The effect of contact-free patient monitoring system on reducing falls and re-hospitalizations in a rehabilitation center

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Introduction

Background: In the Geriatric Long Term Care facility, especially in the Rehab Department, the combination of High Risk Fall Patients and Co-Morbid medical conditions can result in unplanned re-admission to Hospital. The introduction of new technological solution that provides continuous monitoring of Heart and Respiratory Rate as well as patient motion, can provide the medical staff with timely alerts for changes in vital signs, and patients' attempts to leave bed.

Objective: To assess the effects of continuous monitoring in reducing readmission to hospital, and reducing the number of Falls from bed, in a Long Term Care Geriatric Hospital. This was studied using EarlySense™, a contact-free patient monitoring system that continuously displays real-time information on Heart and Respiratory Rates, level of activity in bed, and Bed Occupancy Status, directly to the nursing staff, and instantly alerts when these measurements exceed pre-set threshold values.

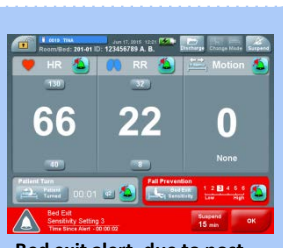
Methods

This study was conducted in Dorot Geriatric Center, a 374-bed facility in Netanya, Israel.
A six month monitoring period was compared to retrospective baseline controls in an orthopedic rehabilitation unit to observe before-after outcome information.
Data on patients' falls, early diagnosis and treatment at the facility, and re-admission to hospital rates, were collected. Contact-free sensors that monitor patient Heart and Respiratory Rates, and in/out of bed status, were utilized. All data and alerts were displayed on Bedside Units and on large monitors at the Nursing Station. In addition, alerts regarding changes in vital signs or bed exit were transmitted to hand held devices carried by nurses, to assist clinical team in identifying patient deterioration and patient exiting bed.

Results

We reviewed 833 patient records at Dorot Geriatric Center. Following implementation of the continuous monitoring, the transfer rate to the hospital decreased by 19%, and the falls rate decreased by 27.8%. Similar trends of improved outcomes were observed in other parameters, though the numbers were too small for statistical significance.

HR alert leading to identification of A-fib



Bed exit alert, due to post-operation patient attempt to get out of bed

High Respiratory Rate Alert Leading to Identification of Pulmonary Embolism

High Respiratory Rate Alert Leading to Identification of Respiratory Distress and to Oxygen Therapy

Results (Tables)

Table 1: Demographics

	Control	Evaluation (monitored)	P Value
Total (no.)	831	562	
Men	289 (34.8%)	181 (32.2%)	0.16 (not static sig.)
Women	542 (65.2%)	381 (67.8%)	0.17 (not static sig.)
Age (average)	78	78	0.26 (not static sig.)

Table 2: Control vs. Evaluation Outcome data

	Control	Evaluation (Monitored)	% Change
Number of Patients	831	562	
Falls from Bed (%)	15 (1.8%)	7 (1.2%)	-27.8% p=0.2 (NSS)
Readmission to Hospital (%)	134 (16.1%)	73 (13%)	- 19.3% p= 0.06 (normalized per 1000 patients)
Death	2	0	-100%
Length of Stay (days)	23.7	24.2	+ 0.5 day (+ 2.1%)

Conclusions

The use of Contact-free monitoring system improved patient safety by reducing the number of falls from the bed, while the staff were able to leave the bed rails down in the knowledge that the system will alert them when a patient is about to leave the bed.

The continuous monitoring provided a tool for the healthcare practitioners and allowed earlier recognition of patients with unstable medical conditions leading to timely intervention that reduced re-admissions to hospital.

The EarlySense System: Patient monitoring solution providing continuous vital sign and motion information for the general care departments.

* Financial Disclosure: EarlySense™ provided the monitoring systems for this project