Dynamic Sling to Support Upper Extremity Injury to Return to Active Lifestyle - Running

Product Design Specifications
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Function:

The purpose of this design will be to create a shoulder sling to aid in rehabilitation and functionality of patients suffering from traumatic brachial plexus injuries. The device must have tensile support of major muscle groups throughout the upper extremity with the ability to vary the amount of support as well as types of support given due to the varying degrees of disability in patients with brachial plexus. In order to aid in the dynamic rehabilitation, the device must contain design elements that allow for a guided and supported natural running motion while having ergonomic specifications that keep the device comfortable during extended periods of exercise.

Client Requirements:

- A sling that is designed to give anterior and posterior support to the shoulder, especially in order to prevent slouching.
- The sling should be designed to assist individuals while they are running or performing other exercises.
- Adjustable for different body types and degrees of disability.
- Comfortable structure that does not cause abrasion or chaffing.
- Easy to assemble and secures properly to the body.
- Materials should be easy to clean and light in weight.

Design Requirements:

1. Operational and Physical Characteristics

a. *Performance Requirements*: The sling should assist in supporting as well as facilitating normal upper extremity movements while running and performing physical activities. The support system should be focused on stabilizing the shoulder and keeping the arm in its proper place throughout the running motion.

b. *Safety*: The sling will be designed so that it will not restrict blood flow, cause abrasions, contain sharp parts attached to a tensile element, cause asphyxiation, or facilitate poor running mechanics.

c. *Reliability*: The sling should function properly throughout operation, and stay secured in its appropriate location.

d. *Life in Service*: The sling will be designed to last throughout a patient's recovery period. This varies depending on injury, but overall, this time span should be approximately 3 to 5 years.

e. *Operating Environment*: The device should be able to withstand the outdoors, including all types of weather conditions. In addition, the sling will be functional inside different indoor environments of the home or office.

f. *Ergonomics*: The sling will be adjustable and comfortable for all types of patients, while not interfering with lightweight clothing. Also, the design will make it easy for patients to place properly on themselves without assistance.

g. *Size*: The size will be adjustable and made for adults of both sexes.

h. *Weight*: The sling should not cause slouching or weigh down the arm due to an increased load. The target goal for the weight of the design is approximately 3 lbs.

i. *Materials*: The material that makes up the design should be hypoallergenic, washable and easy to clean, and weather resistant. In addition, the sling should be relatively soft in places that it come into contact with the skin.

j. *Aesthetics, Appearance, and Finish*: The sling will be designed to look sleek and trim since patients will be wearing the device in public.

2. Production Characteristics

a. *Quantity:* There will be one finished sling product, that will have multiple replaceable components.

b. *Total Product Cost*: The intended cost for the sling will range at approximately

$150.

3. Miscellaneous

a. *Accessories*: The design of the sling will incorporate a utility pocket that will allow for the placement and security of mp3 players, keys, and or other small personal belongings.

b. *Market Approval:* If the sling is successful and reaches market potential, approval by the FDA is required.