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Multi-modal, Assistive, and Augmentive Neurological Based Therapy and Rehabilitation Device


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MULTI-MODAL, ASSISTIVE, AND AUGMENTIVE NEUROLOGICAL BASED THERAPY AND REHABILITATION DEVICE



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Introduction

Rotator Cuff

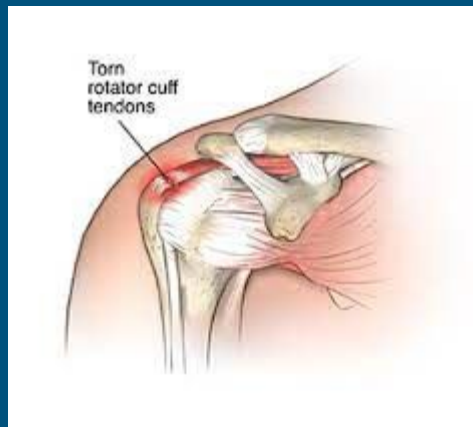
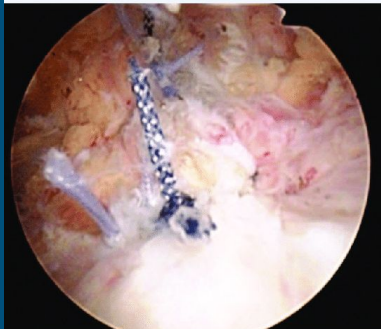
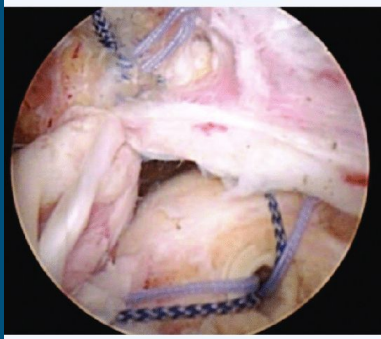
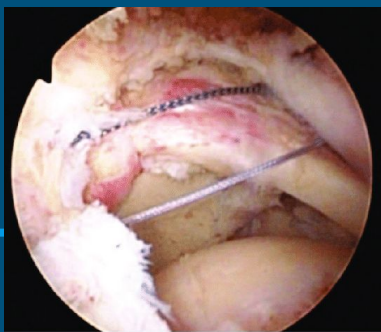
- a tear in the tissues of the group of muscles that connect muscles to bones surrounding the shoulder and socket joint
- Common in adults 30 years of age and older
- Caused by abrupt injury, or slow deterioration
- Intense pulling and burning sensation

Stroke

- a blocked artery (ischemic stroke) or leaking or bursting of a blood vessel (hemorrhagic stroke).
- Every 40 seconds, someone in the United States has a stroke. Every 3.5 minutes, someone dies of stroke. Every year, more than 795,000 people in the United States have a stroke
- FACE ARM SPEECH TIME

Other Traumatic Brain Injuries

- an injury that affects how the brain works via a violent blow to the head
- Concussions and sports such as football are most common
- 1.7 and 3 million sports- and recreation-related concussions happen each year. Around 300,000 of those are from football



Purpose

- address the challenges of access and accessibility in rehabilitative care
- prepare a neurologic assessment and rehabilitation device for clinical trials. This will include completion of device development, expanding device programming with a selectable menu of assessments or therapies for stroke rehabilitation, concussion/TBI, and upper limb musculoskeletal injury or disease, and designing a clinical trial
- prepare an inexpensive, portable, and customizable assistive device for clinical trials. This will include further development of the touch area layout and outer textile housing, creation of a patient interface, and clinical trial design

