Patient lives in a 1 bedroom apartment in a Senior Citizens building with 2 pet dogs on the 8th floor. She has 2 adult children, involved in her care, who live in nearby counties.

Observation: Patient is a former pharmacist who ambulates with a forward head posture, dorsal kyphosis and decreased trunk rotation and uses a wooden stick for balance. She fatigues after 30 feet and requires a standing rest to catch her breath. You notice that she has difficulty rising from the chair, is unsteady on her legs especially while navigating around the chairs in the waiting area. She narrowly clears a backpack in her path and catches her foot on the object before stumbling a few steps. There is little functional use of her casted left hand/wrist in a protective response to her near fall.

Patient goals: Patient wants to reduce her fear of falls and increase LE strength to enter/exit bathtub and navigate curbs without further episodes of falling. She also wants to return to walking 10 city blocks with her cane without stopping so she can enjoy the neighborhood museums and city shops.

PRELIMINARY HYPOTHESIS: (add or delete rows as needed)

Identify, from the case presented and your knowledge of motor control, motor learning, neuroscience and coursework thus far, how you THINK they should(would) present.

What impairments do you expect? Why? (state multi-system, then list the associated single system as a group and then identify why. This should link neuroscience, diagnosis and function)

Multi-System	Associated Single-System(s)	WHY?
Impaired vision	Impaired depth perception Possible impaired visual acuity Decreased contrast sensitivity during dynamic activities Impaired vision which could lead to impaired anticipatory balance	As we age, depth perception, contrast sensitivity, visual acuity, and peripheral vision are all decreased due to the normal aging process. They impact postural stability because there is less information about the surrounding environment being taken in, or inaccurate information is being taken in, impairing the ability to anticipate the changing environment. Impaired contrast sensitivity would make it difficult to see the difference between similar surfaces, such as curbs (which she reports having difficulty with). Impaired visual acuity would make it difficult to see things such as bags on the floor, making it difficult to adjust her path around those things.
Impaired somatosensation	Decreased light touch sensation Decreased proprioception which could lead to poor reactionary balance	Due to the normal impact of aging, we would expect the patient to experience a decrease in light touch and proprioception sensations, which can both lead to an increased fall risk if the impairment is great enough. Due to her history of falls without a known cause, this is a system that could be involved since it is part of the normal aging process even though the patient does not have a PMH of DM or peripheral neuropathies.
Decreased cardiovascular function	Decreased strength of diaphragm and efficiency of accessory breathing muscles	The diaphragm is a muscle and has to be worked in order to maintain it's strength and

	<p>Impaired oxygen saturation due to COPD leading to quick fatigue of muscles</p> <p>Reduced air flow, making any breathing more difficult and labored, particularly during physical activity</p>	<p>ability to function well. If she has had a fear of falling and been getting tired quickly, she likely hasn't been participating in any cardiovascular physical activity. This means the diaphragm hasn't been worked enough and is likely deconditioned, which would make physical exertion more difficult.</p> <p>COPD reduces overall perfusion, and thus less oxygen is reaching the muscles, and thus quick onset of muscular fatigue with physical activity. Breathing is also more difficult in COPD patients due their inability to get air out, thus making breathing inefficient and causing quicker fatigue.</p>
<p>Poor posture</p>	<p>Forward head (leading to weak ant cervical flexors and tight cervical extensors, upper trap and levator scap)</p> <p>Dorsal thoracic kyphosis (leading to tight pecs and weak rhomboids, traps and thoracic spinal extensors)</p>	<p>Patient has a PMH of compression fractures, and upon arrival to the clinic, we observed the patient has a forward head and thoracic kyphosis. This change in position alters the location of the patient's COM within their BOS, which alters the patient's ability to maintain their balance thus putting them at an increased risk of fall.</p>
<p>Decreased motor function</p>	<p>Decreased type 2 muscle fibers in B LE</p> <p>Decreased strength in L wrist (flexion, extension, grip strength, pronation, supination)</p> <p>Decreased AROM/PROM L wrist flex/ext, pron/sup</p> <p>Decreased AROM upper/lower trunk motions</p>	<p>Due to normal aging, we would expect the patient to have experienced a decrease in type II muscle fibers, which will impact their ability to successfully perform independent transfers as well as reactionary balance reactions.</p> <p>The patient just experienced a fracture in their L wrist 2 weeks prior, and the wrist is</p>

