Improving design of a wheelchair repositioning device

DATA RESULTS: https://2uj7kxkavlx4e4ri52y0zq71-wpengine.netdna-ssl.com/wp-content/uploads/2020/10/Improving-design-of-a-wheelchair-repositioning-device-Presentation-of-data.pdf

Take home message

Through Natural Sciences and Engineering Research Council of Canada (NSERC) funding, Northwood facilitated testing of a new design of a wheelchair repositioning device called the Paraglide.

Results show caregivers are willing to replace traditional repositioning methods with the Paraglide.

Why was this research done?	How was the research done?
Knowledge gap: One major issue for caregivers has always been safely repositioning patients in wheelchairs. For optimal comfort, patients should be sitting up straight in their wheelchair, with their hips flush to the seat back. However, over time patients tend to slouch in the wheelchair, with the hips and buttocks sliding forward. In addition to being uncomfortable, this slouching posture can lead to complications such as pressure ulcers. Many wheelchair patients in long-term care no longer have the capability to reposition themselves, and as a result, caregivers must reposition them. Repositioning wheelchair patients exposes caregivers to back injuries. Many facility safety guidelines mandate that two caregivers reposition a patient, exposing multiple staff to injury. There is currently no efficient method to consistently reduce back injuries among wheelchair users as well as workplace injuries for caregivers while repositioning them, in long-term care facilities.	The research has involved three occupational therapists, 10 caregivers and 10 residents using a wheelchair. The residents do not have an intellectual disability and are a mix of ages and genders. The recruitment of participants involved permission or endorsement from Northwood administrators to ensure that participants were able to give their consent. All participants were briefed on the objectives and procedures to ensure that they understood the research and could make informed decisions on their willingness to participate. A mixed-method research design was used to validate and further develop the Paraglide. A consumer-based approach employing in-depth interviews with all participants, supplemented by additional questions that targeted preferences of the wheelchair-using participants were quantified and used for data collection. This approach was developed to identify the issues of wheelchair users having slouching concerns, in addition to other stakeholders. All participants (caregivers, occupational therapists, and residents) were interviewed once. Residents who were considered key informants were interviewed a second time following the trial period of six consecutive weeks to gather the data necessary to meet the objectives of the study. The data collection was triplicated over the course of the project, for statistical

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Problem being solved:

The need for increased workers' productivity in long-term facilities and better conditions for the growing aging population.

Rationale:

NSCC students developed a solution that allows caregivers to reposition patients more easily and safely, based on a concept presented by Gail Giffin, Senior Occupational Therapist at Northwood. The solution virtually eliminates the need for two caregivers and can safely be used to reposition patients of above three hundred pounds. The device was patented and licensed to MacKenzie Atlantic. In collaboration with Northwood and NSCC researchers, Mackenzie Atlantic has been working on commercializing the product. Mackenzie Atlantic has now designed an improved version that completely removes the risk of injury for caregivers, while enabling patients to reposition themselves with ease. This new version required test validation.

consistency. Individual semi-structured interviews were conducted with participants from the three groups listed above. Their different perspectives enabled better triangulation of the data for each of the below research questions. Key informants were identified by their ability to provide conceptual feedback on the design validation of the proposed system.

Research questions:

- Does the device work as intended?
- Are caregivers satisfied with the device? Do satisfaction levels depend on ease of use or effectiveness to reduce workplace injuries?
- Are residents satisfied with the device?
- How would the resident be impacted if this solution is adopted?
- What design improvement would the participants suggest in order to increase the performance of this device?
- In the current stage of the self-correction aid design, and given a choice, would the participants adopt this device to replace traditional methods?

What were the findings?

- The Paraglide is easy to use with clear advantages.
- 98.1% of caregivers willing to replace traditional methods with the Paraglide.

*PowerPoint presentation with detailed findings attached.

What can be done next?

Reported performance issues with the Paraglide device will be addressed:

- “Drum Not Found” when attempting to pair the device with remote.
- Device battery not charged even after leaving device plugged in overnight.

Other reported issues with the Paraglide device will be addressed:

- Remote location is hard for some residents to access.
- Stoppers keeping drum watertight pop out or some caregivers forget to put them in.

	Future research actions will focus on improving the device based on the feedback from this research. Northwood's willingness to serve as validation site enables technology development aimed at improving conditions in the growing aging population.