Postural Control

Includes controlling the body's position in space for the dual purposes of stability and orientation

- **Postural orientation** -The ability to maintain an appropriate relationship between body segments, as well as, between the body and the environment for the task.

- **Postural Stability** - ability to control the center of mass (COM) in relationship to the base of support (BOS)

Balance

Balance is the ability to keep one's center of gravity over one's base of support in any given sensory conditions

Postural control and balance are often used interchangeably

Balance emerges from the interaction of the individual, the postural task and the environment

What the individual contribute to postural control

Visual, vestibular, and somatosensory are the primary sensory neural components contributing to balance/postural control

Individual sensory neural components

Visual – provides information about the environment

Somatosensory: sensory receptors in joints, muscle, and skin to provide perceptions of movement and position in space

Vestibular – provides information on angular & linear acceleration as well as position in space

Vision

Comprised of focal and ambient vision

- Focal- specializes in object motion perception and object recognition

- Ambient -associated with the maintenance of spatial orientation and visual functions that depend on peripheral, preconscious visual inputs

Decreased visual acuity, contrast sensitivity and depth perception are all associated with increase risk for falls

Somatosensory

Information gathered from receptors located in muscles, joints and skin

Provides information regarding body segment movement in space and force generation

Vestibular

Both sensory system and motor system therefore can impact many different components of postural control

Provides information about head motion, head position, and the direction of gravity that the central nervous system needs for postural control

Affects motor control through two outputs, the vestibular ocular reflex (VOR) and the vestibular spinal reflex (VSR)

- VOR – stabilizing visual images during head movement

- VSR – stabilize the body

Sensory Integration and Motor Outputs

Sensory signals are integrated in the CNS and result in descending motor commands to muscle

Reactive and proactive and postural responses allow for adjustments to postural control(balance) in the presence of a changing environment or tasks

Falls/Balance Screening vs. Assessment

Screening	Assessment
Identifies persons at risk for falling or with balance impairment	In-depth, multifactorial measure(s)
Helps guide clinicians in determining who should receive a multifactorial assessment	Examines potential cause of falls
	Provides sufficient detail so as to guide interventions

Falls/Balance Screening

STEADI Stay Independent	John Hopkins Fall Risk Assessment Tool	Fall Risk Assessment and Screening Tool (FRAST)
Quick 12 question survey	developed to facilitate early detection of risk for anticipated physiologic falls in adult inpatients	Created by physical therapists for use in primary care offices
Good sensitivity discriminating fallers and predicting future falls in community dwelling adults	JHFRAT is reliable, with high sensitivity and negative predictive validity	Compiled from previously validated falls screening and assessment measures
		Uses the Timed Up and Go as the assessment

psychometric properties

Reliability	The ability of a test to produce consistent results from one test to the next
Validity	The degree to which an instrument (test/assessment) measures what we intend to measure
Ceiling Effect	A significant percent of a certain group/population scores at the**highest end** of the test, therefore differentiating between these individuals or truly assessing them is not possible with this measure.
Floor Effect	A significant percent of a certain group/population scores at the**lowest end** of the test, therefore differentiating between these individuals or truly assessing them is not possible with this measure.
Minimal Detectable Change (MDC)	The minimum amount of change in a patient's score that ensures the change isn't the result of measurement error
Minimally Clinically Important Difference (MCID)	Represents the smallest amount of change in an outcome that might be considered important by the patient or clinician.

Balance Assessments	
Timed Up and Go (TUG) – Manual and Cognitive	A component of the STEADI falls assessment; Provides insight on balance, strength/power, walking ability, and fall risk; **Individuals are given verbal instructions to stand up from a chair, walk 3 meters as quickly and safely as possible, cross a line marked on the floor, turn around, walk back, and sit down**
30-Second Chair Stand Test	Administered using a chair without arms, with seat height of 17 inches (43.2 cm). The chair may be placed against a wall to prevent it from moving.
4-Stage Balance Test	If the patient can hold a position for 10 seconds without moving their feet or needing support, go on to the next position. If not, STOP the test.
10 Meter walk Test	Two trials are administered at the patient's comfortable walking speed, followed by 2 trials at his/her fast walking speed. The 2 trials, for each speed, are averaged and the 2 gait speeds are documented in meters/second.
Modified Clinical test of Sensory Interaction in Balance (CTSIB-M)	Provides the clinician with a means to quantify postural control under various sensory conditions. Designed to assess if available sensory systems are being used effectively for balance