Functional Model for Reduction of Pediatric Radial Head Subluxation

Team Website Link

Date: September 11th, 2025 - September 17th, 2025

Client: Dr. Carey Wagoner - cwagoner@wisc.edu

Advisor: Dr. Melissa Skala

Team Members:

Siya Agarwal - sagarwal98@wisc.edu (Co-Team Leader)

Maddie Kaltman - mkaltman@wisc.edu (Co-Team Leader and BSAC)

Jacqueline Sceats - jsceats@wisc.edu (Communicator)

Addison Dowe - agdowe@wisc.edu (Co-BWIG)

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Dante Tripathi - vtripathi3@wisc.edu (BPAG)

Problem statement

Radial head subluxation, commonly known as nursemaid’s elbow, is a frequent pediatric injury predominantly in children ages 1-3 that requires proper manipulation of the elbow and forearm for successful reduction. Orthopedists must learn the two techniques for reducing nursemaid’s elbow: hyperpronation and supination-flexion. Maneuvers such as these require appropriate positioning, rotation, and force to return the radial head to its normal position. However, opportunities to practice these methods are limited, which creates a need for a reusable pediatric elbow simulation model. The model should replicate the correct demographic anatomy, appropriate elbow biomechanics, and feedback such as a “click” for medical professionals to safely and accurately practice the skills needed for reducing nursemaid's elbow.

Brief status update

The team is continuing research to better define and understand the problem now that the client requirements are clear. A meeting with the client, Dr. Carey Wagoner, took place with the goal to complete the product design specifications (PDS) to better understand the project. With the completion of the PDS, the team is starting to consider some design ideas and narrowing down which could make it to the top three considerations.

Difficulties / advice requests

There are no difficulties at this time.

Current design

There is no current design at this time.

Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									$0.00	
									$0.00	

Category 2										
									$0.00	
									$0.00	
								TOTAL:	**$0.00**	

Major team goals for the next week

1. Discuss design ideas and make a design matrix
2. Set a meeting with Dr. Wagoner to discuss design ideas and if they meet expectations
3. Talk with Dr. Skala about potential designs
4. Continue research to better understand designs

Next week's individual goals

- Siya Agarwal
    - Brainstorm and turn it into rough schematics on possible designs for the project
    - Dive further into research on competing models and radial head component
    - Work on Design Matrix
- Maddie Kaltman
    - Continue research
        - Look into competing designs and potential materials
    - Come up with and draw potential designs
    - Work with group to create design matrix
- Jacqueline Sceats
    - Brainstorm potential design ideas and further research what materials could be used for each part of the arm model
    - Work on determining criteria for design matrix
- Addison Dowe
    - Continue researching competing models and materials for the model
    - Start to brainstorm designs for the project
- Jason Yang
    - Continue research
        - Research the existing product
        - Compare and think about improvements we can make
        - Researching how the ligament should be made and finding ways to make skin like a silicone rubber arm.
- Dante Tripathi
    - Continue researching the different areas about the injury and continue brainstorming some possible ways we could create functional models

Timeline

Task	September				October					November				December	
	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12
Project R&D															
Empathize	X	X													
Background…															
Prototyping															
Testings															
Deliverables															
Progress Reports	X	X													
Prelim presentation															
Final Poster															
Meetings															
Client															
Advisor	X	X													
Website															
Update	X	X													

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

Previous week's goals and accomplishments

- This is our first week, so there were no previous goals or accomplishments

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Siya Agarwal	9/11 - 9/17	- Researched competing designs for radial head subluxation technique practice models - Brainstormed some designs - Worked on PDS and uploaded examples, as well as assigned roles	-1 hour - 0.5 hour - 2.5 hours	4 hours	6.5 hours

		to team			
Maddie Kaltman	9/11 - 9/17	- Researched applicable standards and specifications for the PDS - Worked on various parts of the PDS	- 2 hours	5 hours	5 hours
Jacqueline Sceats	9/11 - 9/17	- Researched safety and accuracy considerations of the model - Worked on PDS	- 1.5 hours - 1 hours	2.5	4.5 hours
Addison Dowe	9/11 - 9/17	- Researched competing designs and average growth charts for toddler arms - Worked on the PDS	- 1.5 - 1	2.5	4.5
Dante Tripathi	9/11 - 9/17	- Researching - Worked on PDS	1 for each	2	4
Jason Yang	9/11 - 9/17	- Researched materials, shelf life, and service life - Researched possible materials for the skin, bones, ligaments, and joints - Finished the assigned PDS	3 Hr 1.5 Hr	4.5 Hr	6