Early Mobility in Pediatric Critical Care Unit

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Project Goal: Design a rehabilitation device for a wide range of pediatric patients to prevent ICU-acquired weaknesses

Problem

Many patients in ICUs suffer from muscle dysfunction due to immobilization during their ICU stay. When they recover from critical illness, they face physical and non-physical disabilities. Bedside rehabilitation devices are often used to provide passive and active exercise for ICU patients. However, the range of motion is limited and it does not cover a wide range of pediatric patients.

Objectives

Design a device for a wide range of pediatric patients that would:

• Provide passive exercise to unconscious patients through a variety of motion programmed by a physiotherapist
• Provide active exercise to patients who have been restored consciousness
• Enable recording the performance of the patient while doing active exercise
• Encourage the patient to do exercise with fun factors

People

Pediatric Patients: the primary concern of the project
Physiotherapists: the primary user group of the device
Doctors and Kinesiologists: provide medical care and exercise
Nurses: expected to use the device as a secondary user group
Patients’ Family: play an important role in family-centered care

Solution

The device is designed to provide a wide range of various cyclic motion that can be adjusted for the physical and medical conditions of the patients. The patient’s legs are placed on the right and left leg holders, and the device provides two-dimensional cyclic motion by synchronizing vertical and horizontal motion of each leg holder. The device is designed to cover a wide range of pediatric patients from 3 to 17 years old.

Next Steps

Detailed mechanical design including Finite Element Analysis
Electric components and user interface design for usability
Usability tests with a full-scale mock-up and risk management
Research on pleasure in product and implementation of fun factors