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7 million hours of data from more than 60,000 patients show the LEAF◊ Patient Monitoring System helps reduce the incidence of hospital-acquired pressure injuries

Wireless, wearable patient monitoring technology suggests the nation's hospitals could avoid billions of dollars in patient treatment costs by preventing common hospital-acquired pressure injuries (HAPIs).

Abstract

The LEAF Patient Monitoring System has been used for more than 7 million hours on more than 60,000 hospitalized patients. Hospitals across the nation have studied the LEAF System's efficacy to determine whether the system helps to significantly reduce the number of pressure injuries and avoid unnecessary and expensive treatment costs.

Their analyses suggest the LEAF System can be used to help improve care. Several institutions reported reductions of up to 85%[1-4] in sacrococcygeal hospital-acquired pressure injuries (HAPIs). The hospitals' analyses of patient repositioning monitoring data was completed since new international clinical practice guidelines for the prevention and treatment of pressure injuries were released in November 2019.[5]

Those guidelines for the first time recommend that hospitals deploy technology to help prevent hospital-acquired pressure injuries by reminding nurses about the need to reposition patients.[5] The new treatment guidelines come as HAPI rates continue to increase in the United States, even while other hospital-acquired conditions (HACs) have declined, often dramatically.[6]

The latest analyses mirror findings from earlier hospital studies that assessed monitoring data.[7-9] Those independent analyses showed that the LEAF System helps to prevent painful and life-threatening pressure injuries.

Background

Each year, more than 2.5 million acute care patients in the United States suffer from hospital-acquired pressure injuries (HAPIs) and as many as 60,000 die from their complications.[10] The cost of caring for these patients – estimates range from $9.9 billion[3] to $11 billion[10] a year – is greater than the cost of treating seven other common hospital-acquired conditions (HACs) combined: surgical site infections, falls, catheter-associated urinary tract infections (CAUTIs), deep vein thrombosis (DVTs), ventilator-associated pneumonia (VAP), clostridium difficile colitis (CDIs), and central line bloodstream infections (CLABSIs).[6]

The implications for hospitals are significant since the average incremental financial burden for each pressure injury is $21,767,[11] the average HAPI patient's length of stay increases by 9.5 days[11] and HAPI patients are more likely to be readmitted for additional treatment.[12]

Perhaps more concerning, HAPI rates are increasing. US government data show that HAPIs are the most common HAC, growing by 6% even as HACs overall have declined by 13%.[6]

HAPIs develop when patients are not repositioned with sufficient frequency to prevent prolonged pressure, particularly over bony prominences like the sacrum, coccyx, heels, and occiput.[13] Sustained pressure compresses tissue, impairing blood flow and leading to localized tissue damage and cellular death. The injuries can be extremely painful and, in extreme cases, can contribute to a patient's death.

The standard of care is to turn or reposition patients who are at risk to develop pressure injuries every two hours, round the clock. Those risk factors – age, mobility/activity, poor perfusion and vasopressor infusion – are early indicators of potential problems.[14] However, the two-hour turning protocol is often difficult to adhere to because nurses are task-saturated and patient turning is likely a lower priority than more acute patient care needs. Several studies conducted in the last decade show that adherence to this two-hour protocol can range from 10%[15] to 64%,[4] depending on the extent to which an institution enforces its patient repositioning practices, with an average national adherence rate of 48%.[16]

Also, the traditional turn reminders and alerts available to institutions to encourage adherence can be ineffective,[17] which can also contribute to low protocol adherence rates.

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The LEAF◊ Patient Monitoring System's wearable technology improves care

The LEAF System has transformed the way hospitals prevent HAPIs.

Traditional systems to remind nurses to reposition patients are like kitchen timers that ring at a set interval, generally a single interval for all patients in an institution. The LEAF System allows healthcare providers to optimize repositioning by tailoring turn frequency for each patient's needs. It monitors a patient's movement and provides visual information to help staff to make sure patients are repositioned according to their individual turn protocols, are turned with sufficient adequacy to offload tissue, and remain off their pressurized side long enough for the tissue to reperfuse. It also provides hospitals robust data they can use to address individual patient needs, manage treatment within each unit or identify trends across the entire institution – or even across a health network.

The LEAF Patient Sensor is a small, disposable sensor that adheres to a patient's skin, much like a standard electrocardiogram (ECG) lead.

