

Stated or Observed User Problem	Root Problem	Problem Statement	Metrics
Problem Category 1: Use			
People don't use brakes (rollator)	Forget to engage brakes, larger distance to grip	Design a product that automatically engage resistance when moving uncontrollably	% of time brakes are engaged
People don't like walking close to walker	Tend to move walker and walk at the same time	Design a product that promotes fluid and stable walking patterns	Effort required to operate device, correctness of walking pattern. RULA assessment.
Stand lifts take a lot of shoulder strength	Stand lifts only provide the means to stand from a sitting position, and do not physically assist the patient	Design a product that provides stable, easy movement from a sitting position to a standing one.	Force (on handles and under feet) required to go from sitting position to standing.
Sometimes takes two people to roll someone over to change Depends, etc.	Patients can weigh from 100-300 lbs. Therapists/nurses need to lean over table to move patients	Design a product that makes rotary motion of stationary patients that only require	Force required to operate device (physician).
People don't lock wheelchairs/rollators before getting up/sitting down	Forget or don't feel the need to engage brakes	Design a product that will ensure the brakes are engaged when needed.	% of time brakes are engaged when device is not in use
Walkers with all pegs difficult to use	Friction between the pegs and the ground: patients required to lift walker in order to move forward.	Design a product that provides a study walking experience for patients that requires little upper body strength.	Force required to operate device (upper body)
Walker is not portable and prevents other actions once user is seated	Structured materials prevent easy break-down and movement	Design a product that will break down in an easy-to-carry and convenient size	Volume of device when broken down
Gait belt design can be dangerous	One strap can dig into patient or caregiver if fall is abrupt	Design a product used to support standing patients that can be carried by a nurse at all times and will not hurt the patient if they fall suddenly.	Easy to carry, possible injury criteria
Problem Category 2: Ease of Motion			
Walkers too light weight	Lightweight material leads to walker being shaky sometimes	Design a product that is lightweight enough to move around when walking and heavy enough that it will remain steady if shaken.	Force to lift, force to cause product to shake
Tennis balls better than none (walker)	Allow smoother movement compared to the pegs	Design a product that provides a smooth walking experience for patients without having too much or too little friction.	Force required to operate device, coefficient of friction on many surfaces.
Walkers with wheels are better than pegs	Allow smoother movement, promotes better use as they cannot apply full weight on wheeled walker	Design a product that is easy to move while enforcing good user ergonomics	User posture and speed of unassisted movement
Problem Category 3: Independence			
Devices are there to help people move on their own, but some people rely on them too much	Patients become accustomed to their aid device.	Design a product that allows patients to move more easily but still requires some effort to operate.	Effort required to operate device, correctness of walking pattern.
Patients furniture walk - want to be independent, but devices can be clunky	Devices are too large and take too much time to set up for samill walks	Design a product that assists the elder in walker and is compact enough to be used within the users home or apartment.	Overall dimensions: HxWxL,
Problem Category 4: Stability			
Can't stand without walker (mental crutch)	Mentally afraid of falling causes the user to become unsteady when standing	Design a product that give users the feeling of stability when walker is not physically in front of them.	Time user can stand without walker,
Parallel Bars require a lot of body strength	How users relearn how to walk	Design a product that reteaches patients to walk without large applied forces	Weight/force on product needed to operate
Must pay close attention to vitals when moving (sitting up after laying down for long time)	If stationary for long time, blood pressure and other vitals would've changed	Design a product that transitions the users position without impacting vitals	Measure change in vitals during transition (HR, BP, etc.)
Patients lose balance when standing	Laying down for long periods of time limits balance (vertigo when standing)	Design a product to offer more stability to patients when standing that can be quickly put away when not needed.	Force able to withstand, ease of stowing.
Problem Category 5: Use and Ease of Motion			
Use pillow case on slide board to help them get out of bed	Slide board on its own has too much friction	Design a product that can slide effectively without the need of user modifications.	Coefficient of friction, force required by physician.
Rollators less safe	Four wheels are faster, likely to move without intention	Design a product that provides a wide range of motion that is easy to control.	Degrees of freedom, ease of traversing different terrains (floor materials, uphill/downhill, etc.)
Walker not portable with wheelchair	No place on wheelchair to store walker. Users must hold onto walker	Design a product that can securely attach a walker to a wheelchair while wheelchair is in use and then easily release walker when wheelchair is not in use.	Force to remove walker, does it impact wheelchair usability
Rollators hard to stop downhill	No way to limit how fast wheels spin if users are unable to activate breaks. Users try to hold it back with little strength	Design a product that when engaged slows the rotation of the wheels on the rollator.	Movement of rollator downhill before and after device is engaged
Problem Category 6: Ease of Motion and Stability			

One-handed hemi-walker for stroke patients	Only provides stability on one side of the patient's body	Design a product that can be operated using one hand that provides a stable walking experience for both sides of the patient.	Force different between right and left side of body. Efficiency of movement (speed, ease) across distance unassisted
Quad cane for more stability	Cane has four points of contact instead of 1	Design a product that provides extra balance assistance for the user	Force distribution at different angles of input force
Platform walkers better than hemi-walkers - stability on both sides	Used for stroke patients that have limited use of one side of their body with balance on both sides	Design a product that can be used by patients with mobility/strength on one side of their body	Distance covered unassisted
Problem Category 7: Use and Independence			
Some people scoot with feet in wheelchairs	Users not strong enough to walk but capable of using/maneuvering with feet	Design a product that allows movement for patients with limited strength/mobility in their legs.	Measure time for patient to move across room with different devices
Problem Category 8: Use, Ease of Motion, Stability, Independence			
Patients have anxiety when using products	Weak product structure creates shaking and creaking that makes user insecure	Design a stable product that doesn't shake or squeak during use.	Measure the amount of noise produced by the product during use
Certain products can't be used due to legal issues	Device might help user but if it hinders ability to move it is "restraining"	Design a product that is easy to stop using when the user desires	Determine if patient is restricted by device or struggles to escape