



Leaf Healthcare

2018 Global Patient Mobility Monitoring  
Technology Leadership Award

FROST & SULLIVAN

2018

BEST  
PRACTICES  
AWARD

GLOBAL PATIENT MOBILITY MONITORING  
TECHNOLOGY LEADERSHIP AWARD

2018

BEST PRACTICES

AWARDS

## Contents

Background and Company Performance .....	3
<i>Industry Challenges</i> .....	3
<i>Technology Leverage and Business Impact</i> .....	3
<i>Conclusion</i> .....	5
Significance of Technology Leadership.....	6
Understanding Technology Leadership .....	6
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices.....	7
The Intersection between 360-Degree Research and Best Practices Awards.....	8
<i>Research Methodology</i> .....	8
About Frost & Sullivan .....	8

## Background and Company Performance

### *Industry Challenges*

Complications arising from immobility are a leading threat to quality healthcare worldwide. Hospital-acquired pressure injuries (HAPIs), deep vein thrombosis (DVT), hospital-acquired pneumonia (HAP), and muscular atrophy are just some of the many mobility-related complications posing a tremendous concern to medical providers. In the case of pressure injuries, blood flow is compressed over bony regions — leading to severe pain, prolonged hospital stays, and over 60,000 deaths in the United States (US) alone. Although preventable, the condition affects more than 2.5 million US patients annually — nearly 10% of hospital patients —with treatment costs averaging over \$43,000 per injury. As government and other healthcare payers do not reimburse providers for pressure injuries, and the incidence of the condition is considered a key quality metric for healthcare institutions (thereby impacting Medicare reimbursements), stakeholders are keen to adopt solutions. Overall, pressure injuries cost the nation's healthcare system over \$12 billion a year.<sup>1</sup>

While frequent patient repositioning is considered one of the most effective ways to prevent the complications of immobility, Frost & Sullivan points out that current processes (such as manual charting and generic reminders) are largely inadequate. Task-saturated nurses often find it difficult to keep track of a patient's mobility level and turning status. At the same time, critical factors such as ensuring that turns are large enough and sustained for long enough are often overlooked or unable to be measured— compromising the effectiveness of preventative measures.

Frost & Sullivan feels that medical device providers that are able to provide accurate, automatic, and user-friendly patient mobility monitoring that improves both clinical and financial outcomes will provide tremendous value to the sector. Specifically, cost-effective monitoring solutions fostering greater patient mobility — e.g., wearable and wireless technology — will enjoy rapid adoption.

### *Technology Leverage and Business Impact*

Founded in 2010 and headquartered in Pleasanton, California, Leaf Healthcare (Leaf)'s wireless patient monitoring solutions offer providers an efficient and cost-effective means of mitigating the impact of immobility. Recognizing the profound potential of wearables to transform healthcare service delivery, founders Barrett Larson and Daniel Shen leveraged their combined expertise in medicine at Stanford, as well as electrical engineering, computer science, and consumer product design from MIT, to spur industry-leading innovation.

The result is the pioneering Leaf Patient Monitoring Solution, a data-driven mobility monitoring device specifically tailored to

**Leaf's Patient Mobility Monitoring Sensor**



Source: Leaf Healthcare

<sup>1</sup> US Department of Health and Human Services' Agency for Healthcare Research and Quality: <https://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html>

healthcare settings. Unlike other competing technologies such as consumer fitness trackers employed in clinical settings, Leaf properly leverages its roots in the medical field to provide a specialized tool that helps improve patient outcomes through minimizing immobility-related complications.

