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A Frost & Sullivan White Paper

Improving Patient Care with the Smith+Nephew LEAF◊ Patient Monitoring System

Survey of U.S. Hospital Clinicians and Administrators Demonstrates Need for New Pressure Injury Reduction Strategies

FROST & SULLIVAN

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Introduction

Recent reports from the Agency for Healthcare Research and Quality (AHRQ) indicate that, while the incidence of many other hospital-acquired conditions is falling, the incidence of hospital acquired pressure injuries (HAPIs) has grown by 6%.[1] Many underlying factors contribute to the development of these injuries, but one of the most common is inadequate patient repositioning by nursing staff to offload pressure from high-risk anatomical locations. In 2019, the National Pressure Injury Advisory Panel (NPIAP) published its most recent clinical guidelines encouraging facilities to implement strategies that more proactively remind staff to turn their patients. Most U.S. hospitals today are not using any real-time, patient-generated data to meet these guidelines, instead relying on clinician education, auditing and chart reviews. Unfortunately, these methods have been inadequate at reversing the growth of HAPIs in U.S. hospitals, demanding that providers explore new technology solutions to address this significant challenge.

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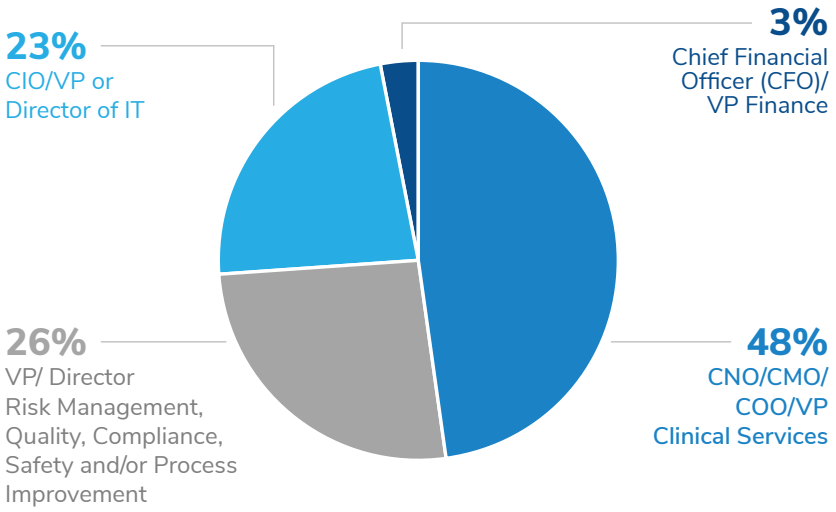
Research Process

In partnership with Smith+Nephew, Frost & Sullivan conducted 20 in-depth interviews with a wide range of U.S. hospital clinicians, administrators and other healthcare professionals to explore their experience managing HAPIs as well as their opinions on a new sensor-based monitoring system for the prevention of pressure injuries (Figure 1). These insights were used to develop a web survey, which was then deployed to a similar sample of 131 professionals at U.S. hospitals with more than 100 beds (Figure 2). Approximately 59% of respondents worked at not-for-profit hospitals, 34% at for-profit facilities and 7% at government hospitals. Slightly more than one-third (30%) of respondents were at academic hospitals, and 37% of participants indicated their facilities were American Nurses Credentialing Center (ANCC) Magnet hospitals.

Figure 1: Interviews of U.S. Hospital Professionals Completed by Frost & Sullivan

Title	#
CNO/CMO/COO/VP Clinical Services	5
CIO/VP or Director of IT (Clinical services/systems)	3
Risk Management/Safety Officers	2
Quality/Process Improvement/"Magnet"/COE Directors	2
Materials/Purchasing Managers	2
Wound Care Nurse Managers	2
Med/Surg Nurse Managers	2
Critical Care Nurse Managers	2
Total	**20**

Figure 2: Breakdown of Respondents to Frost & Sullivan Web Survey of U.S. Hospital Professionals



The Growing Problem of Hospital Acquired Pressure Injuries

Ninety percent (90%) of respondents stated the prevention of hospital-acquired pressure injuries in their facility had a significantly or somewhat high priority compared to other safety and clinical care priorities. Pressure injury prevention is among the top three highest priority hospital acquired conditions that hospitals are attempting to reduce, the other two being falls and central line associated bloodstream infections (CLABSIs).