		<p>immobilized in a cast. While WB is allowed, the inability to activate the muscles of the wrist while immobilized would lead to decreased overall motion and strength in all of the wrist muscles.</p> <p>The pt is observed having decreased trunk rotation and due to her poor posture, it's likely that other trunk motions are limited as well. The ability to move both the upper and lower trunk through it's fully ROM actively is critical for basic ADLs, transfers, and successfully maintain your COM within your BOS.</p>
Decreased vestibular function	<p>Decreased accuracy of input from the saccule - (decreased/impaired vertical acceleration input) or utricle (decreased/impaired horizontal acceleration input)</p> <p>Decreased accuracy of input from the semicircular canals (impaired angular acceleration information)</p> <p>Potentially impaired VSR</p> <p>impaired anticipatory and reactionary balance</p>	<p>Changes in the vestibular system are common in older adults, including decreased vestibular hair cells and nerve fibers (both leading to decreased accuracy of input from saccule and utricle) and changes in VSR. If input into sensory system are decreased or altered, she won't be able to make appropriate adjustments in response to the information from the vestibular system, affecting overall postural stability.</p>
Impaired motor control	<p>Decreased activation of TrA (decreased proximal stability), or TrA not firing in correct sequence</p> <p>Inability to activate the lateral trunk effectively and in the correct sequence, impairing weight shifting and reactionary balance</p> <p>Poor ankle, hip, and stepping strategies</p>	<p>If this patient has a weak TrA (and core overall), she won't be able to achieve proximal stability. Not only does the TrA need to be able to be activated, but you also have to have the motor control so that it is the first thing activated prior to any other motions. She also may not have the motor control to activate the lateral trunk muscles effectively, which means one side shortening while the other lengthens</p>

		during activities such as weight shifting to get into the tub, stepping up on a curb, lifting up your pelvis when you're on the toilet, etc. This could make her more vulnerable to falls in these situations if she isn't able to get her COM over to the side she's shifting to. Lastly, the ability to recruit the proper strategies (ankle, hip, stepping) depending on the situation is something that takes a lot of motor control. If she isn't able to recover from even small losses of balance, falls are more likely to occur. And if she hasn't been utilizing these strategies, they won't be a natural reaction for her body.
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What activity limitations do you expect to see? Why? Based off the case, current level, outcome measure provided and time since injury, what do you anticipate will be a functional limitation and to what degree, why? (the why should link neuroscience and neuromuscular processes, disease progression/pathology NOT 'because it was in the case')

Activity Limitation	To What Degree (Level of assist)	WHY?
Taking a shower or bath (including getting into/out of tub and standing to take a shower)	Min A	The patient has reported multiple falls in the tub already and reports fear of falling while getting into/out of the tub. At this point, even though it appears the patient is performing this activity independently without supervision, she most likely needs some assistance to perform this activity safely and to avoid falls.
Sit to stand	Supervision	During my observation, I notice that she has difficulty rising from the chair. She was able to do it, and doesn't report any previous falls during a sit to stand, but she likely is not safe doing this transfer at this point without someone close by to help in case something were to happen. Particularly as of now since she has a broken arm and is likely not able to use her arm as much as usual due to decreased strength to help lift herself up

		out of the chair as a compensation for decreased LE strength.
Walking around outside	Min A	The patient specifically mentions that a goal of hers is to be able to walk around outside independently. Due to her multiple recent falls and quick fatigue, she is most likely not safe enough to do this activity without some assistance, particularly with a longer walk with more obstacles to negotiate around.
Stairs	Mod A	Due to significant LE weakness, the patient is likely not able to ascend/descend the steps without significant help. Many of her falls have occurred while stepping over curbs, which is a similar pattern to stairs, so she is likely to fall with stairs as well.

