ABSTRACT TITLE: DEVELOPMENT OF A DISPOSABLE WIRELESS SENSOR FOR MONITORING PATIENT MOVEMENT AND ACTIVITY

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Background/Introduction: Pressure ulcers place a significant financial burden on the healthcare industry. Each year approximately 2.5 million Americans suffer from pressure ulcers and the annual cost of treating these ulcers is estimated to be as high as $11 billion. It is well established that frequent and regular patient turning is a key element to pressure ulcer prevention. The currently accepted standard of care is to turn high-risk patients at least every 2 hours, day and night. In many healthcare facilities, such a turning protocol is difficult to maintain. To address the need for improved pressure ulcer prevention methods, we developed a wireless patient monitoring system to improve both system efficiency and patient care by monitoring and coordinating patient turning efforts. The system provides caregivers with information regarding a patient's position over time, thus enabling them to easily identify which patients are turning adequately on their own and which patients are in need of a caregiver-assisted turn.

Methods: A disposable, wireless sensor is affixed adhesively to the patient's upper torso. The sensor takes measurements of the patient's orientation and communicates this data wirelessly to a mesh network of relay antennas. The mesh network communicates data from the sensors to a server computer having an RF to USB transceiver. The network server software collects patient data from the transceiver and stores the data into an SQL database for subsequent analysis. A user-interface displays each patient's turn history and current status and also alerts staff if any patient requires a caregiver-assisted turn.

Results: The monitoring system was successfully tested in a clinical environment. The sensor was used to continuously monitor and record the position/activity of over 100 patients. The user-interface was used to successfully coordinate patient turning efforts and ensure compliance with such efforts.

Conclusion: Factors that impair compliance with turning protocols include difficulty monitoring patient position, ineffective turn reminders/alerts, and sub-optimal caregiver staffing ratios. In this study, we developed a system to monitor patient turning patterns and to explore the possibility of improving turning protocols through the implementation of novel IT policies/procedures. The system may be used to help monitor and manage the surface pressure distribution in perioperative and critically ill patients. Furthermore, the technology can serve as a platform for other wireless patient monitoring applications.