Movement strategies

Used to return the body to equilibrium

Ankle strategy

The body moves at the ankle as a flexible inverted pendulum: the fulcrum is the ankle, and the head is the opposite end of the pendulum. Activation of leg muscles from distal to proximal.

Appropriate for small amounts of sway, slow disturbance speed and uses the length of the foot as a lever to correct minor losses of balance.

Hip strategy

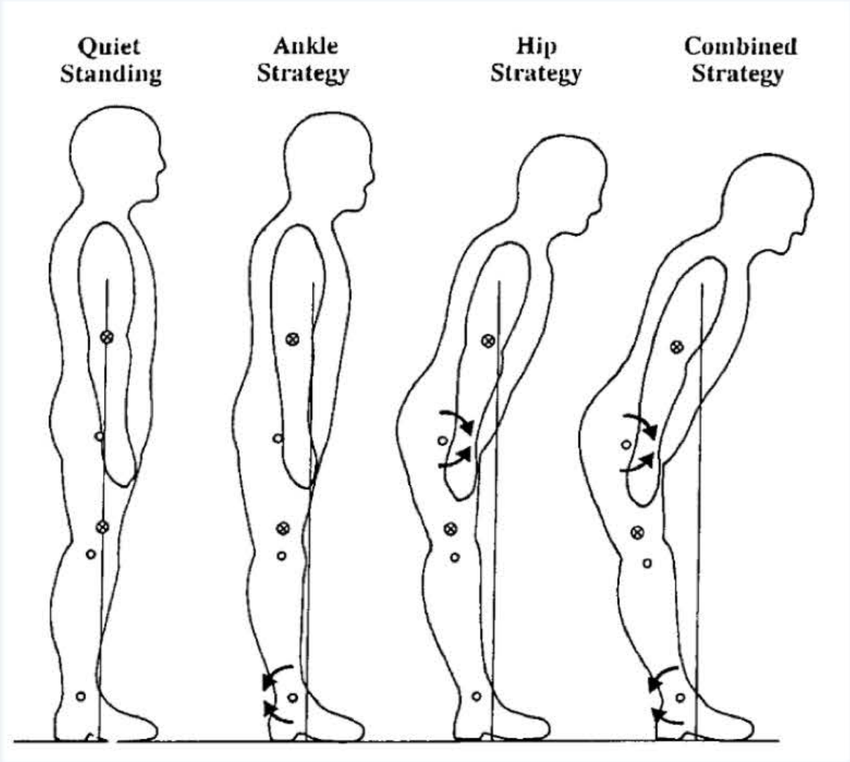
The body exerts torques at the hips to quickly move the body center of mass. Activation of muscles from proximal to distal.

Used during larger losses of balance and fast disturbance speed or when the support surface does not allow the use of the ankle, such as when person stands on a compliant or narrow surface.

Stepping strategy

To prevent a fall requires increasing base of support with a quick and fast step to slow down the momentum of the body's center of mass.

Control can occur:
1. Voluntary: proactive in advance of a predictable disturbance (I.e. self initiated step in a cluttered environment)
2. Reactive: reflexive recovering balance after a trip.



WHAT DOES THE RESEARCH SAY?

Older adults:
- Initiate stepping around lower levels of balance instability.
- Lack strength in hip abductors, hip flexors and knee extensors for effective stepping .
- Take multiple steps to recover balance especially for lateralperturbations. (Millie, 2013)
- Initiate step with the passively unloaded limb and have an increase in collisions of the stepping and stance legs. .
- Initiate arm movements and reach for objects or startle response. (Maki 2006)
- With diabetic neuropathies exhibit reduced ability of the ankle strategy to resist posturalsway. (Vongsirinavarat,2020)

Stepping tests

MAXIMAL STEP LENGTH TEST: the ability to maximally step and return to the initial position

RAPID STEP TEST: the time taken to step out maximally and return in multiple directions as fast as possible.

FOUR SQUARE STEP TEST: rapidly step forwards, backwards and sideways over obstacles in a specified sequence.

TRAINING

A systematic review and meta-analysis has demonstrated that step training can prevent falls by approximately 50% in older adults.(Lord, 2017)