

# “Turning” to Technology: Reducing Hospital Acquired Pressure Injuries in Critical Care with Visual Turn Cueing

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## ABSTRACT

### BACKGROUND AND SIGNIFICANCE

Critical care patients are at high risk of developing pressure injuries due to prolonged immobility and explored whether improvement in patient repositioning frequency and quality could help reduce pressure injuries. The hospital’s ICU HAPI rate significantly exceeded NDNQI 50 percentile mean. Gaps in patient turning had been observed through documentation review. Turning adherence, positioning and other individualized interventions were rarely documented in the patient health record and staff believed patients were “too sick to turn”. Previous study<sup>2</sup> in critical care had shown significant reduction in HAPI using turn cueing technology, recommended in the pressure injury clinical practice guideline.<sup>3</sup>

### METHODS

Mixed methods pre/post test design was used. Study aims were (1) compare patient turning adherence during the intervention to large previous ICU study, (2) describe pressure injury incidence before and during the 3.5-month intervention and (3) explore nursing attitudes towards repositioning and pressure injury prevention. At-risk patients were assigned a wearable sternal sensor and a 2-hour turn protocol. SICU/MICU Staff were encouraged to respond to visual turn cues from the patient monitoring (PM) system (LEAF<sup>®</sup> Patient Monitoring System), which uses wearable sternal sensors to capture patient activity. Adherence with the repositioning protocol was measured with the PM system and compared to a blinded baseline obtained from a large ICU study<sup>4</sup>. Staff attitudes were measured with a post-survey of the units’ Registered Nurses.

### RESULTS

Total of 105 patients were monitored for 11,341 hours. Mean turning adherence was 77% for the 3.5-month period. Of the >11,000 monitoring hours, patients spent 29% on the left side, 29% on the right and 42% supine. Sacrococcygeal HAPI rate decreased from 4.11% pre-study to 1.34%, relative reduction of 67%. Half the patients with HAPIs were not monitored despite meeting risk criteria. Most survey respondents (n=95) felt training (69.7%) and support (68.5%) were adequate, however only 23% felt patient turning had positive impact on outcomes or would result in fewer HAPIs (25%). The perceived increased workload indicated that patient turning hadn’t occurred as frequently before the study..

### CONCLUSIONS

This study demonstrated that wearable patient sensors improve adherence to turning adherence and thus reduce HAPI rates. This study brought substantial awareness regarding cultural barriers to early mobility, likely impacting rates of HAPIs. Investing in technology such as this monitoring system is an innovative way to transform nursing team adherence with turning protocols, strengthen patient outcomes and improve a nursing sensitive metric.

## OBJECTIVES

### Outcome Measures and Targets

85% improved turning compliance for patients receiving LEAF Sensor and turning protocol during the trial period. Evidence estimates national compliance at 52%. Pre-data not available.

70% reduction in the total number of ICU acquired sacral pressure injuries in patients receiving the LEAF Sensor and turning protocol during the trial period.

80% of patients receiving LEAF Sensor and turning protocol will remain free of VAEs and nosocomial pneumonia due to increase in manual postural changes<sup>5</sup>

15% reduction in WOCN consults (not triggered by a Braden score) during the trial period.

