

Reducing Pressure Injuries in Critical Care Using Wearable Sensor Technology

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ABSTRACT

Introduction

Patient turning has been a cornerstone of pressure injury prevention since Florence Nightingale, yet literature shows that ICU compliance to two-hour protocols is documented at 38%-51%. This project tested a strategy for monitoring compliance on a 36-bed ICU of 535-bed county hospital with prescribed turning protocols and its impact on hospital acquired pressure injury (HAPI) incidence.

Methods

Between January and May 2016, staff turn compliance for at-risk patients (n=451) was monitored via wearable patient sensor† shown to improve turn compliance. HAPI incidence before and after system implementation was collected through chart review. Descriptive analyses and tests of difference were performed to obtain percent compliance and change in compliance scores by patient, group, and HAPI incidence.

Results

Monitored patient care hours (44,021) had a 5-month mean turn compliance of 93%. Sacral HAPI incidence was 55% lower than same period previous year. Full-thickness HAPIs were reduced by 44%. Sensor data was used for HAPI root-cause analysis, nurse education and improving patient treatment plans.

Conclusions

Highly compliant turning regimen can reduce hospital-acquired pressure injury incidence and severity. Wearable technology can help sustain a high turn compliance as integral element in individualized patient care.



INTRODUCTION

Patient turning is a cornerstone of pressure injury prevention and one of the oldest interventions to prevent pressure injuries.

Compliance to two-hour protocols is difficult to maintain in busy nursing units, particularly in critical care. Literature shows that turn compliance in ICUs ranges between 38%-51%.¹⁻²

OBJECTIVE

This project tested a strategy for monitoring turn compliance on a 36-bed Level I Trauma ICU in a 535-bed county hospital with prescribed turning protocols, as well as the impact of timely, good quality patient repositioning on Hospital-Acquired Pressure Injury (HAPI) incidence.

METHODS

- Measure staff turn compliance turn compliance using wearable sensor technology:

$$\text{Avg. Turn Protocol Compl.} = \frac{\sum(\text{Time in Compl. with Turn Protocol per Patient})}{\sum(\text{Total Time Monitored per Patient})}$$

- Provide daily feedback to staff on turn compliance

- Analyze Hospital-Acquired Pressure Injury incidence before and after system implementation via chart review

- Inclusion criteria:

Monitoring Protocol	
Expected ICU stay	>48 hrs
Mechanical Ventilation	>12 hours
Braden Scale Score	≤13

- Staff turn compliance was monitored via wearable patient sensor†:

- Monitors patient position and movement
- Provides visual turn alerts when a patient has been immobile longer than prescribed turn period
- Encourages adequate offloading by requiring that minimum turn angle and decompression time are met for each repositioning
- Has been shown to improve staff turn compliance³



Room	Patient	Time Until Next Turn	Position	Information
2301	M.S.	1:57	L B R	Upright
2302	C.M.	0:14	L B R	
2303	S.S.	Turn Due 0:03 Over	L B R	
2304	M.L.	1:51	B R	Prone

