Bed occupancy variations during periods of high and low functioning in community-dwelling older adults at risk of mobility decline

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BACKGROUND

- In older, frail individuals, bed transfers are often a problematic activity of daily living, and can be a determining factor in the capacity of an individual to live at home independently.
- Therefore, the quantification of selected bed transfer features, as well as bed occupancy characteristics of older adults, may provide valuable information to the health care team and/or caregivers.
- Our team has developed and is testing a method to monitor bed transfers/occupancy based on a pressure-sensitive mat technology, which can collect data continuously over extended time periods.

RESEARCH GOAL

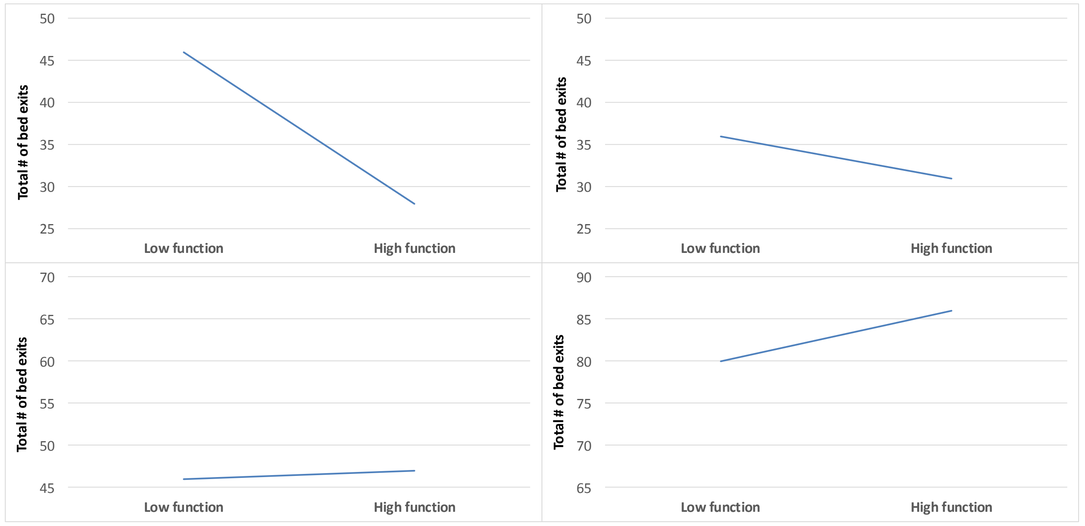
- Our current activities are aimed at testing the sensitivity of variables extracted from the pressure-sensitive mat through complex algorithms to monitor changes in the health status of community-dwelling older adults at risk of mobility decline.

METHODS

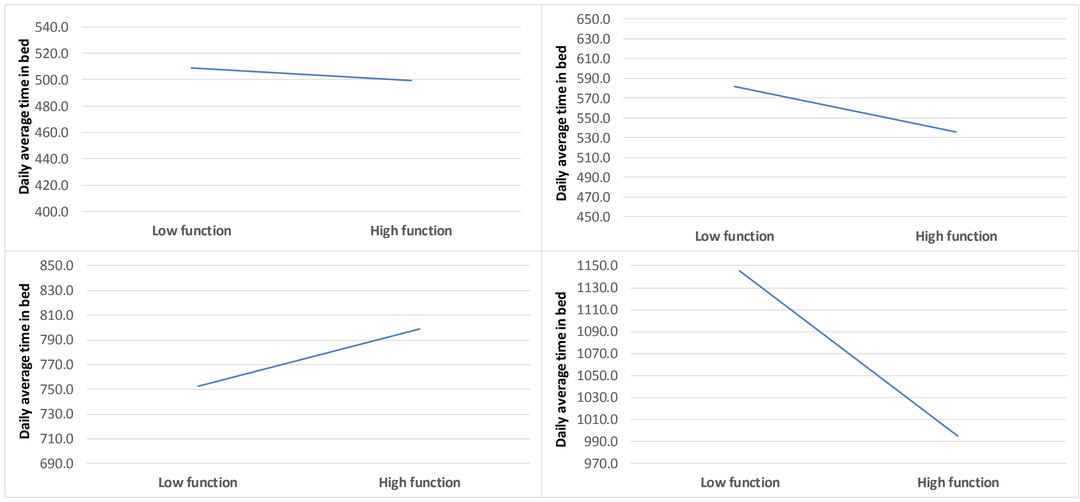
- Pressure sensitive mats manufactured by S4 Sensors Inc. were installed under the bed mattress in the home of 22 volunteers. Each mat contained 72 equidistant fiber optic sensors placed in an 8 x 9 grid array, from which pressure data was recorded continuously at 20 Hz.
- A processing algorithm based on a percent pressure load feature was developed via MATLAB to quantify initial variables of interest related to bed occupancy.
- We determined total and daily average time spent in bed, total and daily number of bed exits, and average time in bed per bed entry.
- Data were compared between periods of high and low functioning that were determined through clinical assessments of mobility (Timed Up-and-Go, Berg Balance Scale, Gait speed, Ottawa Sitting Scale) and reports of critical events (e.g., falls).