SUBJECTIVE QUESTIONS:

Based off of the case presented and your associated coursework knowledge, identify 8 questions that would be helpful in guiding your examination and assisting in ruling in/ruling out the need for screens versus examinations and selecting appropriate outcome measures. (Limit home set-up and prior activity questions to ONLY those that you need RIGHT now to do your examination and make choices)

1. Do you use any oxygen to manage your COPD? If so, how much? Only with activity or with rest and activity?
2. Are you currently experiencing any pain in your wrist?
3. What amenities are provided at the senior citizens building you live in? Are you responsible for your own cooking and cleaning? Do they have anyone that comes to check on you on a regular basis?
4. I see you have had trouble with falls in the tub and when stepping onto curbs. Have you caught yourself from nearly falling in any other situations either inside your apartment or out in the community?
5. Are you currently taking 4 or more medications on a daily basis?
6. Do you use your cane around the house, or just when you're out walking in the community?
7. Have you had an eye exam recently? Do you wear glasses or have trouble with vision, reading, seeing objects in front of you, etc.?
8. Are you ever lightheaded or dizzy with positional changes?

SCREENS: (add or delete rows as needed in the next four sections))

List the systems you will SCREEN (versus fully examine), identify what elements of the screen you will prioritize (or state "all" if the whole screen needs to be done) and why.

SYSTEM TO SCREEN	What will you screen (or write "all")	Why?
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Vestibular system	Static balance with eyes closed and standing on foam (modified CTSIB)	With just normal aging, we would expect the vestibular system to decline; however, there is nothing noted in the case that indicates that this is a primary cause of her falls. Additionally, we know that dehydration can cause vestibular issues, and dehydration can be an issue in the elderly patient. Therefore, we want to screen the system, and if the screen indicated a larger issue, then we would examine it.
Motor Function	R UE shoulder flexion/extension, shoulder abduction, elbow flexion/extension, wrist flexion/extension, grip strength	Her main complaint is LE weakness, and she has a recent fx on the L wrist, so the only area of the body we'd want to screen out is R UE just to make sure there's no significant strength deficits.
Sensation	Light touch and proprioception, specifically on the LE	There's nothing in her PMH or case to point to sensation deficits causing her balance impairment. However, sensation is often affected by the aging process, so we'd want to make sure light touch and proprioception are intact enough to not be a large contributor to her poor balance. If any deficits of significance were noted, we'd examine this further.
Vision	Visual acuity (Snellen chart) Depth perception Decreased contrast sensitivity	We'd do a basic screen to see if any major deficits are noted (which we expect based on the case and situations in which she fell). If she reports not having an eye exam recently OR if visual deficits are picked up on during the screen, we would refer her to an optometrist for an eye exam, since that isn't within our scope of practice but important in the whole picture

		of this patient maintaining her balance dynamically.
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EXAMINATIONS:

List the systems you will FULLY EXAMINE (versus screen) and identify why.

SYSTEM TO EXAMINE	What will you examine? (Or write "all")	WHY?
Motor function	<p>BLE MMT hip flex/ext, abd/add, knee flex/ext, ankle DF/PF</p> <p>Trendelenburg test</p> <p>Will assess functional closed chain LE strength through the 5x STS</p> <p>LUE MMT elbow flex/ext</p> <p>AROM/PROM for 16 trunk motions</p>	<p>One of the patient's main complaint is decreased LE strength, so we'd want to thoroughly assess this to determine if there is a specific muscle group that is weak. The trendelenburg test would be a particularly important test to assess hip ABD strength, as this is important for weight shifting, gait, stairs, and several of the activities she is having difficulty with.</p> <p>Since the pt recently fractured her L wrist and is currently immobilized, we'd want to examine the integrity of the joint above. Once the cast is removed, we'd want to thoroughly examine the strength and ROM of the wrist as well.</p> <p>Through observation, we noted that the patient has decreased trunk rotation. This would be a clue to examine all of the trunk motions (both upper and lower) to see her available motion. The ability to move the trunk effectively is important for weight shifting, transfers, etc. and if she is not able to move her trunk through a functional range, it's possible that is causing her to lose her balance.</p>
Cardiovascular	<p>Get resting vitals (HR, BP, O2 Sat, RR) and with activity (monitor before, after 6 MWT)</p> <p>Cardiovascular endurance - measured with the 6 MWT</p>	<p>One of her goals is to walk further distances, and her cardiovascular system is likely getting in the way of her achieving this goal right now. She is likely unable to achieve adequate air flow/gas exchange in her lungs due to the underlying COPD leading to decreased oxygen delivery to the muscles, which will increase her rate of fatigue. She is more likely to have falls</p>

