FROST & SULLIVAN

BEST PRACTICES AWARDS

Dräger

2020 GLOBAL VENTILATOR TECHNOLOGY INNOVATION LEADERSHIP AWARD

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Background and Company Performance

Industry Challenges

From premature infants to the elderly, all ventilated patients are at risk of serious complications including sepsis, acute respiratory distress syndrome (ARDS), pulmonary embolism, and ventilator associated pneumonia (VAP). In fact, clinical evidence indicates incidence of VAP at about 20% in intubated patients.[1] Mortality in patients with acute lung injury and on mechanical ventilation has been estimated at 38.5%, on average, and found to increase with age; this is at about 24% in people ages 15 to 19 years and increases to around 60% for patients above 85 years.[2] The past decade has seen an increase in both clinical understanding of respiratory pathophysiology and in awareness about potentially adverse events caused by the use of mechanical ventilators. These adverse events have been highlighted more prominently during the 2020 COVID-19 pandemic, wherein many cases of mortality coincide with prolonged use of invasive ventilation. In addition, considerable clinical evidence has been noted for ventilator-induced lung damage as well as VAP that was otherwise preventable if a proper ventilation approach had been administered.[3]

Globally, the rate of preterm births (before 37 weeks of gestation) ranges from 5% to 18% of babies born[4], with many needing ventilator support for assistive breathing due to their partially developed lung capacity. To work with immature lungs, extremely gentle and advanced technologies are required for neonatal ventilation. Babies supported by volume controlled and high frequency ventilation systems typically survive free of lung damage.[5]

During the global COVID-19 pandemic, Frost & Sullivan analysts are now observing how the deployment of different types of ventilator models as well as care provided by healthcare professionals without formal ventilator training has resulted in clinical care variability for ventilated patients. With the advent of value-based care, healthcare providers are under pressure to provide quality care that will minimize patient readmission - as well as length of hospital stay. Frost & Sullivan points out that ventilator-associated complications along with nosocomial infections during intubation are some of the key determinants tied to health outcomes and care experience for ventilated patients. Other key challenges in care delivery to ventilated patients have variable pulmonary compliance due to heterogeneous lung disease and air leaks during non-invasive (mask) ventilation. Pulmonary compliance can be defined as the measure of lungs' ability to stretch and expand, so mechanical ventilation at high volumes has high possibility of damaging the lungs by over-distending lung tissue. Also, during non-invasive ventilation, leakage around the mask is frequently inevitable. If not dealt with properly, leakages may lead to patient-ventilator asynchrony.

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[1] Clinical outcomes related to the incidence of ventilator-associated pneumonia in adults - a cohort study, https://www.scielo.br/scielo.php?pid=S0103-51502018000100211&script=sci_arttext (2018)
[2] Ventilator Associated Event (CDC) https://www.cdc.gov/nhsn/PDFs/pscManual/10-VAE_FINAL.pdf (Jan. 2020)
[3] The Preventability of Ventilator-associated Events. The CDC Prevention Epicenters Wake Up and Breathe Collaborativehttps://www.atsjournals.org/doi/full/10.1164/rccm.201407-1394oc (2014)
[4] World Health Organization, Preterm Birth (Feb 2018)
[5] Volume Targeted Ventilation and High Frequency Ventilation as the Primary Modes of Respiratory Support for ELBW Babies: What Does the Evidence Say? https://www.frontiersin.org/articles/10.3389/fped.2020.00027/full (2020)

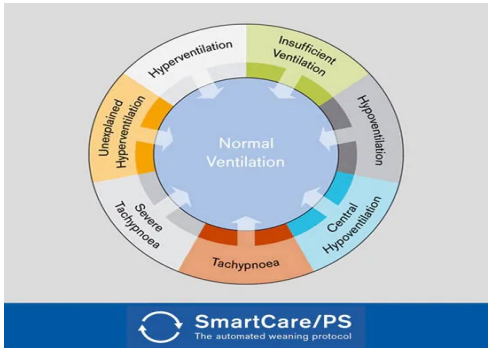
Ultimately, preventing the need for intubation by employing effective non-invasive ventilation eliminates the chance of intubation-associated risks. If this approach is not possible, then properly following effective ventilation strategies to protect the lungs, control infection, and support early weaning all become critical for reducing mortality rates and achieving positive health outcomes.