RESULTS

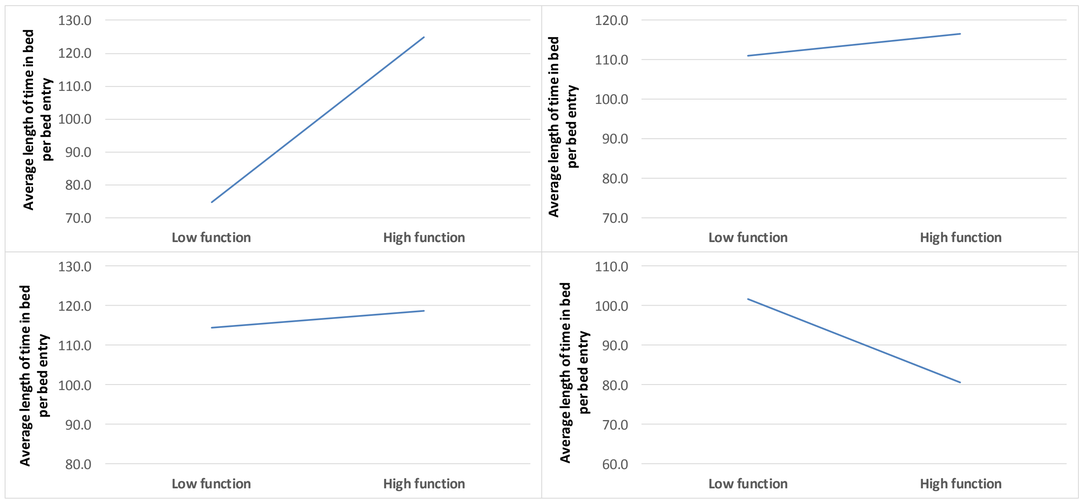
- Based on preliminary analysis of data from 6 participants, trends were identified with periods of low function more frequently associated with a higher number of bed exits, longer daily average time in bed and shorter average time in bed per bed entry, in line with the assumption that older adults spend more time in bed when not doing well.



Total number of bed exits over two 7-day periods, one of low functioning, one of high functioning. Data shown for 4 representative participants.



Daily average time spent in bed (in minutes) over two 7-day periods, one of low functioning, one of high functioning. Data shown for 4 representative participants.



Average length of time in bed per bed entry (in minutes) over two 7-day periods, one of low functioning, one of high functioning. Data shown for 4 representative participants.

DISCUSSION

- Selected bed occupancy features appear to change with periods of high versus low functioning in community-dwelling seniors at risk of mobility decline.
- If our method proves to be sensitive to the changing health/mobility status of older, at risk individuals, it could then be integrated into a smart monitoring system that would warn a healthcare provider or caregiver of significant changes in function, thus allowing a timely intervention before an adverse event, such as a fall, occurs.

ACKNOWLEDGMENTS

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