Advancing Hospital Fall Prevention Strategies With Sensor-Driven Insights

Executive Summary

Inpatient falls remain a persistent and costly challenge for hospitals across the United States, contributing to extended length of stay, avoidable injuries, and increased litigation and financial penalties. While evidence-based practices exist, implementation gaps remain, and not all hospitals have leveraged modern tools to their full potential. Among the tools that have demonstrated meaningful impact, fall prevention sensor technology has emerged as a critical enabler of fall prevention. The following section presents new data on its effectiveness.

Recent real-world analysis using the **Vizient® Clinical Data Base (CDB) and MarketPulse tool provides compelling evidence that investment in fall prevention sensor technologies, such as bed, chair and toilet alarms, is associated with as much as a 30% reduction in patient falls.** This white paper synthesizes these findings and contextualizes them within a broader, multidisciplinary fall prevention strategy involving sensors, clinical and environmental practices, organizational alignment, and staff and patient engagement.

The Ongoing Challenge of Falls in Hospital Settings

Hospital falls impact approximately 700,000 to 1,000,000 patients annually in the US, with about one-third of falls resulting in injury, averaging as much as $36,776 in direct cost per fall. In nearly 50% of malpractice cases involving patient falls, rulings favor the patient. Additionally, as set out in the International Classification of Diseases, Tenth Revision (ICD-10) Hospital Acquired Condition (HAC) list, the Centers for Medicare & Medicaid Services penalizes hospitals in the lowest quartile for fall-related injuries (HAC-05), costing them up to 1% of their Medicare reimbursements.

Hospitals have been implementing fall prevention strategies for many years. Despite these and other formal programs, many hospitals struggle to reduce fall rates consistently or are unable to sustain improvement. Even when fall prevention programs are in place, lack of adherence or ineffective deployment can limit impact. Root causes often include insufficient staff training and patient education, inadequate environmental safety measures, lack of a culture of safety, and a lack of patient-specific interventions.

Sensor Technology: The Data Behind the Impact

Sensor technology, such as bed, chair and toilet sensors, can significantly enhance patient fall prevention strategies in hospitals by providing real-time monitoring and early detection of at-risk movements. These alarm monitors are connected to a sensor that detects when weight is removed, triggering an alert to the caregiver and thereby enabling faster intervention for patients at increased risk for falling. Notably, a 2017 study published in the *Joint Commission Journal on Quality and Patient Safety* by Potter and colleagues reported a 54.1% reduction in fall rates in one inpatient medical unit following the implementation of a depth and bed sensor system, highlighting the substantial impact of targeted sensor integration on patient outcomes.

Combining observation with sensor technology, hospital staff can also track and report data on patient activity patterns, enabling care teams to analyze trends and share insights during interdisciplinary huddles. This data-informed approach allows clinicians to proactively adjust care plans, mitigate risks and better align interventions with patient needs. Through thoughtful integration with existing clinical workflows, sensor technology can serve as a more responsive and data-driven approach to patient safety.

To assess the use of sensor technology in fall prevention strategies, we undertook an analysis using data from 750 hospitals in the Vizient Clinical Data Base from Q4 2021 through Q3 2024. Results analyzed 30,484 falls across 158,344,570 bed days from CDB hospitals during this time frame to understand the scope of falls across different types of hospitals. This analysis considered the use of fall prevention sensor technology as determined from hospitals' spending on sensor products and evaluated the rate of total falls and the rate of falls with injury.

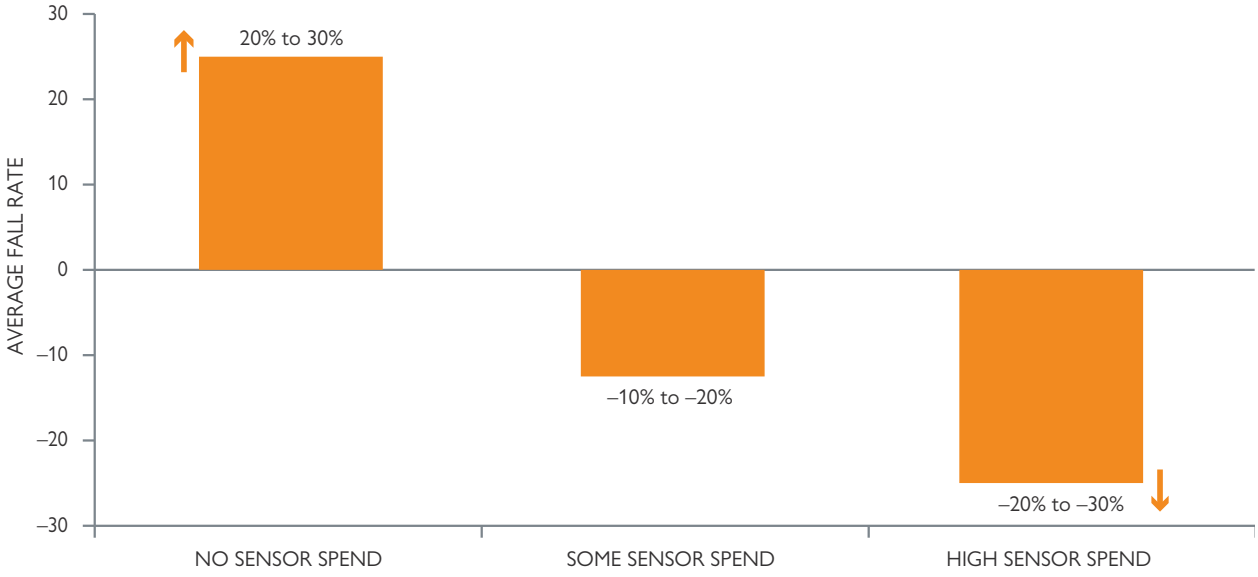
Hospitals that had invested in fall prevention sensors were segmented based on the overall clinical acuity of patients admitted and the level of spend. Hospitals with no evidence of sensor spend, which we refer to as hospitals without sensors, were also analyzed. Falls were determined from ICD-10 discharge diagnosis codes that were not present on admission.

