

# **Evaluation of A Passive Back-Support Exoskeleton during In-Bed Patient Handling Tasks\_Data Set**

## **Introductory Information**

The objective of this study was to evaluate the effect of a back-support exoskeleton (Laevo V2.5) on the trunk and hip angles, low back muscle activity, and heart rate during in-bed patient handling tasks. Eight participants (5 males and 3 females) performed four different in-bed patient handling tasks, including sitting to lying, repositioning toward the caregiver, turning toward the caregiver, and turning away from the caregiver.

## Methods Collection

### Data Collection:

- 8 participants (5 males, 3 females) had 39 markers placed on anatomical locations of their body and performed in-bed patient handling tasks while being recorded by eight cameras (Flex 13; Optitrack; Natural Point, OR). The participant's movements were captured at a sampling rate of 50 Hz.
- Each subject performed two trials of four in-bed patient handling tasks: 1) sitting to lying, 2) laterally repositioning toward the caregiver, 3) turning toward the caregiver, and 4) turning away from the caregiver
- All IRB and study protocols were followed including informed consent from participants.

### Data Processing

- The motion capture software (Motive 2.0; Optitrack; Natural Point, OR) was used to process and analyze three-dimensional (3D) position of markers
- 3D joint angles of the trunk and left/right hips were computed between the local coordinate system of the torso and thighs relative to the pelvis, respectively
- The peak (90<sup>th</sup> percentile) and the median angles (50<sup>th</sup> percentile) of the trunk flexion/extension and left/right hip flexion/extension were summarized
- Muscle activity signals were smoothed using a window size of 0.025 s root mean square in EMGworks 3.0 (Delsys Analysis Software)
- Processed EMG signals of each task were normalized by 95<sup>th</sup> percentile value of MVC of individual muscle (% MVC); the peak (90<sup>th</sup> percentile) and median (50<sup>th</sup> percentile) normalized muscle activity values of each task were summarized

### Citations – Publications based on the dataset

Zheng, L., Alluri, C.S.V., Hawke, A.L., Hwang, J., 2024. Evaluation of a passive back-support exoskeleton during in-bed patient handling tasks. International Journal of Occupational Safety and Ergonomics, 1-8.

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