		<p>when she is more fatigued, so we want to assess where her cardiovascular endurance is to determine if this system is a major source of her falls. Her COPD makes her particularly susceptible to poor CV performance.</p>
Posture	<p>Forward head - occiput to wall or tragus to wall measurement, strength of deep cervical flexors/middle trap/rhomboids, muscle length for pecs and cervical extensors</p> <p>Dorsal thoracic kyphosis (measure with flexicurve)</p>	<p>From our observation of the patient walking into the clinic, the patient has noticeable forward head and thoracic kyphosis. This posture adaptation has likely been accentuated by her vertebral compression fractures at T6 and T10. This posture places her at a higher risk of developing another vertebral compression fracture due to increased stress on the anterior vertebral bodies due to her flexed position. By examining this system, we can assess her risk of a future vertebral fracture by using the flexicurve and comparing to normative values on the kyphotic index.</p> <p>Additionally, we would examine this system as it places her at a greater risk for a fall in the future. Her current posture shifts her COM posteriorly making it harder to maintain her COM within her BOS, which places her at a higher risk of falling.</p> <p>We would want to examine posture in order to know more about specific muscle length and strength imbalances contributing to her poor posture so that we would know specifically where to intervene with treatment. Muscles that will likely require strengthening include deep cervical flexors, scapula retractors and depressors, and trunk extensors. Muscles that will likely require stretching include cervical extensors and pecs.</p>
Motor control	<p>Ability to activate TrA (would assess in supine)</p> <p>Ability to shorten/lengthen lateral trunk during weight shifting</p>	<p>We want to assess if she is able to activate the TrA, as its activation is necessary in creating proximal stability prior to distal mobility. If she is not activating her TrA and other stabilizing</p>

	<p>Ability to recruit proper strategies (ankle, hip, knee) - would apply small perturbations in standing to assess ankle and hip strategies, stepping strategies would be assessed during the MiniBEST</p>	<p>proximal muscles, then she will be at an increased risk of fall.</p> <p>Additionally, the patient needs to be able to weight shift, which is properly accomplished via lateral trunk activation. Specifically, in weight shift one side of the trunk must shorten (activate) while the other side lengthens. This coupling of lateral trunk activation and lengthening is imperative to achieving proper weight shift in gait, which is necessary in order to maintain one's balance in mobility. If this is not happening, then the body will attempt to compensate for the lack of proper weight shift, which places the patient at a higher risk of falling.</p> <p>Also, the ability to recruit the proper strategies (ankle, hip, stepping) depending on the situation is something that takes a lot of motor control. We'd want to see if she's able to utilize the proper strategies depending on the degree of the loss of balance.</p>
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FUNCTIONAL TASKS:

List the Functional Tasks you feel are necessary to assess at this initial examination and state a reason why.

Functional Task you will assess	WHY?
Getting in/out of tub	Patient reports previous falls in the tub. Since this is a challenging task for the patient, we would want to assess how the patient currently completes this task so that we could make changes as needed to encourage safety.
Stepping up/down on curb	The patient's family reports she has had falls while stepping up onto curbs. We would want to assess the patient's ability to successfully complete a curb as this is essential in accomplishing her goal of walking in the city with a SPC.
Gait with SPC (in a cleared/safe environment and around obstacles)	When the patient arrived to the clinic, we observed her struggle to ambulate around the bags that were in the floor of the lobby. This

	<p>patient has the goal of ambulating with her SPC around the city blocks, which will definitely have challenges of crowds, cars, and uneven surfaces. We would want to assess her ability to perform this task prior to here doing it on her own in the community. We'd also want to assess if the SPC is the best AD for her to use, or if she needs one at all, which would require us seeing her walk without the cane as well.</p>
STS	<p>Patient reports a decrease in the strength of her BLE coupled with a report of difficulty rising from a chair. We would want to observe and assess her complete this task so that we would know where to intervene with our treatment. This would allow us to better understand if the STS difficulty is due to a weight shift, body positioning, ROM or muscular strength (type II fibers for power) deficit. We could functionally assess this while she is performing the 5x STS outcome measure.</p>
Stairs	<p>One of the patient's goals is to be able to ambulate out in the community and enjoy neighborhood museums and shops. In order to achieve this goal, she will need to safely negotiate stairs, which is likely a problem for her as of now due to the need for LE strength to perform them. Watching her go up and down the stairs will give us a good idea of her functional LE strength.</p>