Our analysis uncovered a strong correlation between fall reduction and the level of hospital spend on sensor technologies. Key findings are shown in Figure 1.

Notably, benefits related to total fall reduction were realized across all hospital sizes and types, with evidence of sensor spend indicating scalable value. High-acuity hospitals demonstrated the greatest improvement, likely due to their higher baseline risk.

These archetypes support more nuanced planning and enable supply chain leaders, clinical leaders and C-suite executives to align priorities.

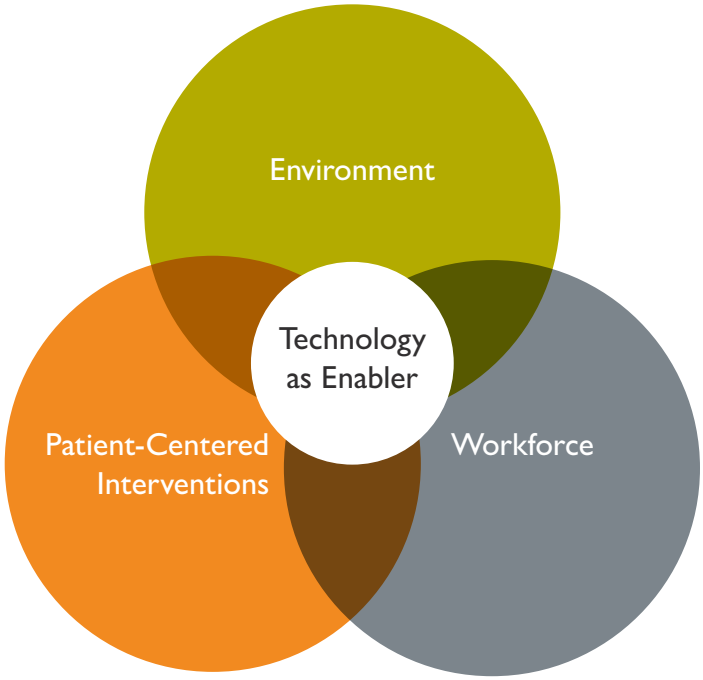
FIGURE 1. FALL RATE CHANGES BY SENSOR TECHNOLOGY SPEND LEVEL (OBSERVED RANGES ACROSS HOSPITALS)



Note: Observed ranges in patient fall rate changes are based on hospital investment in fall prevention sensor technology. Each bar and bar cap line reflects the range across multiple hospitals from Q4 2021 to Q3 2024. **Source:** Vizient Clinical Data Base. Irving, TX: Vizient, Inc.; 2025. https://www.vizientinc.com.

Evidence-Based Components of an Effective Fall Prevention Program

Fall prevention in hospitals is inherently multifaceted, requiring the coordination of clinical practices, environmental safeguards, organizational culture, and staff and patient engagement. While the analysis presented in this paper focuses on the impact of sensor technology, it was not intended to evaluate the contribution of all individual components within a comprehensive fall prevention program. Other critical factors, such as patient education, a strong culture of safety and caregiver presence at the bedside, also play essential roles in determining program success. Drawing on established frameworks such as the Agency for Healthcare Research and Quality's *Preventing Falls in Hospitals* guide and the Fall TIPS Toolkit, the following section outlines the core, evidence-based elements that support a holistic and sustainable fall prevention strategy.



Patient and Family Engagement

The use of technology such as bed, chair and toilet sensors can greatly enhance patient and family engagement in fall prevention by making safety more visible, interactive and responsive. For example, the importance of calling for help before a family member attempts to move the patient is reinforced when patients and families are informed that bed-exit or chair-exit sensors are in place, fostering a sense of shared responsibility for safety.

