

AI Supported Delirium Management 2.0

Hasemann, W.^{1,2}, Eichenbrenner, T.¹, Vatter V.¹, Ryser, V.¹, Glaser, I.¹

¹ University Department of Geriatric Medicine, FELIX PLATTER | Contact: wolfgang.hasemann@felixplatter.ch

² Institute of Nursing Science (INS) at the University of Basel

1. Background

Background: Patients with delirium are at a higher risk of falls in hospitals compared to other patient groups. To prevent unattended bed exits, which are a common precursor to falls, hospitals often use bed rails, mechanical and chemical restraints, as well as pressure point-controlled electromechanical bed exit monitoring systems. However, these traditional bed-exit systems have shown limited effectiveness in preventing falls. We implemented a paradigm shift by (1) managing delirious patients in a dedicated geriatric ward (Delirium Unit) regardless of their underlying condition, (2) avoiding the use of mechanical and chemical restraints, (3) using low-floor beds without bed rails, and (4) extending the bed surface with an additional mattress if needed. Additionally, we employed a contactless radar and AI-supported system (Qumea[®]) developed within our department to monitor bed-exits and detect falls. However, the effectiveness of Qumea[®] in fall prevention remains unclear.

2. Aims:

To evaluate the effectiveness of a newly developed bed-exit warning and fall detection tool (Qumea[®]) compared to a conventional pressure-sensitive mat placed at the bedside



3. Methods

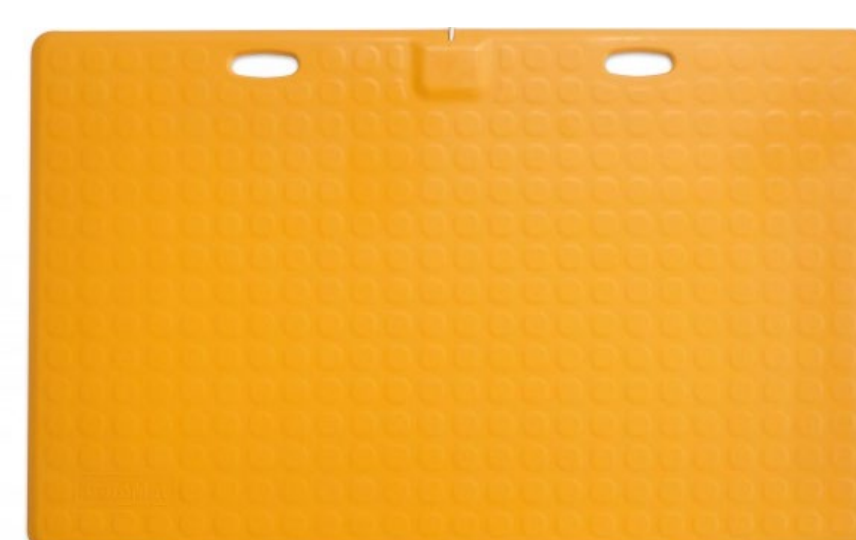
Setting: A Geriatric University Department in Switzerland for patients aged 65 and over. Patients with delirium, mainly transferred from medical and surgical wards, as well as from the ICU of a University Hospital in Switzerland, were assigned to rooms equipped with either contact mats or the Qumea[®] system for bed-exit monitoring. Bedside nurses were notified via smartphone when patients intended to leave the bed.

Intervention: Contact mats were used in three patient rooms for bed-exit warnings. In the remaining five patient rooms, Qumea[®] was used as the bed-exit warning tool. Falls were detected in each patient room by Qumea[®].

Data Collection: Trained research assistants reviewed each thermal video of a fall and manually searched nurses' and doctors' notes in the electronic health record for indications of a fall. Timestamps from Qumea[®] and Hospical[®], the patient call system, were electronically downloaded to calculate nurses' presence in patients' rooms and the time to confirm bed-exit warnings.

Statistical analyses: Demographic data are presented using frequencies and measures of central tendency, including mean scores with standard deviations (SD) and median with first (Q1) and third quartiles (Q3). Inferential statistics and Generalized Estimating Equations (GEE) models were calculated using SAS by a statistician.

Ethical approval: was granted by the Cantonal Ethics Committee (EKNZ 2021 – 02501). Since patients with delirium are incapacitated and unable to provide informed consent, family members were asked to provide written consent on their behalf. The study is registered with ClinicalTrials.gov: NCT05391334.



Classical contact mat which is positioned in front of the bed



Bed-exit surveillance and fall detection via 3-D-Radars Qumea[®]

4. Results

Data collection spanned from December 2022 to October 2023. We recruited 119 participants for our study. Of those, 73 were male and 46 were female, with an average age of 84.08 (SD ± 6.80).

In total, the research team identified 49 falls of which 29 happened in the the context of bed-exits.

Results: The risk of falling when using contact mats was nearly twice as high. Additionally, there was a 7.6 times higher risk of falling during the night shift compared to the late shift. Bed-exit warnings increased by 34.17% with contact mats, leading to an 11% increase in daily care time per patient. Nurse assistants and healthcare professionals from the core team helped reduce the frequency of bed-exit warnings, while qualified nursing staff from the core team shortened the confirmation time of these warnings.

5. Conclusion

Qumea[®] not only reduces fall rates but is also the first system to objectively detect falls. Nurses' workload in terms of smarter bed-exit warnings was significantly reduced by Qumea[®].