

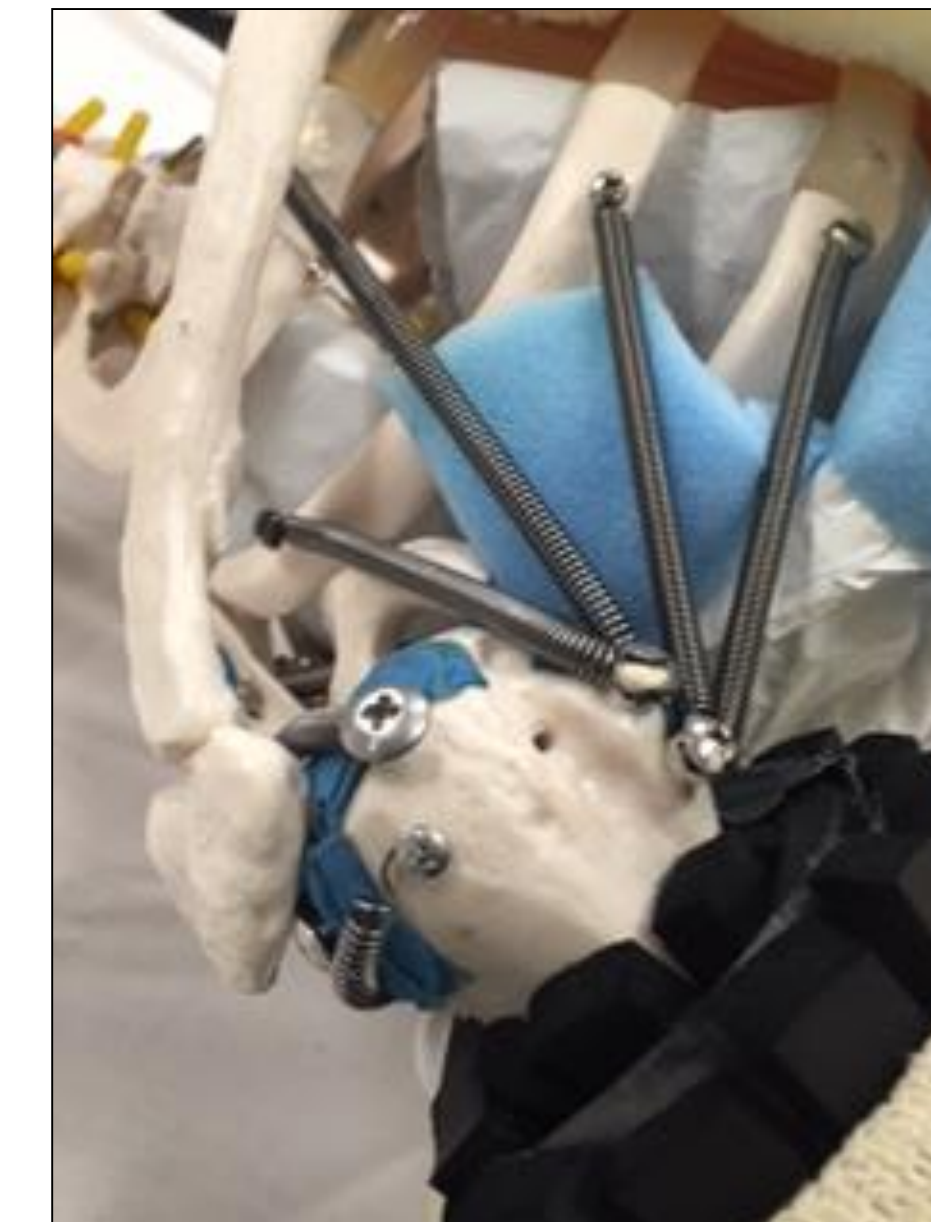
RATIONALE/NEED

- Eight to thirteen percent of all athletic injuries involve the shoulder.
- Dislocations of the shoulder also account for 50% of all large joint dislocations.
- There are no task trainers available on which medical students and clinicians can practice shoulder reductions before performing the procedure on an actual patient.
- This shoulder reduction task trainer can be used to teach relocation techniques in a safe, simulation-based environment.

METHODS/DESCRIPTION

- A commercial whole body skeleton provides the basic structure for the trainer.
- The right humerus was disconnected and reattached using springs to replicate tension caused by ligaments, tendons, and muscles surrounding the shoulder joint. Angles of tension were adjusted to best match the anatomical arrangement of these structures.
- Eight separate steel extension springs with a large spring constant were attached to various components of the shoulder girdle using screws.
- A labrum was designed in SolidWorks and 3D printed to mimic the natural glenoid articular anatomy.
- Soft tissue tactile structure of the arm and chest wall was provided using foam padding and bandage material.
- A wetsuit was used to envelop the body of the skeleton, to mimic the continuity of soft tissues.
- The structures were weighted to approximate the real weight of the anatomic part.

PHOTOGRAPHS



Date: _____ Participant ID: _____

Profession: _____

Years of Experience: _____

You are being asked to review the design of the shoulder dislocation simulator. Please rate the device from 1 (Poor) to 5 (Excellent).

	Poor	Average	Excellent		
1. Ease of use for yourself	1	2	3	4	5
2. Predicted ease of use for students	1	2	3	4	5
3. Realistic amount of force used	1	2	3	4	5
4. Realistic range of motion required	1	2	3	4	5
5. Likelihood posterior relocation simulation	1	2	3	4	5
6. Likelihood anterior relocation simulation	1	2	3	4	5
7. Durability of the simulator	1	2	3	4	5

8. Did you have any challenges using the device?

9. What changes or improvements would you make to the device?

10. Do you think this device would be helpful for training students?

11. Do you have any additional comments or concerns?

EVALUATION PLAN

- Study has been approved by the IRB.
- Emergency physicians having successfully performed actual shoulder reductions will perform shoulder reductions on the task trainer.
- A Likert scale based survey will be completed by participants to assess simulator realism, general applicability, and overall acceptability of the task trainer as a training tool.
- Participants will compare simulated tactile anatomy, range of motion, haptics, and amount of force necessary to perform a reduction on the task trainer compared to an actual patient.
- Data will be compiled and reported.

IMPACT/LESSONS LEARNED

- The development of a shoulder reduction task trainer may provide trainees with an effective model that can be used to teach and practice shoulder reduction techniques in a safe environment.
- Validation of the task trainer will occur through data provided from surveys.

ACKNOWLEDGEMENTS

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- 3D printing was provided by the College of Engineering and Technology.
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