Research shows that patient-specific risk assessments, incorporating clinically derived predictors such as mobility limitations, cognitive status, medication profiles and patient-reported measures like fear of falling, are essential for developing personalized fall prevention plans. In a 2020 multisite study by Dykes and colleagues, a nurse-led, patient-centered fall prevention toolkit that translated individual risk factors into customized education and signage resulted in a 15% reduction in overall falls and a 34% decrease in injurious falls. These findings underscore the value of engaging patients and families directly in tailored fall prevention strategies that are visible and meaningful at the bedside.

Real-time alerts from sensors also enable quicker staff response, which families can observe and trust, increasing their confidence in the care team's vigilance. In some cases, technology can even be integrated with patient education—through bedside displays or mobile apps—that shows activity trends or explains why certain precautions are necessary. By making risk more tangible and engaging families in the use of these tools, technology helps translate clinical protocols into daily, relatable actions that support fall prevention.

Essential Aspects of Patient and Family Engagement

- Patient-specific risk assessments
- Visual cues at the bedside (eg, laminated posters, bedside monitors)
- Patient education on fall risk and prevention

Organizational Alignment

Organizational alignment within a hospital's leadership structure plays a critical role in enhancing fall prevention strategies by ensuring consistent prioritization, resource allocation and accountability across all levels of care. Active support of these efforts by hospital leaders fosters a culture of safety in which frontline staff feel empowered and responsible for patient outcomes. Leadership involvement can also ensure the designation and authority of fall prevention champions, establishment of interdisciplinary committees at both the system and hospital levels, and inclusion of fall metrics in quality dashboards and performance reviews.

Moreover, aligned leadership facilitates the integration of fall prevention into strategic planning and operational workflows, promoting system-wide adoption of best practices and evidence-based tools. It enables cross-department collaboration among nursing, therapy, informatics and supply chain, making technology implementation, staff training and outcomes tracking more effective. This top-down commitment drives sustainability, continuous improvement and, ultimately, better patient safety outcomes.

Essential Aspects of Organizational Alignment

- Leadership buy-in and accountability
- Designation of unit-based fall prevention champions
- Routine training and consistent internal communication

Clinical and Environmental Foundations

A robust fall prevention strategy begins with foundational clinical and environmental practices that minimize patient risk and create a safer care environment. Standardized precautions and an optimized care environment form the baseline for consistent, system-wide improvement and enable more advanced interventions to succeed.

Essential Aspects of Clinical and Environmental Foundations

- Universal fall precautions (eg, nonslip footwear, patient call bells within reach)
- Environmental design (eg, grab bars, proper lighting, nonslip flooring, adjustable beds)
- Post-fall management protocols and interdisciplinary debriefs
- Cord management (eg, wireless/wired options, uncluttered cords)

Strategic Recommendations for Hospital Leaders—From Data to Deployment

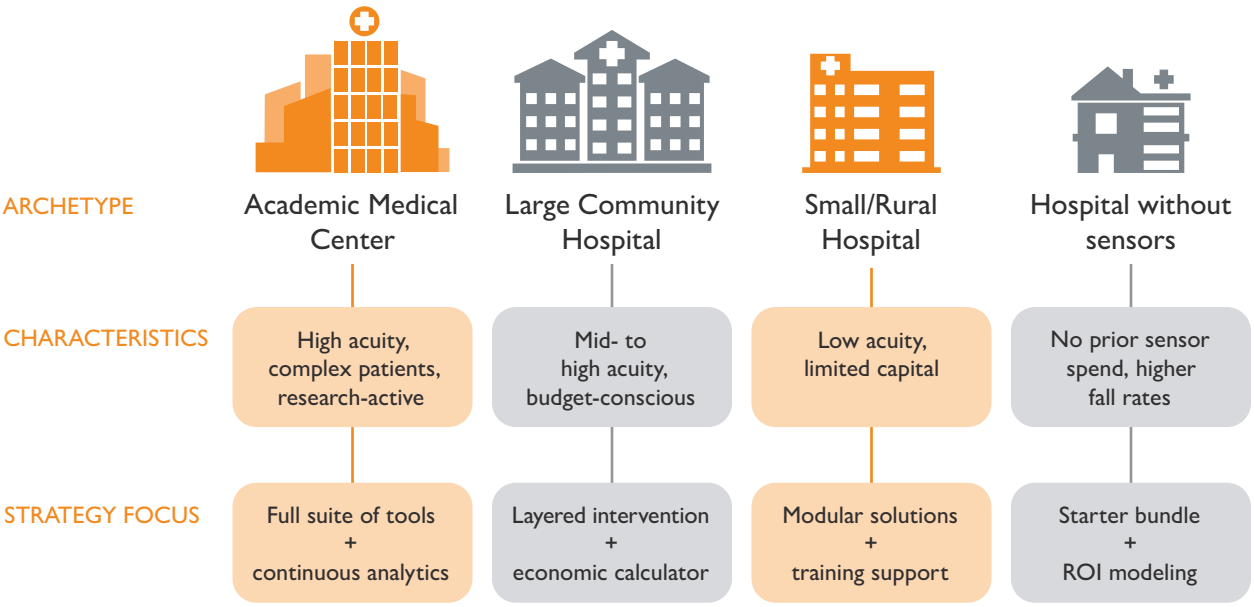
To effectively integrate sensor technology into a hospital's overall fall prevention strategy, leaders should begin by aligning technology implementation with existing patient safety protocols and interdisciplinary care plans. This step involves engaging frontline staff—nurses, therapists and patient safety officers—in the selection and deployment of sensor systems to ensure usability and clinical relevance. Training programs should be established to educate staff on interpreting sensor alerts and incorporating data insights into daily rounds and care decisions. Clear protocols for responding to sensor-generated alerts are essential to avoid alarm fatigue and ensure timely interventions.

