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# TRANSFORMING PRESSURE ULCER PREVENTION IN THE ICU WITH PATIENT WEARABLE TECHNOLOGY AND NURSING LEADERSHIP

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## ABSTRACT

**Introduction**
Patient turning is a cornerstone of pressure ulcer (PrU) prevention and one of the oldest interventions to prevent pressure injuries. However compliance to two-hour protocols is difficult to maintain in busy nursing units, in particular in critical care. Literature shows that turn compliance in ICU's is only 38%-51%.[1-2]

In an effort to reduce hospital acquired pressure ulcers (HAPU), nursing leadership decided to explore whether use of novel technology that provides individual patient cuing for turning could improve turn compliance and reduce pressure ulcer incidence.
The month of January, which has been associated with the highest pressure ulcer incidence rate, was chosen for a 30-day performance improvement pilot.

**Methods**
Wearable monitoring system† shown to improve turn compliance[3] was implemented on a 36-bed ICU of a teaching hospital. The system provides visual turn cues on charting computers based on patients' individual needs and time since last repositioning.
Inclusion criteria for monitoring was an expected ICU stay of greater than 48 hours, mechanical ventilation greater than 12 hours and Braden Scale score of 13 or lower. Two-hour turn protocol was assigned to all patients per existing unit protocol.
Nurses and techs received training on the monitoring system and a skills training on proper patient turning and repositioning technique. After implementation, Unit Nursing Director received daily reports on turning compliance for the previous day's shifts.

**Results**
In the first 11 days, 21 patients with a BMI range of 24 to 84 were monitored for 1730 hours. Mean turn compliance was 93.2% which significantly exceeds literature benchmarks. Compliance varied slightly by date and by shift, and ranged from 90% to 98%. No hospital-acquired pressure ulcers were observed during the period, compared to 7 in January 2015.

**Conclusions**
The role of nursing leadership is vital in allowing patient care units to evaluate new technologies and their impact on improving patient care. Nursing leadership championship was particularly key in obtaining approvals from Materials Management and IT, and getting necessary support equipment such as wedges and pillows to sufficient par levels on the unit. The encouragement and positive reinforcement staff nurses receive from project champions and their nursing leaders helps maintain a high level of performance.

## INTRODUCTION

Patient turning is a cornerstone of pressure ulcer (PrU) prevention and one of the oldest interventions to prevent pressure injuries. However compliance to two-hour protocols is difficult to maintain in busy nursing units, in particular in critical care. Literature shows that turn compliance in ICU's ranges between 38%-51%.[1- 2]

In an effort to reduce Hospital Acquired Pressure Ulcers (HAPU's), Wound Care collaborated with nursing leadership to explore whether the use of novel technology that provides individual patient cuing for turning could improve turn compliance and reduce pressure ulcer incidence.

ICU was chosen for the 30-day pilot since it has had the highest Pressure Ulcer incidence in January for the past 2 years.

## METHODS

A wearable monitoring system† shown to improve turn compliance was implemented on a 36-bed ICU. The system provides visual turn cues on charting computers based on patients' individual needs and time since last repositioning.

| 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 | L B R | Prone |

Patients at high risk of Pressure Ulcers were selected to participate based on meeting all of the following criteria:

1. **Expected ICU stay of greater than 48 hours**
2. **Mechanical ventilation greater than 12 hours**
3. **Braden Scale score of 13 or lower**

A two-hour turn protocol was assigned to patients per existing unit policy.

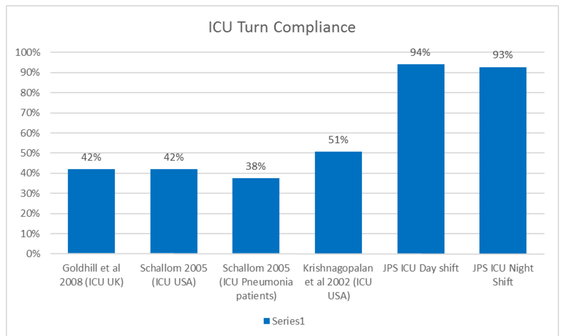
Nurses and techs received training on the monitoring system and on patient turning and repositioning technique for proper offloading.
Nursing Leadership and Wound Care project champion received daily reports on turning compliance, which were posted on unit for staff awareness.

## RESULTS

49 Patients met the Criteria for turn monitoring:

| Pilot Data: Jan 4 – Jan 27 | |
|---|---|
| Number of Patients | 49 |
| BMI Range | 24 - 84 |
| Total Monitoring Hours | 7101 |
| Day Shift Avg Compliance to Q2 turning | 94% |
| Night Shift Avg Compliance to Q2 turning | 93% |
| Number of HAPU in Pilot: | 1 |
| Number of HAPU in baseline period: | 7 |

Overall turn compliance for the pilot period was 93.7%.
Individual shift compliance ranged from 80% to 98%.
This significantly exceed ICU turn compliance benchmarks noted in literature, which range from 38% to 51%.




Hospital Acquired Pressure Ulcers were reduced 85% from 7 to 1, compared to same period last year.

This equals a savings of $71,556 in non-reimbursable treatments costs.

| Pilot Outcomes | Jan-16 | Jan-15 |
|---|---|---|
| **Total number of HAPU** | **1** | **7** |
| Incidence of Stage II HAPU | 0 | 2 |
| Incidence of Stage III HAPU | 1 | 3 |
| Incidence of Unstageable HAPU | 0 | 2 |
| Stage II PrU treatment cost[4] | $8,206 | |
| Full thickness PrU treatment cost including unstageables[4] | $13,786 | |
| **Total savings in Jan 2016** | **$71,556** | |

## CONCLUSIONS

This pilot project demonstrated that high compliance to turn protocols is feasible and sustainable, and can have a profound impact on reducing pressure ulcer incidence.

When a turn protocol is already firmly in place, repositioning technique is easily amended by simple education.

Nursing leadership support is crucial for getting staff nurse buy-in with new technology adoption and for recognizing that proper and timely turning is an important therapeutic tool to prevent hospital acquired conditions.

More data will need to be collected to show statistical significance in HAPU reduction.

### ADDITIONAL FACTORS THAT FACILITATED SUCCESSFUL PILOT:

1. Open mindedness of the ICU nursing staff and willingness to try something new
2. Teamwork approach for turning patients
3. Sharing daily compliance data with nursing staff as an ongoing quality metric
4. Adequate ongoing supply of wedges and pillows; collaboration with Materials Management and EVS
5. Hospital Executives' interest in pilot and patient outcomes

## REFERENCES

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