

Thigh Walker: Assistive Mobility Device for Pediatric Patients with Lower Limb Injuries

Madison White, Nicholas Fioravanti, Lillian Cardonne, Kianna Ly, Dr. Pramath Nath¹, Dr. Adrian Shieh²

¹Saint Christopher's Hospital, ²School of Biomedical Engineering, Science, and Health Systems

Need

- Children < 7 y/o are unable to use crutches
- >24,000 lower leg injuries annually (5-7 y/o)
- Parents required to carry around the child with non-weight bearing injury

Design Inputs

Constraints

Device Weight



< 6.58 lbs

Dimensions



61.7 x 44.2 x
23.6 cm

Knee Angle



< 15°

Requirements

Friction



$\mu \geq 0.202$

Stair Ability



17.8 x
27.9 cm

Adjustability



11.7 cm

Load



> 515.47 N

Solution

Design



Key Features



Stainless
Steel Support

Build



Bending
Base

Intended Use



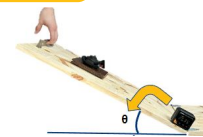
Adjustable
Clamp

Verification Testing

VT1: Friction Testing

Test if base slips on
common floor types

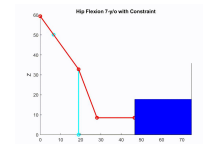
PASS:
 $\mu > 0.202$



VT2: Stair Climbing

Create model to test
device can ascend
stairs

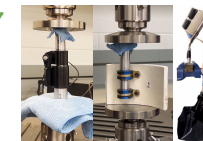
FAIL:
cannot climb w/
knee attachment



VT3: Load Bearing

Test if device
components
can withstand
patient load

Adjustable Clamp
Pass: $\mu > 515.47$
Loop Clamp
Fail: $\mu < 419.65$
Main Bend
Pass: $\mu > 515.47$



Future

Revisions

- Lighter metal
- Additional loop clamps
- Alter knee adjustability

Impact

- Returns independence to patients
- Reduces caretaker burden