

# Functional Model for Reduction of Pediatric Radial Head Subluxation

[Team Website Link](#)

Date: September 24th, 2025 - September 24th, 2025

Client: Dr. Carey Wagoner - [cwagoner@wisc.edu](mailto:cwagoner@wisc.edu)

Advisor: Dr. Melissa Skala

Team Members:

Siya Agarwal - [sagarwal98@wisc.edu](mailto:sagarwal98@wisc.edu) (Co-Team Leader)

Maddie Kaltman - [mkaltman@wisc.edu](mailto:mkaltman@wisc.edu) (Co-Team Leader and BSAC)

Jacqueline Sceats - [jsceats@wisc.edu](mailto:jsceats@wisc.edu) (Communicator)

Addison Dowe - [agdowe@wisc.edu](mailto:agdowe@wisc.edu) (Co-BWIG)

Jason Yang - [snyang4@wisc.edu](mailto:snyang4@wisc.edu) (Co-BWIG)

Dante Tripathi - [vttripathi3@wisc.edu](mailto:vttripathi3@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 anatomical demographics, appropriate elbow biomechanics, and provide feedback, such as a "click," to help medical professionals safely and accurately practice the skills needed to reduce nursemaid's elbow.

## Brief status update

The team brainstormed some designs for the project and organized a design matrix for the top three ideas. The team will continue researching to improve the design mechanisms for the preliminary designs. A meeting will be scheduled with the client, Dr. Carey Wagoner, to discuss preliminary designs and presentations. With the design matrix complete, the team is beginning to consider steps to begin fabricating and ordering materials.

## Difficulties / advice requests

There are no difficulties at this time.

## Current design

There is no current design at this time.

## Materials and expenses

[illegible]

| Category 2 |  |  |  |  |  |  |               |               |  |
|------------|--|--|--|--|--|--|---------------|---------------|--|
|            |  |  |  |  |  |  |               | \$0.00        |  |
|            |  |  |  |  |  |  |               | \$0.00        |  |
|            |  |  |  |  |  |  | <b>TOTAL:</b> | <b>\$0.00</b> |  |

## Major team goals for the next week

1. Start working on Preliminary Presentation
2. Set a meeting with Dr. Wagoner to finalize design ideas and if they meet expectations
3. Talk with Dr. Skala about design matrix
4. Continue research to better understand designs and mechanisms

## Next week's individual goals

- Siya Agarwal
  - Work on Preliminary Presentation
  - Dive further into research on detent mechanism and angular ligament
  - Start looking into materials to order for fabrication
- Maddie Kaltman
  - Work on Preliminary Presentation
  - Continue researching mechanisms and materials for design
  - Work on preliminary designs and start to shape final design
- Jacqueline Sceats
  - Work on the Preliminary Presentation
  - Research materials and fabrication methods for design
  - Continue researching mechanism for joint
- Addison Dowe
  - Prepare for the preliminary design presentation
  - Continue working on the preliminary designs
  - Research potential materials and mechanisms
- Jason Yang
  - Continue research
    - Research the existing product
    - Researching how to make a reliable ligament.
    - Continue working on the preliminary designs
- Dante Tripathi
  - Continue research for possible mechanisms that could be used
  - Continue working on preliminary design
  - Look into possible ways to fabricate and what might need to be bought

## Timeline

| Task                   | September |    |    |    | October |    |    |    |    | November |    |    |    | December |    |
|------------------------|-----------|----|----|----|---------|----|----|----|----|----------|----|----|----|----------|----|
|                        | 5         | 12 | 19 | 26 | 3       | 10 | 17 | 24 | 31 | 7        | 14 | 21 | 28 | 5        | 12 |
| <b>Project R&amp;D</b> |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Empathize              | X         | X  | X  |    |         |    |    |    |    |          |    |    |    |          |    |
| Background...          |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Prototyping            |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Testings               |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| <b>Deliverables</b>    |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Progress Reports       | X         | X  | X  |    |         |    |    |    |    |          |    |    |    |          |    |
| Prelim presentation    |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Final Poster           |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| <b>Meetings</b>        |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Client                 |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Advisor                | X         | X  | X  |    |         |    |    |    |    |          |    |    |    |          |    |
| <b>Website</b>         |           |    |    |    |         |    |    |    |    |          |    |    |    |          |    |
| Update                 | X         | X  | X  |    |         |    |    |    |    |          |    |    |    |          |    |

Filled boxes = projected timeline

X = task was worked on or completed

## Previous week's goals and accomplishments

- Determined the three best design ideas and created a design matrix to select the primary design.

## Activities

| Name         | Date        | Activity                                                                                                                                                                                                                                    | Time (h)                                                                                                        | Week Total (h) | Sem. Total (h) |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------|----------------|
| Siya Agarwal | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>Researched detent mechanisms for radial head subluxation technique practice models</li> <li>Brainstormed detent design</li> <li>Went to team meeting</li> <li>Worked on design matrix and</li> </ul> | <ul style="list-style-type: none"> <li>- 1 hour</li> <li>- 1.5 hour</li> <li>- 1 hour</li> <li>- 1.5</li> </ul> | 5 hours        | 11.5 hours     |

|                   |             | uploaded examples, as well as assigned roles to team                                                                                                                                                                                                            | hour                                                                                                 |         |         |
|-------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------|---------|
| Maddie Kaltman    | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>- Brainstormed and fleshed out elastic band design/partial encapsulation design, shared with group</li> <li>- Researched elbow ligament anatomy to better inform mechanism</li> <li>- Worked on design matrix</li> </ul> | <ul style="list-style-type: none"> <li>- 2 hours</li> <li>- 1 hour</li> <li>- 1 hour</li> </ul>      | 4 hours | 9 hours |
| Jacqueline Sceats | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>- Researched potential materials, ideas for joint mechanism, and discussed ideas at team meeting</li> <li>- Worked on design matrix</li> </ul>                                                                           | <ul style="list-style-type: none"> <li>- 2.5 hours</li> <li>- 1 hours</li> </ul>                     | 3.5     | 8 hours |
| Addison Dowe      | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>- Researched competing designs</li> <li>- Worked on preliminary designs</li> <li>- Went to team meeting</li> <li>- Worked on design matrix</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>- 0.5</li> <li>- 1</li> <li>- 1</li> <li>- 1</li> </ul>       | 3.5     | 8 hours |
| Dante Tripathi    | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>- Researching</li> <li>- Worked on preliminary design</li> <li>- Went to team meeting</li> <li>- Worked on design matrix</li> </ul>                                                                                      | <ul style="list-style-type: none"> <li>-1 hr</li> <li>-1 hr</li> <li>-1 hr</li> <li>-1 hr</li> </ul> | 4 hr    | 8 hours |
| Jason Yang        | 9/18 - 9/24 | <ul style="list-style-type: none"> <li>- Researched possible materials for ligaments</li> <li>- Working on the preliminary designs</li> <li>- Working on design matrix</li> </ul>                                                                               | <ul style="list-style-type: none"> <li>2 Hr</li> <li>1.5 Hr</li> <li>0.5 Hr</li> </ul>               | 4 Hr    | 10 Hr   |