Additionally, hospital leaders should leverage data from sensors to identify high-risk patients and evaluate the effectiveness of fall prevention interventions. Collaborating with clinical informatics teams can help integrate sensor data into the electronic health record, enabling seamless documentation and enhancing clinical decision support. Finally, a continuous improvement framework should be adopted, using sensor analytics to monitor trends, adjust practices, and inform quality improvement initiatives aimed at reducing fall rates and improving patient outcomes.

Next Steps

- Adopt a systems approach: blend training, environmental redesign and technology.
- Use data strategically: benchmark using clinical outcomes databases like CDB, and monitor spend data such as invoice trends via MarketPulse.
- Justify with economics: apply tools such as economic calculators to demonstrate return on investment.
- Engage the C-suite: frame fall prevention as a clinical outcomes measure similar to reputational, financial and compliance issues.
- Start with archetypes: tailor interventions based on facility type and spend profile (Figure 2).

FIGURE 2. HOSPITAL ARCHETYPES FOR FALL PREVENTION STRATEGY



Source: Vizient Analysis, 2025.

Conclusion: Building a Safer Future Through Data-Informed Design

Reducing inpatient falls is both a quality imperative and a financial necessity. Hospitals that embrace an integrated, data-driven approach—combining clinical best practices with bed, chair and toilet sensors along with other sensor technologies—are better positioned to safeguard patients, protect reimbursements and lead in safety innovation. An effective fall prevention strategy can even garner $14,600 in net avoided costs per 1,000 patient days.

While technology alone is not a silver bullet, the evidence is clear: when embedded into a holistic fall prevention program, it significantly amplifies impact. Hospitals that strategically deploy sensor technology as part of a systems-based fall prevention approach are well-positioned to achieve both clinical and economic gains.

Lead from the top. Empower from the bedside. Prevent from every angle.

Sources: Vizient Clinical Data Base. Irving, TX: Vizient, Inc.; 2025. https://www.vizientinc.com; MarketPulse Analysis, 2025; Stocking J et al. *Measure Justification Form: Falls With Major Injury—Task 2, Deliverable #3-4.* IMPAQ International. May 2021; Dykes PC et al. *JAMA Health Forum.* 2023;4(1):e225125; Mele F et al. *Healthcare (Basel).* 2023;11(9):1290; CMS. Hospital-Acquired Condition Reduction Program. Updated September 10, 2024; Potter P et al. *Jt Comm J Qual Patient Saf.* 2017;43(8):414–421; Agency for Healthcare Research and Quality. Fall TIPS: a patient-centered fall prevention toolkit. February 2021; Dykes PC et al. *JAMA Netw Open.* 2020;3(11):e2025889; Patient Safety Network. Preventing falls through patient and family engagement to create customized prevention plans. May 31, 2023.

APPENDIX

Vizient® Clinical Data Base

The Vizient® Clinical Data Base (CDB) is one of the nation's largest clinical benchmarking resources, drawing on performance data from 1,400 hospitals nationwide. It tracks outcomes including mortality, length of stay, complications and readmissions, giving organizations the scale and transparency needed to measure against peers. With clear, actionable insights, the CDB enables leaders to reduce variation, accelerate improvement and enhance quality of care.

Sg2 MarketPulse

Sg2's MarketPulse offers unmatched visibility into medical device and supply purchasing, capturing billions of transactions from over 12,000 US health care facilities, including half of all hospitals. By delivering SKU-level insights into purchasing trends, new products and emerging market entrants, it provides a strategic view of supply dynamics. These insights help decision-makers anticipate shifts and guide smarter, future-focused planning.