"It's a growing challenge for a lot of reasons," said a hospital chief nursing officer interviewed by Frost & Sullivan. "The acuity of patients is much higher than we have seen, especially over the last five to 10 years. Patients don't come in just for a routine pneumonia. They come in with pneumonia that's complicated with diabetes and a behavioral health issue and a cardiac issue. As they're aging, patients have higher acuity when they even come into the hospital. Many of those who we would have treated 10 years ago are treated as an outpatient now. Also, turnover of staff impacts pressure ulcers, too. We see staff onboard, acclimate and then move into agency work or travel assignments. The turnover of staff and keeping them educated that pressure ulcers are a high priority requires intense education and monitoring."

Respondents indicate that most of the pressure injuries hospitals manage originate within the facility. The MedSurg and Critical Care units represent the largest sources of HAPIs, but patients from the emergency department, operating room and other units make up about 10% of the injuries. The average number of reportable pressure injuries in hospitals where respondents worked was 51, with 11 in "medium" (100-300 beds) and 86 in "large"-sized hospitals (300 beds). The incidence rate of HAPIs was more than four times higher in larger hospitals (0.29% vs. 0.06%). Both academic and not-for-profit hospitals reported significantly more pressure injuries in 2018, averaging 105 and 77 respectively, compared with non-academic and for-profit hospitals, 21 and 8 respectively.

Frost & Sullivan believes the higher incidence rates of HAPIs at larger, academic and not-for-profit hospitals have more to do with the tendency of these types of facilities to care for higher acuity patients. Not surprisingly, respondents from larger hospitals were less satisfied with their own management of HAPIs than medium-sized facilities. Frost & Sullivan believes that as lower acuity patients are treated and released sooner or avoid hospital stays altogether, the overall hospital population will become more acute, meaning hospitals will be more likely to continue struggling to reduce the clinical and financial burden of HAPIs.

Economic Impact of Hospital Acquired Pressure Injuries

Estimates calculate pressure injuries across all care settings as costing the U.S. health care system $9.9 billion[2] to $11 billion[3] per year, but determining an exact figure can be very challenging. Recent clinical literature reports that the average cost of treating a pressure injury is $21,767[4] above and beyond care already administered, but Frost & Sullivan survey respondents reported a higher figure at $31,099.[5] More than half (55%) of respondents were unable to provide an estimated cost for the condition, suggesting low overall awareness of the financial impact of pressure injuries on their institutions, a problem in itself. Half of respondents reported feeling their costs associated with HAPIs were high and the same percentage felt the costs were increasing.

While none of the respondents were able to provide an exact dollar amount regarding their *total* hospital/departmental expenditure related to HAPI management, many admitted that it was something that hit across different departments and budgets.

The total facility impact of HAPI prevention and care would need to include:

- Labor and supplies cost associated with additional patient length of stay
- Readmission due to complications
- Medicare penalty/reimbursement
- Medicolegal liability costs
- Negative pressure wound therapy (NPWT) costs
- Mattress/overlay costs
- Ongoing nurse education
- Bed lifts and slides
- Wound dressings
- Others

As of October 2008, Medicare denies reimbursement to hospitals for preventable complications. It requires appropriate documentation of skin integrity upon admission to the hospital or else the hospital "owns" any newly documented pressure injuries during the patient's stay. This is a major motivation for hospitals to reduce their pressure injury incidence. Unfortunately, about two-thirds (66%) of HAPIs are likely to originate within the hospital. Respondents estimated 35% of the pressure injuries they encounter originated from outside the hospital, 29% from MedSurg, 27% from Critical Care and the balance from other departments.