## INCLUSION CRITERIA

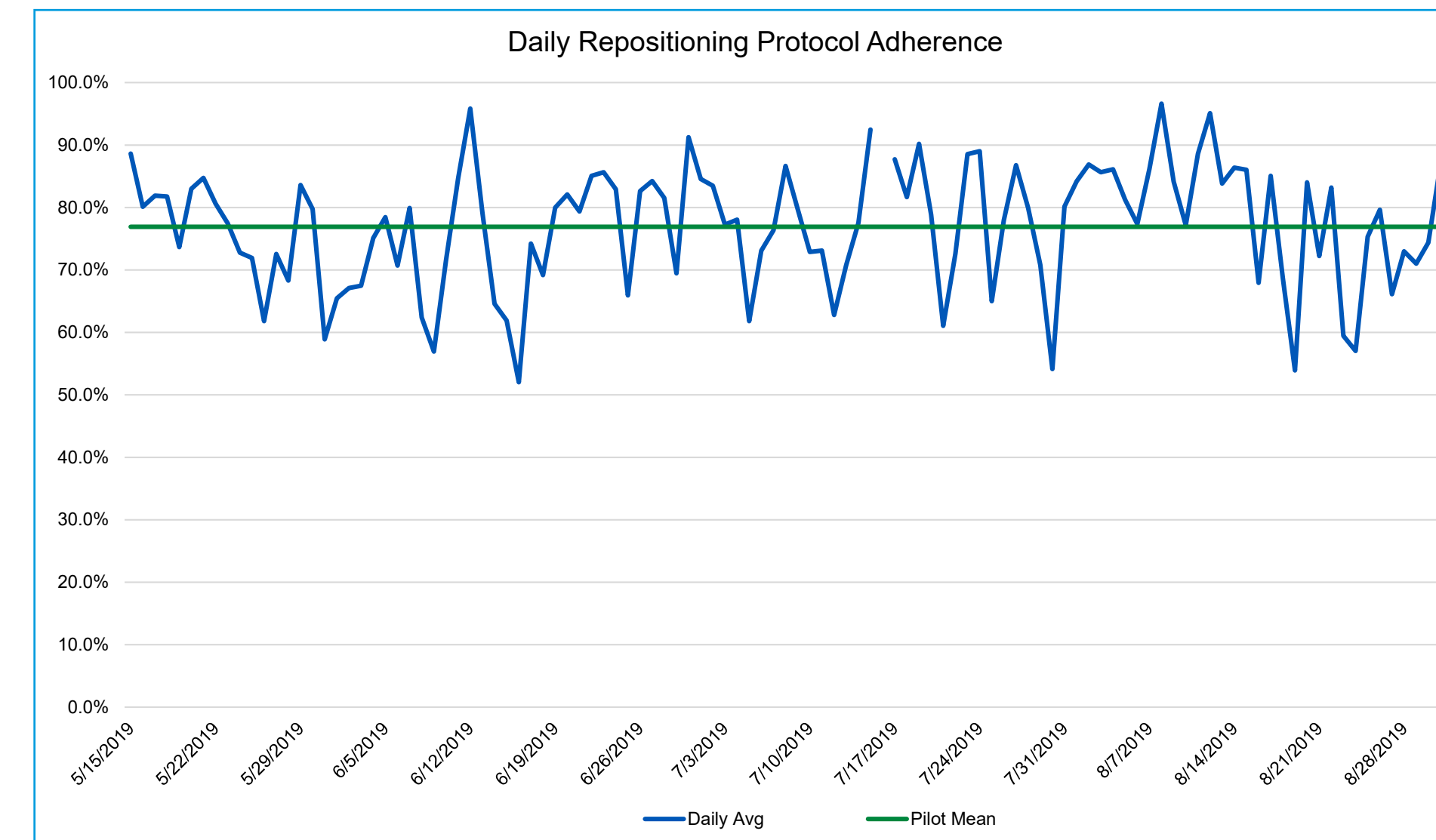
Expected ICU stay ≥48hrs, and ONE of the following:

- Pressure Injury POA
- Mechanical ventilation >24 hours and receiving vasopressors, sedation or paralytics
- BMI <18 or >35
- Braden Scale Score <13
- Stable spinal cord injury
- Need for Arctic Sun Application
- Rectal Tube
- MASD
- IAD
- Lower extremity flaccidity
- Need based on nursing judgment