Provider-friendly features include:

- *Ease-of-use.* The Leaf system features a wireless, waterproof, and disposable sensor; a digital timer, and simple indicators that let healthcare providers know when an intervention is due. As a result, Leaf makes it easy for staff to identify patients that aren't mobilizing enough on their own.
- *Ease-of-installation.* Leaf requires no capital equipment or infrastructure investment, as it supplies the required server, tablets, and monitoring supplies.
- *Multi-tiered daily and monthly reports.* With the ability to provide both granular and enterprise-wide data, Leaf's reports help facilities identify protocol performance in light of both peer facilities and institutional goals. Detailed patient mobility history — including turn and ambulation documentation — can also bolster a hospital's litigation defense — thus eliminating costly settlements or court-imposed penalties.
- *Workflow and resource optimization.* Leaf's actionable, real-time clinical data helps nursing staff prioritize high-risk patients. Chief nursing officers can leverage reports to determine whether a facility is reaching its patient mobility goals, whereas unit supervisors can determine and address the causes for differences in turn protocol adherence between shifts. In addition, Leaf is a more cost-effective and impactful alternative to therapies such as pressure redistribution mattresses. Alternatively, the system can be used in tandem with specialty beds to maximize the efficacy of the support surfaces.
- *No risk.* There is no term commitment with Leaf's technology.

Leaf is committed to ongoing improvement of its core technology; in 2018, the company incorporated hundreds of thousands of hours of targeted data analysis to launch its Integrated Positioning Index™ (IPI). Leaf designed the IPI algorithm to be an objective measure of the quality — versus just the quantity

Sample of Leaf Display

Room	Patient	Time Until Next Turn	Position	Information
2301	M.S.	1:57	L B R	Upright
2302	D.C.	0:14	L B R	
2303	S.S.	TURN DUE 0:03 OVER	L B R	
2304	M.L.	1:51	ⓧ B R	Prone
2305	G.C.	Ambulating	🚶 🚶 🚶	
2306	D.L.	0:42	L B R	Upright

Source: Leaf Healthcare

— of patient mobility, as its algorithms accurately measure patient turn frequency, turn magnitude, and tissue reperfusion time. Through allowing the ability to forecast and thereby mitigate the risk for pressure injuries, IPI optimizes the therapeutic benefit of the system. The company also recently introduced its well-received point-of-care sensor, which provides caregivers instantly accessible and local data and can also be used to provide monitoring in areas without wireless transmission. Frost & Sullivan further notes

that Leaf is expanding its platform to focus on promising newer applications, including ambulation and head-of-bed monitoring.

### **Achieving Clinical Reliability and Validity**

The clinical benefits of the Leaf System were validated in a large, prospective, blinded, randomized-controlled trial (RCT) conducted at Stanford University. The study, which involved almost 1,500 patients and was one of the largest and most scientifically rigorous studies ever conducted in the field, showed that patients protected by the Leaf were 73% less likely to develop a pressure injury. This seminal study has demonstrated, beyond a reasonable scientific doubt, that Leaf dramatically reduces rates of pressure injuries. Stanford hospital is now doing a full commercial deployment of the Leaf System given the proven clinical and financial benefits.

A recent article in *Nursing Open*, a peer-reviewed journal, reported the Leaf Patient Monitoring System improved in-bed mobility levels from a baseline of 64% to 98%.<sup>2</sup> As a direct result of this clinical research, a number of major integrated delivery networks and hospital systems — including Kaiser Permanente and Trinity Health — are adopting Leaf's technology. Additionally, in 2017, Leaf secured a strategic investment and distribution agreement with Smith & Nephew, a billion-dollar medical technology firm, to enable new growth opportunities domestically and internationally. Smith & Nephew's resources further provide Leaf the ability to rapidly scale — an important consideration, as last year alone the company experienced over 100% year-to-year financial growth.

Leaf anticipates continued growth acceleration in upcoming years due to contracts currently in place. While Leaf remains focused on the US market, it is generating a great deal of interest abroad, and recently conducted meetings with hospital administrators in Japan. Leaf is also leveraging its partnership with Smith & Nephew to build traction in the European market. As a result, Frost & Sullivan firmly believes that Leaf Healthcare is uniquely positioned to help change the standard of care for pressure injury prevention worldwide.