OUTCOME MEASURES:

List Outcome Measures you feel are **most relevant** for this patient and why and identify level of ICF. Add or remove rows as needed. (consider setting and appropriateness. What are goals? These outcome measures should guide your treatment toward goals as well as give you a means of prognosis and/or showing progress)

Outcome Measure Chosen	Why?	ICF Level
6MWT	<p>Patient reports wanting to be able to ambulate at least 10 city blocks with SPC, but patient has COPD. This OM will tax the CVP system in order to assess the patient's LE muscular and CVP endurance, which are both required to accomplish her ambulation goal. We would want to take vitals before and after 6 MWT to see how her cardiovascular system responds to physical activity.</p>	Activity

5 STS	This would be a good measure of power in the LE, which is something she is lacking and we'd want to use as a measure over time to track improvements in LE power. It's also a functional outcome measure.	Body structure/function Activity
MiniBEST	The miniBEST will assess the patient's balance (anticipatory and reactionary) and obstacle clearance in ambulation, which should be assessed as they are both necessary in order to successfully and safely walk in the city, which is part of the patient's goal. This outcome measure will give us a good idea of her static and dynamic balance.	Body structure/function Activity
Activities-Specific Balance Confidence Scale	The patient reports a fear of falling, so this questionnaire would be an easy way to assess her confidence in her own abilities, as well as to track if this confidence increases over the course of our treatment. Falling has both physical and psychological causes, and the ABC would give us some insight into the psychological side of things.	Activity

EDUCATIONAL NEEDS: add or remove rows as needed

Person Being Educated	What education is needed?	Why is this education needed?
Patient	COPD management	COPD is not something that can be "fixed", but we can help her to manage it to maximize her energy and hopefully have more energy to participate in the things she wants to. If she is currently using oxygen, we can educate on proper use (if that's needed). We can also discuss ways of conserving energy throughout the day.
Patient	floor to stand	Because she has had several falls already and also lives alone, we'd want to make sure she is able to pick herself up off the ground in case of a fall. We would want to educate on different techniques she can use, and make sure she feels comfortable doing that in case of a future fall.

		This is not a functional task she is likely commonly performing right now, which is why we didn't include it under functional tasks. Nonetheless, we want to make sure we include this in our treatment/education to ensure she is safe and has a strategy to get herself up should she find herself on the floor.
Patient	Importance of physical activity	While the patient does have a goal of returning to walking (which would provide some cardiovascular exercise), we also want to encourage her to incorporate some resistance exercises into her routine. We'd want to explain the importance of resistance exercises in maintaining/improve bone mass. Since she has osteopenia and has already experienced a fracture, a fall is more likely to result in a fracture if she doesn't do something to increase bone mass. Also, we'd want to explain the importance of cardiovascular training with her diagnosis of COPD, and how that can help to decrease some of the negative effects of COPD on her life.

WHAT IS THE ROLE OF PT FOR THIS PATIENT? (clearly identify if this is a one time visit, suggest a timeframe for visits for the episode of care, is this for restorative, compensations, family training, equipment prescription, a combination (explain).

ROLE OF PT	Explain your plan related to the topic (if not part of plan put "not needed")	What resources will you or the patient need to accomplish this?
# of visits	12 (2x/week)	We would want to see if she is able to drive, and if not, make sure she has family members that are able to bring her. If

		that's not an option, we'd want to help her look into a transportation service to help her get to us.
Equipment	We might want to get her an actual cane (if she does need the cane to help with her balance), or another AD if the SPC isn't the best choice	Insurance to help cover cost of AD (if she would benefit in a new AD)
Community Resources	As stated earlier in our plan, if our patient presents with serious vision deficits or hasn't had an eye exam recently, we'd want to refer her to that. Also, if we notice her O2 sats drop significantly with physical activity, we might want to encourage her to see her PCP.	Optometrist
Home exercise program	Her HEP would be based upon the impairments identified during our examination, but strengthening of LE, core, cervical retractors, and traps would be important along with stretching of pecs. We'd want to exercises to be as functional as possible.	Exercises might include: <ul style="list-style-type: none"> - Bridging - Rows with TB - doorway stretch for pecs - mini squats holding onto a counter
Other:		