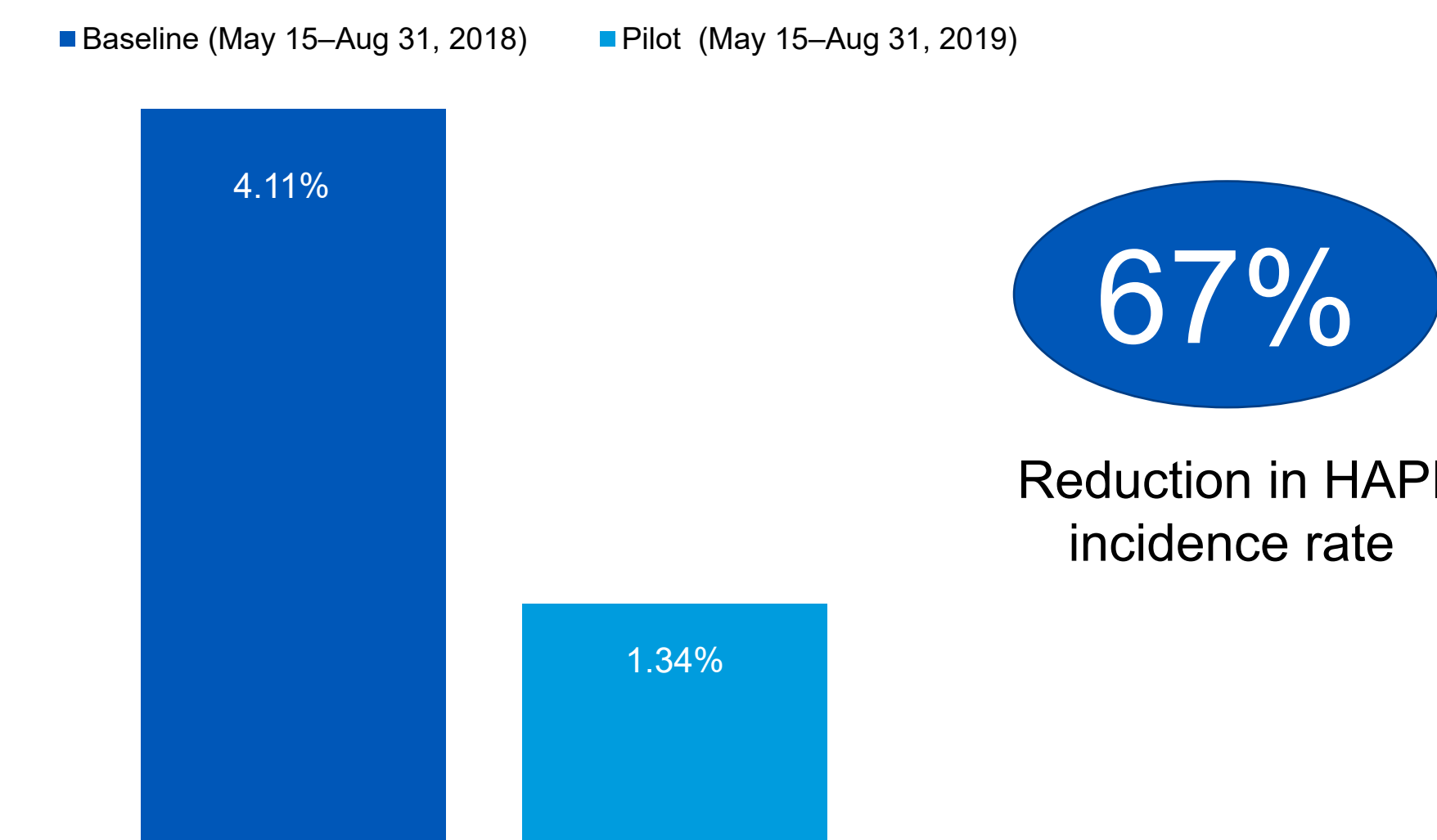
Nursing staff received refresher training on proper repositioning techniques and how to achieve an adequate offloading turn.

## RESULTS: PROTOCOL ADHERENCE



## RESULTS: PRESSURE INJURIES

### HAPI incidence



## RESULTS: WOUND CONSULTS

Reason for Wound Consultation	Braden Score	Non-Braden Score	Skin Care	PrI	Incont.	Wound
Jan 1–Mar 15	0	50	6	8	3	14
Mar 16–May 14	2	40	6	9	1	9
May 15–Aug 30	4	84	14	22	5	37

- Great staff awareness!
- Increased proactive preventative consults
- Improved partnership with WOC team
- Higher acuity and increased HAPI risk during the pilot period

## RESULTS: VAE

- Avoidance of ventilator-associated events is a secondary benefit of increased manual patient turning<sup>1</sup>
- 25 VAEs during pilot period
- 7.6% of the pilot patients were mechanically ventilated
- 92.4% of the patients receiving increased turning adherence remained free of VAE

92%

Patients with increased turning adherence remained free of VAE

## RESULTS: RETURN ON INVESTMENT

### 3.5-Month Pilot Return on Investment

Cost to treat per HAPI	\$43,180
Total HAPI costs avoided	\$561,340
Cost of monitoring system	\$25,200
ROI	\$536,140

\$536k

Pilot ROI

\$3.4M

Estimated annual house-wide ROI

Annually, we estimate that a house-wide adoption would provide a Return On Investment of \$3.4 Million Dollars based on 2018 data..

## DISCUSSION

- Overly aggressive turn/tilt angles on initiation
- Pillows are cheap and not ideal for turning
- Turn alerts initially not visible enough: loaded LEAF<sup>®</sup> Patient Monitoring Software on every computer
- Out of 7 Pilot HAPI, 3 were not monitored with sensor and remaining 4 had significant gaps in turning compliance
- Difficult message that a fundamental skill is inadequate: Required relearning what a 30° turn looks like
- Share daily reports with staff from the start

## CONCLUSIONS

- Pilot goals achieved in turn adherence, HAPI incidence reduction and VAE
- Increased wound consultations reflected the prioritization of pressure injury prevention
- Led to evaluation of early mobility practice standards
- EPIC flowsheet integration and enterprise-wide adoption next
- Experience used in Magnet<sup>®</sup> re-designation SOE

## REFERENCES

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