Current Methods for Monitoring Patient Turning Compliance Are Inadequate for Reducing HAPIs

On average, hospital respondents reported they used four different methods in conjunction to confirm patient turning protocols were followed. The most common methods included nurse documentation of turning in patient records (87%), charge nurse reminders (58%), white board/paper/electronic tool at unit level (54%) and monthly audits of patient charts (47%). Consequently, there is a significant labor and documentation burden associated with the current methods for monitoring turning compliance, and because it cannot address compliance lapses in real time, it introduces risk to individual patients. All of these methods for tracking compliance are done retroactively to address gaps in processes, which still introduces risk for patients developing pressure injuries if systems break down. In fact, 92% of respondents stated they *only* used retrospective methods for tracking patient turning compliance, with the most common proactive approach being random audits of current patients, which can still leave individuals not selected at risk. Unfortunately, even with these many systems in place, 85% of survey respondents said their hospitals still experienced HAPIs to some degree. Hospitals should have as their goal the *elimination* of HAPIs, not just the *reduction* of these life-threatening wounds. Most hospitals should be exploring new strategies that can help them achieve this objective while reducing the labor burden on nursing staff.

A randomized control trial found that hospital patients at high risk for HAPIs were only turned on time 47% of the time.[6] Survey respondents reported that inadequate patient turning was the third most influential factor for HAPI development, and the one factor that hospitals have complete control over. Hospitals can provide treatment for the top ranked factor, "Patient Nutrition and Perfusion," but the patient's underlying health status will limit the degree to which these treatments will be effective. The second ranked factor, "Patient Fragility, Comorbidities and Age," is entirely out of a hospital's control. This research indicates that hospital respondents believe that improving patient turning is the most important variable that hospitals *can control* to prevent HAPIs. And yet, most hospitals are inadequately doing it. Healthcare providers need better tools to simplify management of patient turning while improving outcomes, aligning their in-house protocols with evidence-based clinical guidelines.

Smith+Nephew LEAF Patient Monitoring System

First cleared by the FDA in 2014, the LEAF Patient Monitoring System uses a single-use, wearable sensor applied to a patient's chest in an acute care setting to monitor patient turn protocol adherence as part of pressure injury prevention protocols. The sensors and accelerometer in the device monitor the patient's position, orientation, movement and activity and wirelessly communicates through relay antennas that are plugged into wall outlets. The resulting data can be viewed in a customized interface on centralized computers, local workstations or any web-enabled device to help staff prioritize who needs to be turned and when.

> "In both real-world experience and studies, the system has been shown to help facilities improve patient turn protocol adherence, thereby improving on-time care delivery, documentation and nursing teamwork."

The system allows reports to be generated on a patient, unit or enterprise level to help identify training opportunities, help sustain high levels of turn protocol adherence and optimize resources.[7]

According to Smith+Nephew, the LEAF System is backed by more than 7 million hours of data on over 60,000 patients and was shown to help reduce pressure injuries by 73% in one investigator-led, randomized controlled trial.[6] In both real-world experience and studies, the system has been shown to help facilities improve patient turn protocol adherence, thereby improving on-time care delivery, documentation and nursing teamwork.

Smith+Nephew has positioned the LEAF System as part of its broader pressure injury prevention portfolio along with its ALLEVYN◊ Life and ALLEVYN◊ Gentle Border range of dressings and SECURA◊ skin care products. Combined, the products address critical recommendations from the NPIAP in a way that no other set of solutions has been able to do.

Using Patient-Worn Sensors to Bring Care to Best Practice Levels

Guideline 5.4 in the 2019 NPIAP International Clinical Practice Guideline states that providers should "Implement repositioning reminder strategies to promote adherence to repositioning regimens."[8] The recommendation indicates providers should use auditory or visual feedback systems to prompt healthcare professionals to round and reposition patients as necessary. Consequently, Frost & Sullivan believes an automated system based on patient-worn sensor data aligned with an individualized patient turning and mobility plan is the most reliable and least burdensome strategy to meet the guideline. While 81% of respondents were satisfied with their current HAPI prevention protocols, only 5% were currently using a monitoring tool like the LEAF System.

