Lifting and Transfer Mechanism for Gait Training Device

1. Technology:

The system consists of a frame constructed with 40x40mm aluminium extrusions, patient harness, a hand winch with a capacity of 362 kgs, a carriage with pulley, an additional hook for transfer, lock nuts, and a T rod. The lifting and transfer mechanism for patients is assembled with the existing frame of the gait training device. The extension of the device was designed, and the internal structure of the extrusions is chosen based on analysis of load bearing abilities. The attachments are bolted with t-nuts using aluminium L joints. The load bearing is endured by two parallel 40x40 aluminium extrusions. A box frame carriage is made of 2mm mild steel plates. A nylon shaft that incorporates ball bearings is designed, fabricated and assembled to the carriage. The nylon shaft is fabricated with a profile that slides within the grooves to facilitate omnidirectional rotation over the parallel aluminium extrusions. A locking system is incorporated using a threaded lock nut that is designed, fabricated and assembled on the loading and transfer end. When the patient is being loaded a T rod of length 1 feet is fastened to prevent the carriage from gliding during the loading process. The patient can be lifted using the hand winch that can be attached to the harness of the patient through a pulley mounted on the carriage. When the patient is in position, the harness is attached to the additional hook that is mounted on the eye bolts of the carriage using cables. The hook of the hand winch is detached to facilitate the transfer without tension from the hand winch. The patient can be transferred by the carriage and when the carriage is in the transfer end the T rod is fastened to the lock nut. The patient can then be transferred on to the device (Fig 14) and the carriage can be returned to the loading end while the patient is undergoing training. When the training is completed, the patient can be transferred back to their wheelchair by the same process.

Fig. 1 Trial of the Lifting and transfer mechanism

2. Problem Addressed:

The lifting and transfer devices available in the market cannot be used on a typical gait training device. The ones available can be used to transfer patients from one bed to another as it has wheels the can roll under the bed while lifting and transferring. These devices cannot be used as gait training devices rests with maximum contact with the ground. The need for a lifting and transfer mechanism that is customized to the requirement in gait training process was needed. The mechanism was designed, analyzed, fabricated and assembled to the existing device. The lifting and transfer mechanism assembled to the existing Gait training device required very little additional space. The lifting and transfer mechanism does not incorporate any electrical motor and it is simple and cost efficient. It enables the lifting and transfer of the patient to the gait training device with minimal effort and risks

3. Industrial Applications:

The lifting and transfer mechanism enables the patient to be safely lifted from their wheelchair and be transferred and loaded on the gait training device and transferred back to their wheelchair after the training procedure. The patient wearing the harness is lifted using a pulley on carriage actuated by hand winch pulley attached to the frame. While lifting, the carriage is locked by a fastened T rod. After the patient is lifted the lock is released and the carriage incorporated with nylon shafts is made to glide on the load bearing aluminum extrusions. Once the carriage is in the transfer end it is locked again, and the patient is transferred to the gait training device. The process is repeated in reverse once the training is completed, and the patient is transferred back to their wheelchair.

4. Patent Application Number: 202441078671