Current Standard in Rotator Cuff and TBI Rehab

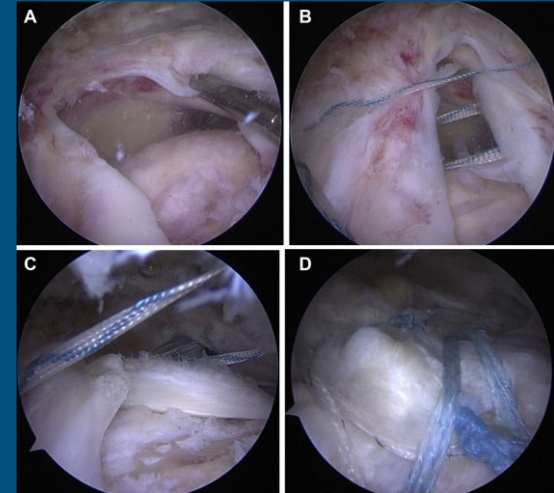
- No known device to accurately measure the degree at which a patient can lift their arm with a rotator cuff injury
 - All estimated by the human eye
 - Rehabilitation window is between 4 to 6 months, which expands the older a patient is
 - Shoulder abduction immobilizer splint
 - Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT)
-
- incorporating game-style activities is vital in recovery



Patent pending

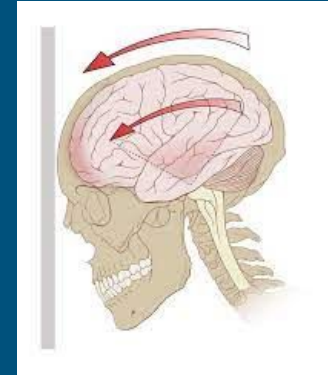
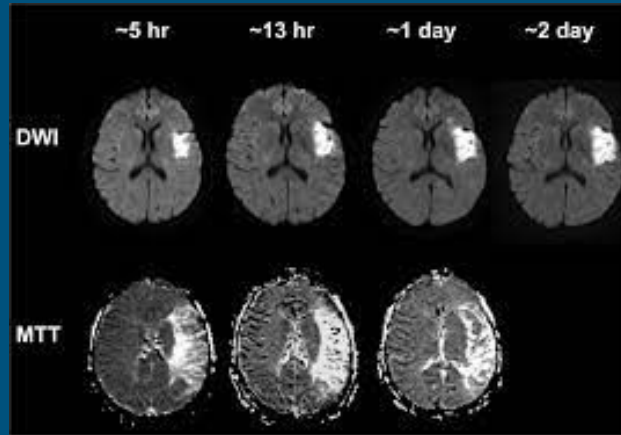
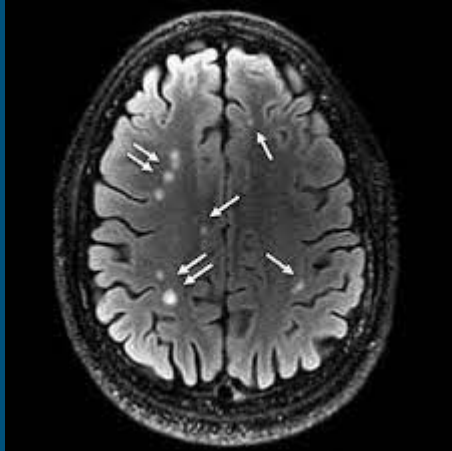
Clinical Challenges

- According to Hospital for Special Surgery, the general population sees approximately 22.1% of rotator cuff injuries
 - Rigorous healing process of 4 to 6 months
 - 30 to 50 physical therapy visits
- In more severe cases, can be cured via arthroscopic surgery



