

Creating Healthy Work Environments 2019

Using a Sensor-Based Monitoring System to Improve Body Mechanics

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Introduction: For health professionals, injuries is a potential risk. Estimates of the incidence/prevalence of low back pain (LBP) among nurses and other health care workers are alarming. Among nurses, 52% complain of chronic back pain and there is a lifetime prevalence up to 80%. Thirty-eight (38%) of nurses' report having occupational-related back pain severe enough to require leave from work. Back pain is so common, many nurses accept musculoskeletal pain as part of their job (Gropelli, 2011). In 2016, nursing and residential care facilities had the highest rates of injury of all occupations (Labor, 2016). Strong to moderate occupational risk factors such as heavy physical work, bending and twisting postures, whole body vibration, and patient handling in particular, have been identified in the literature (Riihamaki, 2014). One-fourth of workers who receive work disability compensation for back injury self-reported re-injury after returning to work (Keeney et al., 2012). No approach to date can totally eliminate injuries caused by patient handling. It is felt that a substantial portion can be prevented by an effective control program and ergonomic design of work tasks. A main goal of this project was to design an effective system to help improve body mechanic awareness in the workplace.

Methods: This was a two-year project that consisted of one year of formative evaluation of a local long-term care nursing facility gathering qualitative and quantitative data assessing the facility's existing patient handling program in relation to a current model of best practice as well as to develop a compliance monitoring and feedback system consisting of an inexpensive Microsoft Kinect-based real-time motion tracking and smart watch. Both program design and implementation involved collaboration between multiple health care disciplines and community partners. The team consisted of nursing, physical and occupational therapy and engineering. In the second year, a pilot program was implemented using the real-time motion tracking device with the nursing assistants. A quantitative and qualitative summative evaluation was completed. The effectiveness of the pilot updated safe handling program as well as the new compliance monitoring and feedback system were reviewed. It also addressed the perceptions of the participants about the impact of the monitoring on their safe movement during bedside patient care tasks, their perceptions of its effectiveness in cuing them to perform tasks more correctly, and their perception of the value of real-time versus summative feedback. The system was trialed for 2 different activities. Seven nursing assistants were recruited from the regular STNA staff and used the system during their daily activities in caring for patients. The second activity was a Fall Frenzy when 40 nurses and nursing assistants used the system in various mock activities to related to body mechanics.

Results: For the 7 STNA's, a survey method was used to gather data about their experience with the system. All 7 reported satisfaction with the activity detection accuracy. Five participants stated that the system resulted in changes in their body mechanics. Six participants felt the system would be helpful when first learning good body mechanics. Five participants felt that the vibrating watch helped them to know when they were using poor body mechanics during their bedside care. All 5 were satisfied with the watch itself and did not feel it interfered with their work.

For the Fall Frenzy, there were 40 participants that were surveyed after their participation. Of the 40 participants, 37 felt that the vibrating watch helped them to know when they were using poor body mechanics. Thirty-five participants felt that the system would be helpful when first learning good body mechanics. Thirty-three did not mind having the Kinect camera record their body positions while practicing beside care. Thirty-four participants like this way of learning compared to previous lecture/computer learning.

Discussion: While this was a small pilot program, it did provide valuable information regarding a method that could be used to help with training medical professionals better body mechanics and help reduce the number of musculoskeletal injuries. By offering this method for training, it can improve the understanding

of proper body mechanics at the bedside. While this method was used with nurse and nursing assistants, it can be expanded to all those working in any field where poor body mechanics can cause injury.

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Title:

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References:

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Abstract Summary:

An innovative sensor-based monitoring system that can be used to help users develop proper body mechanics and help to decrease injury while caring for patients in the workplace.

Content Outline:

I. Introduction

A. Statistics on healthcare worker injuries

B. Goal of project

II. Methods

A. Year one

1. Evaluation of facility
 - a. Review of current model
 - b. Development of Kinect-based real-time motion tracking and smart watch system
2. Trial of system
 - a. STNA group of 7 participants
 - b. Fall Frenzy- group of 40 participants
3. Results
 - a. STNA group using survey
 - b. Fall Frenzy group using survey

III. conclusion

1. Changes in current practice
2. Future use of system

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Professional Experience: 1994-present- Staff RN at Cleveland Clinic Foundation, Cleveland, OH 1998-2000- Clinical Instructor, Department of nursing, University of Akron, Akron, OH 2001-2005- Term faculty, Department of nursing, Cleveland State University, Cleveland, OH 2005-present- Assistant professor, School of Nursing, Cleveland State University, Cleveland, OH Responsible for planning didactic courses in pathophysiology, geriatrics, medical surgical nursing I, assessment and Nursing Framework courses. For courses assigned a clinical component, responsible for overseeing the clinical instructors, visiting clinical sites and instructors, overseeing student problems, disciplinary issues, following up on issues related to the clinical sites. Also a clinical instructor in some of the medical surgical courses for sophomore, junior and senior clinical. Clinical Instructor Responsibilities: · Responsible for up to 10 students, either sophomore, juniors or seniors, in a clinical setting.

Author Summary: Over 24 years experience as an RN in medical surgical nursing, management and as an educator. An Associate Professor at Cleveland State University School of Nursing since 2001. Research interest on using simulation in education and on educating students on how to work in interprofessional teams to plan care of clients. Currently on 2 HRSA grants related to interprofessional simulation and educating students on interprofessional simulation.