A study of 1,300 critical care patients found that those monitored by the LEAF System had 73% fewer HAPIs than those receiving standard care.[1]

Reminders are sent wirelessly to the appropriate display at the nurses' station or on individual workstations (i.e., WOWs). As a result, adherence to turn protocols in facilities using the LEAF◊ System has been shown to be higher than the national average of 48%. Studies[16,18-21] have found adherence improves considerably once the LEAF System is deployed, with average turn protocol adherence reaching 98%.[7]

Recent independent studies from individual hospitals found that using the LEAF System will improve adherence and reduce HAPIs:

73% HAPI reduction in California critical care units
A randomized, controlled trial conducted in two critical care units of a large California hospital compared the incidence of pressure injuries in more than 1,300 patients. Half of the patients were monitored using the LEAF System, which cued intervention by nurses; the rest received standard care. The study analyzed more than 100,000 hours of patient data. In the end, patients monitored by the LEAF System sensors had 73% fewer HAPIs than those receiving standard care and the units experienced a 3% relative increase in turn protocol adherence.[1]

95% turn protocol adherence at top-ranked Magnet hospital
LEAF System sensors were used with 231 CCU/CVICU patients at a Magnet hospital in California. After six months, turn protocol adherence rose to 95%, up from a baseline of 67%. At the same time, the institution reduced sacrococcygeal HAPIs by 84.6%.[2]

85% reduction in sacrococcygeal injuries
Nearly 250 patients at a long-term care New Jersey hospital caring for critically ill patients, following their critical care hospitalizations, were fitted with LEAF System sensors. After nine months, the institution reduced the number of sacrococcygeal HAPIs by nearly 85% and maintained an average turn protocol adherence of 87.3%.[3]

90% turn protocol adherence, 67% reduction in HAPIs
During a yearlong study, 918 patients of a Pennsylvania medical center qualified to be fitted with the LEAF System sensor. The hospital monitored nearly 113,000 patient care hours. At the end of the year, the institution had a turn protocol adherence rate of 90%, nearly twice the national average. Meanwhile, the number of HAPIs was reduced by 67%.[4]

The LEAF System helps reduce HAPI rates and save hospitals money

Increased turn protocol adherence and decreases in HAPI rates can translate into related cost savings and, at least as important, cost avoidance for hospitals. The implications for healthcare institutions under significant financial pressure cannot be overstated. If each HAPI represents an average financial burden of $21,767,[11] reducing the incidence of avoidable cases can potentially save the average hospital hundreds of thousands or even millions of dollars each year.

A 73% reduction in HAPI cases could eliminate more than $39.7 billion in avoidable HAPI costs.

Meanwhile, independent analyses by several hospitals using the LEAF System report considerable financial benefits:

Florida hospital projects $3.4 million in HAPI treatment ROI
During a three-month pilot, the SICU/MICU of a Florida Magnet hospital improved its adherence to turn protocols by 85% and reduced ICU-acquired sacrococcygeal HAPIs by 65%. The hospital determined that its three-month trial resulted in the avoidance of $561,340 in hospital-acquired pressure injury costs. Based on its own HAPI treatment cost data, it estimated that full deployment of the LEAF System would result in an annual enterprise-wide return on investment of $3.4 million.[22]

New Jersey long-term acute care hospital avoided $1.4 million in HAPI costs
During its nine-month study of the LEAF System, a New Jersey hospital avoided $1.4 million in HAPI costs. The hospital's investigators estimated that would translate into a return on investment of $1.2 million.[3]

California hospital projects $871,000 in HAPI cost avoidance
A Magnet hospital in California estimated that its six-month trial of the LEAF System helped the institution avoid 20 HAPIs and estimated costs of $435,000. That translates to an estimated annual HAPI cost avoidance of $871,360. Researchers estimated an annualized return on investment of $776,960.[2]

California hospital saved $120,000 in annual specialty bed rentals
Some hospitals have relied on specialty beds to reduce the risk of pressure injuries, even though studies have found these pressure-redistribution mattresses do not significantly impact HAPI rates.[23,24] Frequent patient repositioning has been shown to be the most effective ways of preventing hospital-acquired pressure injuries.[23-25] Despite this, specialty beds are often used as a substitute for good patient repositioning. One California hospital assessed the efficacy of the LEAF System as a more cost-effective alternative to pressure-redistribution mattresses. Use of the LEAF System helped to reduce rental bed usage and expenses by over 75%, approximately $120,000 per year.[22]

Conclusions

The data demonstrated that use of the LEAF Patient Monitoring System helps improve patient care by improving turning protocol adherence and reducing the incidence of HAPIs, while providing significant benefits to financially challenged hospitals by helping them avoid the costs of treating patients for these preventable wounds.

The potential nationwide benefits are dramatic if one applies the average reduction in HAPI rates of 73% achieved by hospitals that studied the LEAF System's effectiveness. Eliminating 73% of the 2.5 million HAPIs could reduce the number of U.S. HAPIs to 750,000. Since the average incremental financial burden for each pressure injury is $21,767, the reduction in HAPI cases could eliminate more than $39.7 billion in avoidable HAPI costs.

The findings of recent studies reflect data cited in 2019, when new international clinical practice guidelines for the prevention and treatment of pressure injuries for the first time recommended that hospitals use technology to help prevent painful, life-threatening and costly HAPIs.

The latest evidence simply reinforces the value of technology like the LEAF System to combat America's most common hospital-acquired condition and curb its growth.

For detailed product information, including indications for use, contraindications, precautions and warnings, please consult the product's applicable Instructions for Use (IFU) prior to use.

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