Clinical Challenges

- Many concussions and strokes go unnoticed and undetected



Working Prototype of Novel Device

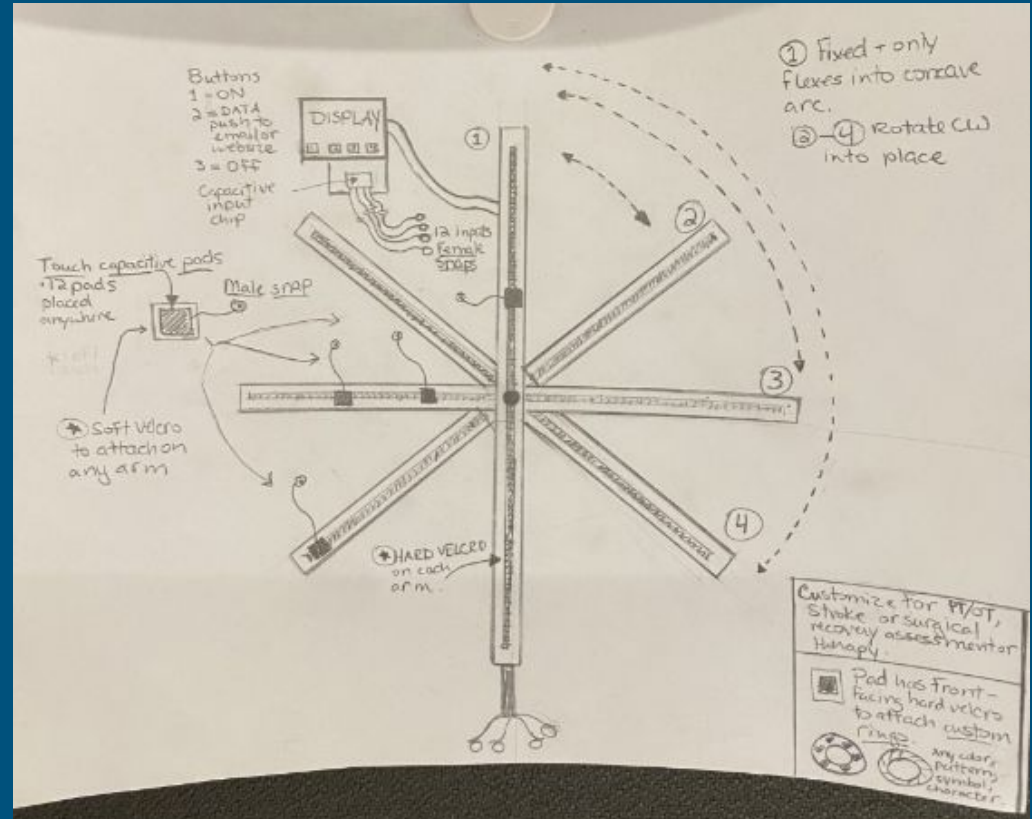
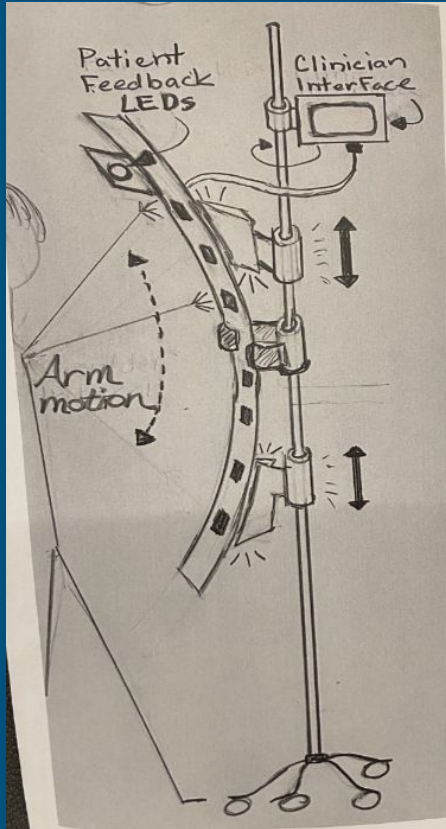
Prototype of New device:

Measured for a 20 year old female at a height of 5 feet, 3 inches.

- Touch capacitive Buttons at specific angles to be touched by patient
- The button a patient touches is the highest degree at which they are able to abduct their arm with a rotator cuff injury
- This specific angle measurement will help determine the angle restriction in a shoulder sling for an uphill recovery of the patient.



Prototype Design



Final Working Prototype

- Touch capacity and force-sensing areas that sense user textile interaction
 - Selective illumination of LED lights
 - LED lights take into account the millions of individuals that are deaf or hard of hearing
 - Use of different shapes for those diagnosed with colorblindness
- Patient interface contains text and images to guide them to perform certain touch arrays
- LED feedback
- Touch array is fastened to capacitive sensor using conductive thread and metal fasteners
- Customization enhances patient engagement
- Used to assess pincer grasp, targeting, cross-body movement, and lateral shoulder abduction

images of new prototype will be
inserted here

Conclusion

- Patent pending device is fit for numerous injury, post-surgical, PT, and OT activities and rehabilitation
- Patient touching sensing arrays resulting in LED illumination via the microprocessor and patient interface encourages engaging therapeutic activities
- Saved data can be used for clinicians to provide appropriate care and monitor patient status