### **Conclusion**

*Frost & Sullivan observes how the digital transformation of patient monitoring technology is truly revolutionizing healthcare globally. Leaf Healthcare (Leaf)'s comprehensive mobility monitoring solution leverages world-class medical and technical expertise to tackle one of the industry's most acute issues - pressure injuries. By providing caregivers at every level with the ability to quickly and accurately assess a patient's mobility level, Leaf's cost-effective and clinically-proven technology helps dramatically reduce the risk of pressure injuries.*

*With its clinical efficacy, versatility, and unparalleled client value, Leaf Healthcare earns the 2018 Frost & Sullivan Technology Leadership Award in the Global Patient Mobility Monitoring Market.*

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<sup>2</sup> "Assessing the effect of continual position monitoring on patient turning," *Nursing Open*: [1] Schutt S, Tarver C, Pezzani M. Assessing the effect of continual position monitoring on patient turning. *Nursing Open* 2017 Vol 4; 4.

## Significance of Technology Leadership

Technology-rich companies with strong commercialization strategies benefit from the increased demand for high-quality, technologically-innovative products. Those products help shape the brand, leading to a strong, differentiated market position.



## Understanding Technology Leadership

Technology Leadership recognizes companies that lead the development and successful introduction of high-tech solutions to customers' most pressing needs, altering the industry or business landscape in the process. These companies shape the future of technology and its uses. Ultimately, success is measured by the degree to which a technology is leveraged and the impact that technology has on growing the business.



## Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan Awards follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 <b>Monitor, target, and screen</b>	Identify Award recipient candidates from around the globe	<ul style="list-style-type: none"> <li>• Conduct in-depth industry research</li> <li>• Identify emerging sectors</li> <li>• Scan multiple geographies</li> </ul>	Pipeline of candidates who potentially meet all best-practice criteria
2 <b>Perform 360-degree research</b>	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> <li>• Interview thought leaders and industry practitioners</li> <li>• Assess candidates' fit with best-practice criteria</li> <li>• Rank all candidates</li> </ul>	Matrix positioning of all candidates' performance relative to one another
3 <b>Invite thought leadership in best practices</b>	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> <li>• Confirm best-practice criteria</li> <li>• Examine eligibility of all candidates</li> <li>• Identify any information gaps</li> </ul>	Detailed profiles of all ranked candidates
4 <b>Initiate research director review</b>	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> <li>• Brainstorm ranking options</li> <li>• Invite multiple perspectives on candidates' performance</li> <li>• Update candidate profiles</li> </ul>	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 <b>Assemble panel of industry experts</b>	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> <li>• Share findings</li> <li>• Strengthen cases for candidate eligibility</li> <li>• Prioritize candidates</li> </ul>	Refined list of prioritized Award candidates
6 <b>Conduct global industry review</b>	Build consensus on Award candidates' eligibility	<ul style="list-style-type: none"> <li>• Hold global team meeting to review all candidates</li> <li>• Pressure-test fit with criteria</li> <li>• Confirm inclusion of all eligible candidates</li> </ul>	Final list of eligible Award candidates, representing success stories worldwide
7 <b>Perform quality check</b>	Develop official Award consideration materials	<ul style="list-style-type: none"> <li>• Perform final performance benchmarking activities</li> <li>• Write nominations</li> <li>• Perform quality review</li> </ul>	High-quality, accurate, and creative presentation of nominees' successes
8 <b>Reconnect with panel of industry experts</b>	Finalize the selection of the best-practice Award recipient	<ul style="list-style-type: none"> <li>• Review analysis with panel</li> <li>• Build consensus</li> <li>• Select recipient</li> </ul>	Decision on which company performs best against all best-practice criteria
9 <b>Communicate recognition</b>	Inform Award recipient of Award recognition	<ul style="list-style-type: none"> <li>• Present Award to the CEO</li> <li>• Inspire the organization for continued success</li> <li>• Celebrate the recipient's performance</li> </ul>	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10 <b>Take strategic action</b>	Upon licensing, company is able to share Award news with stakeholders and customers	<ul style="list-style-type: none"> <li>• Coordinate media outreach</li> <li>• Design a marketing plan</li> <li>• Assess Award's role in future strategic planning</li> </ul>	Widespread awareness of recipient's Award status among investors, media personnel, and employees

## The Intersection between 360-Degree Research and Best Practices Awards

### Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry players and for identifying those performing at best-in-class levels.

### 360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



## About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.