Use of Sensor System Data for Early Detection of Health Status Changes in Older Adult Residents of a Retirement Community

Myra A. Aud, PhD, RN; Gregory Alexander, PhD, RN; Marilyn J. Rantz, PhD, RN, FAAN; Marjorie Skubic, PhD
University of Missouri-Columbia

Introduction: TigerPlace is an innovative retirement community that is designed to promote aging-in-place. Because early detection of health status changes leads to early intervention, unobtrusive sensor systems were deployed in apartments of resident-volunteers to establish baseline patterns in activities and to recognize variations from baseline patterns that may reflect to health status changes.

Purpose: To assess the correspondence between data collected by the unobtrusive sensor systems in apartments and the reality of residents’ activities when data is reviewed in the context of known health-related events.

Research Questions:
• Does sensor data accurately capture resident activities?  YES
• Does sensor data provide indications of health status changes?  YES

Method:
• Small group Interviews with each resident-volunteer, a family member, and research team members
• Retrospective review of graphically displayed activity and bed restlessness sensor data

Flow chart of sensor system with proposed video component and proposed analysis leading to notification of residents, family, and caregivers.

Resident #1
• 82 year old man
• Living alone in one-bedroom apartment
• Initially independent in all IADLs and ADLs
• Major health event during 16 months of sensor system deployment = elective knee replacement surgery
• Independent in IADLs and ADLs at this time

-What reality did the sensors capture?
• Consistent pattern of activities preoperatively
• Recovery from knee replacement surgery
• Additional family presence in apartment in first 2 days after hospital discharge
• Unbroken sleep on first night back from hospital related to fatigue according to resident
• Broken sleep on subsequent night related to restlessness attributed to discomfort and/or fatigue from physical therapy
• Physical therapy bed exercises
• Restored pattern of personal care i.e., morning routine, shower, bedtime routine
• Time on bed in evening described as time spent removing compression stockings

Resident #2
• 80 year old man
• Living alone in one-bedroom apartment
• Initially independent in IADLs and ADLs
• Deterioration of health status during 14 months of sensor system deployment = several hospitalizations for cardiovascular events and one hospitalization for CVA

-What reality did the sensors capture?
• Pattern of frequent trips to bathroom during the night
• Change of pattern = reduction in the frequency of trips to bathroom at night with use of Flomax
• Three nights of increased restlessness immediately prior to CVA
• After discharge from hospital post CVA stayed in bed longer in the morning
• Spending more time in bed during the day
• Activity in shower reflecting installation of shower chair by two workers
• Activities by personal care aides

This project was partially funded by the National Science Foundation and the Administration on Aging.