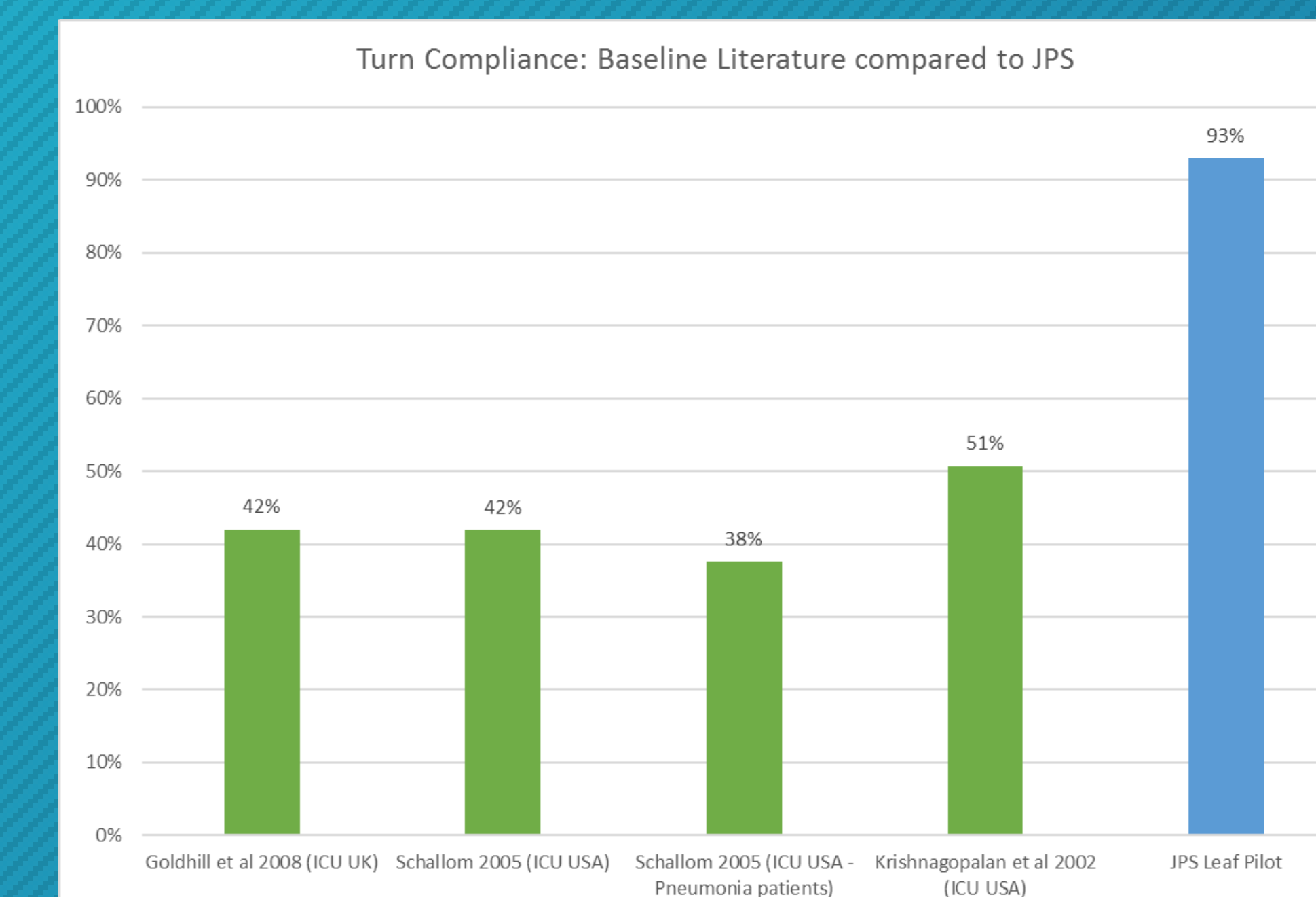


RESULTS

- Data collected between January and May 2016

Monitored Patients	
Number of Patients	451
Mean Braden Scale Score	11.5
BMI Range	15 - 84
Total Monitored Care Hours	44,021

- Five-month mean turn compliance was 93% - roughly twice the ICU turn compliance documented in literature.¹⁻²



- Sacral pressure injury incidence was 55% lower than same period previous year
- Full-thickness pressure injuries were reduced by 44%

Results	
Day Shift Avg Compliance to Q2 turning	93.4%
Night Shift Avg Compliance to Q2 turning	92.3%
Total HAPI in monitoring period	4.5*
Total HAPI in baseline period	10
Full-thickness HAPI in monitoring period	4.5
Full-thickness HAPI in baseline period	8

CONCLUSIONS

- Highly compliant turning regimen can reduce Hospital-Acquired Pressure Injury incidence and severity.
- Wearable technology can help sustain a high turn compliance as an integral element in individualized patient care.
- Sensor data was useful for HAPI root-cause analysis, nurse education, and improving patient care plans.
- Daily compliance reports encouraged staff to maintain high turn compliance.



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*Pressure injury responsibility shared by two units.

† Leaf Healthcare, Inc., Pleasanton, CA.

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