

Step by Step: A Comprehensive Approach to Stair Climbing Assistance

Date: 2/29/2024

Client: Dan Kutshera

Advisor: Dr. Russ Johnson

Team:

Margo Amatuzio

Gracie Kreissler

Delani Wille

Cameron Owens

Riley Toth

Problem statement

In the field of neuro-rehabilitation, physical therapists encounter a significant obstacle when assisting patients with weight-bearing restrictions to transition back to their homes. The primary challenge revolves around negotiating steps, which often proves to be an arduous task due to various constraints. Ramps, typically considered a solution, are frequently deemed impractical due to cost implications and compliance with rise-to-run criteria. As an alternative, patients are advised to use garden benches from hardware stores, which lack adjustability and medical design. This makeshift solution is frustrating for healthcare providers, as it is not purpose-built and poses issues with bench availability.

To address this gap in the next three months, there is a clear need for a specialized, medically designed bench tailored for step use, offering safety and adjustability to improve the mobility and independence of patients in neuro-rehabilitation.

Brief status update

This week, Riley met with ARROW and got approval for the information in the documents. The team is going to meet to review the documents and prepare them for submission. Another goal is to get the prototyping done for the design. Gracie is moving forward with communicating about manufacturing two different bases, and designing a mechanism to attach the bases to the support column. We hope to have that in the upcoming weeks to test its functionality, modify the design accordingly, and manufacture a final design.

Difficulties / advice requests

Current design

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Date	Total
CORNER BRACE	BRACE, CORNER_2"_GAL V_4PK	Everbilt	030699152674	Home Depot	02/04/24	\$6.97
BRACE, CORNER_5"_ZIN C	BRACE, CORNER_5"_ZINC	Everbilt	030699152124	Home Depot	02/04/24	\$5.94
CLEVIS PIN	TOWSMART 3/8" CLEVIS PIN	TowSmart	849278012038	Home Depot	02/04/24	\$5.38
SQ TB1.25	PUNCHED SQ TUBE ZP 1-1/4X36	Everbilt	887480030471	Home Depot	02/04/24	\$22.93
SQUARE TUBE	TUBE SQUARE ALUM 48X1X1/16	Everbilt	887480013078	Home Depot	02/04/24	\$28.47
8 IN SHIMS	8" COMPOSITE SHIM (12 PC BDL)	Timberwolf	852981002098	Home Depot	02/04/24	\$2.28
						\$71.970

Major team goals for the next week

1. SUBMIT ARROW

Next week's individual goals

- Riley Toth
 - Review ARROW document to ensure correctness
 - Write an email to be sent to participants
 - Write questionnaire
- Delani Wille
 - Assist in writing questionnaire
 - Submit Innovation disclosure
- Gracie Kreissler
 - Assist with writing questionnaire
 - Machine new L brackets for adjustable base
- Margo Amatuzio
 - Assist in writing questionnaire
 - Review ARROW documents with the team for submission
- Cam Owens
 - Finish or help with any remaining work on the prototype
 - Help group members with other tasks

Timeline

Task	Jan	Feb				March					April				May	
	26	2	9	16	23	1	8	15	22	29	5	12	19	26	3	10
Project R&D																
Empathize	x	x	x													
Background...																
Prototyping																
Testings																
Deliverables																
Progress Reports	x	x	x	x	x											
Prelim presentation			x													
Final Poster																
Meetings																
Client	x															
Advisor	x	x	x	x												
Website																
Update																

Filled boxes = projected timeline
 X = task was worked on or completed

Previous week's goals and accomplishments

- Riley Toth
 - Met with arrow to confirm the consent form
 - Put finishing touches on the protocol form for ARROW
 - Finished my portion of the preliminary report and reviewed others to make sure it coincided with ARROW documentation
- Delani Wille
 - Finished my portion of preliminary report - Background and objectives
 - Researched GRF of walking and stair climbing
- Gracie Kreissler
 - Finished writing my portion of the preliminary report
 - Researched statistical analysis of testing data
- Margo Amatuzio
 - Finished my portion of the preliminary report – Appendix and BME400 review
 - Research questionnaire framework and wrote draft
- Cameron Owens
 - I finished my portion of the preliminary report that included doing some research to add to the report, as well as working on notebook entries.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Riley Toth	2/26/2024 2/27/2024 2/28/2024	Arrow Meeting Arrow forms Preliminary report	0.5 1 1	2.5	14
Delani Wille	2/28/2024 2/27/2024	Preliminary Report Gait Research	2 2	4	15
Gracie Kreissler	2/28/2024 2/27/2024	Preliminary Report Statistics research	2 2	4	15
Margo Amatuzio	2/29/2024	Preliminary Report/Research	3	3	11.5
Cameron Owens	2/20/2024 2/21/2024	Preliminary Report Notebook Research	2 1 1.5	4.5	16