The survey was fielded before the publication of these guidelines, and while very few hospitals have adopted sensor-based solutions to meet this particular guideline, the research indicated that hospitals are very motivated to integrate NPIAP and other guidelines, so they can ensure their protocols align with best practices, especially if they are an ANCC Magnet and/or academic facility. This same guideline also indicated that frequent repositioning of patients was a crucial part of HAPI prevention.[8]

Sixty-nine percent (69%) of survey respondents stated they were moderately or extremely familiar with NPUAP (now "NPIAP") guidelines, and 73% said they integrated those guidelines into their facility's HAPI prevention protocols, but evidence suggested that there is often a significant lag between when those guidelines are introduced and when they are put into effect. Fifty-nine percent (59%) of respondents believed it was extremely important for their facilities to integrate NPIAP guidelines into their protocols. Fifty-seven percent (57%) of respondents indicated they would definitely or probably implement the NPIAP guideline advising the adoption of a patient-worn sensing device to document patient turning. Note that this question was presented *before* describing the LEAF System. Only a very small percentage of respondents reported using a wearable sensor such as the LEAF System, which can document turning in real time, automatically capture patient turn protocol adherence for individual patients and alert staff if the patient has not been turned and provide confirmation the patient has been turned far enough to offload tissue. Only 14% of respondents said they would *not* adopt the LEAF System, which suggests that most hospitals are open to the idea of this technology.

Plans to Implement Patient Turn Monitoring Technology

While only a small percentage of survey respondents were currently using a patient-worn sensor to monitor patient turn protocol adherence, awareness of such technology was much higher, at 30%. Slightly less than half of all respondents (47%) indicated they would likely adopt the LEAF System. The majority of respondents (80%) indicated that if they adopted such a technology they would deploy it strategically across their facility to only those scoring Moderate/Severe (<15) on the Braden scale. These patients made up approximately 38% of the total inpatient population according to the survey. Frost & Sullivan believes these findings are based on the common assumption among hospital personnel that many factors driving HAPIs are beyond their control even when following the best available guidelines. Enthusiasm for the LEAF System was similar across different types of hospitals and different types of respondents, with slightly higher scores among IT executives versus clinical and risk management respondents.

Though the significant majority of hospitals still experienced HAPIs, most believed they were already doing everything possible to prevent the injuries from occurring. However, respondents reported a much lower degree of confidence in their ability to ensure that every patient is being turned adequately to prevent pressure injuries.

The top areas where respondents believed a sensor-based turning compliance solution would most benefit their hospital were:

- Ensuring your staff is turning every patient adequately to prevent pressure injuries (72%)
- Improving your hospital's overall ability to prevent pressure injuries (66%)
- Reducing the amount of time and effort spent pulling charts and auditing compliance with pressure injury prevention protocols (63%)
- Reducing your hospital's overall incidence of pressure injuries (60%)

Conclusion

Despite hospitals' significant efforts to implement training and processes that reduce the risk of HAPIs, these injuries continue to exact a significant toll on patients in both morbidity and mortality. Complications from pressure injuries are estimated to result in 60,000 deaths each year in the United States.[3] The most recent NPIAP clinical guidelines advocate for providers to implement more active reminders for patient turning. And while inadequate patient turning is ranked as the third most important factor contributing to HAPIs after patient nutrition/perfusion and patient fragility/comorbidities/age, respondents still indicate it is a factor in 83% of HAPI cases. Most importantly, of these factors, patient turning is the one that hospitals can do the most to directly address. Patient turn monitoring tools, such as the LEAF System, are an important new technology that providers should consider implementing to not only push HAPI incidence closer to zero, but also free time for nurses to focus more on clinical care instead of auditing, chart review and documentation.

Endnotes

1 AHRQ National Scorecard on Hospital-Acquired Conditions Updated Baseline Rates and Preliminary Results 2014–2017.

2 Rogers M. Reducing Hospital-Acquired Pressure Injures (HAPI) in Long-term Acute Care with Turn Cueing Technology. Presented at AONL Virtual Symposium. Sept. 24, 2020.

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5 Nussbaum SR, Carter MJ, Fife CE, et al. . An economic evaluation of the impact, cost, and medicare policy implications of chronic nonhealing wounds. Value Health 2018;21:27–32.

6 Pickham D, Berte N, Pihulic M, Valdez A, Barbara M, Desai M. Effect of a wearable patient sensor on care delivery for preventing pressure injuries in acutely ill adults: A pragmatic randomized clinical trial (LS-HAPI study). Int J Nurs Stud. 2018; 80, 12-19.

7 Schutt SC, Tarver C, Pezzani M. Pilot study: Assessing the effect of continual position monitoring technology on compliance with patient turning protocols. Nursing Open. 2018;5:21–28.

8 European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. Emily Haesler (Ed.). EPUAP/NPIAP/PPPIA: 2019.

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