Technology Leverage and Business Impact

Headquartered in Germany, Dräger is an international leader in the field of medical and safety technology products. Dräger offers its hospital customers anesthesia workstations, ventilators for intensive and emergency care, patient monitoring solutions, as well as neonatal care equipment for premature babies and newborns.

EVITA: High Performance Ventilation with Intuitive Design and Innovative Safety Features

For more than a century, Dräger has remained truly committed to innovation, beginning with its first ventilator, the Pulmotor, in 1907. Since then the company has evolved to consistently upgrade its ventilator technology, and in the emerging age of value-based care, it has become even more patient-centric. For instance, the company's Evita® series offers both invasive and non-invasive ventilation modes as required by different patient groups: adults, children, and neonates. The value of one piece of equipment that works with multiple patient groups helps healthcare providers save on capital expenses -as well as on valuable clinical space.



Source: http://www.Dräger.com

Dräger's multi-mode ventilators address major challenges like pulmonary compliance and patient-interface leakage in addition to delivering advanced technologies that support lung protection and early weaning. For instance, its latest Evita® models offer advanced lung monitoring and diagnostic features such as smart pulmonary view, which provides real-time visualization of pulmonary function in easy-to-interpret graphical output, and automatic low-flow maneuver, which allows for optimal PEEP (i.e., positive end-expiratory pressure) settings. Frost & Sullivan points out that these features are particularly useful, since the percentage of potentially recruitable lung (proportion of lung tissue in which aeration is restored at airway pressures between 5 and 45 cm of water) is extremely variable and strongly associated with variation in PEEP. To deliver advanced weaning support, Dräger created SmartCare®/PS technology, an automated clinical protocol designed to stabilize the patient's spontaneous breathing in a comfortable zone of normal ventilation and to automatically reduce ventilator support, which is a great plus to help restore normalcy.

Other benefits of Dräger' ventilation solutions as identified by Frost & Sullivan include the following:

- Flexible patient mobilization: supports intra-hospital transport and early recovery
- Secured connectivity with other devices: facilitates remote monitoring

- Early warning sign detection and notification: helps with infection control and other complications

Considerable variation exists over the terminology used by different manufacturers to define different ventilation modes, making it quite difficult to compare equipment between manufacturers. In 2007, Robert Chatburn established common ventilator terminology for different ventilator modes as a way to enable effective vendor comparison. On the basis of Charburn's classification, Dräger ventilators were found to have the highest number of volume controlled modes among its competitors.[6] Frost & Sullivan believes that Dräger's status as a technology leader is the result of its continual development of innovative product features with direct focus on clinical benefits, which are seen lacking among many of its other competitors that have been more focused on incremental upgrades related to aesthtic design and ease of use.

Dräger focuses not only on improving clinical outcomes, but also on care delivery by offering more intuitive designs. For instance, its new Evita V500 model provides an easy-to-navigate tablet-like display featuring an advanced color concept. With fewer signal colors present on the screen, users can more readily read and navigate the system. A 360-degree alarm light flashes in colors that correspond with priority and are viewable from any direction in a room or open space, thus helping health care providers place ventilators as needed within various settings (yet maintain a clear line of sight).

Well-positioned for Meeting Growth Demand and Customer Expectations

Considering the spike in global demand, Dräger has significantly increased its average production for the remainder of 2020. This dynamic increase in production has resulted in many countries increasing its ventilator capacity.

Frost & Sullivan recognizes Dräger for its pioneering efforts in development of industry-leading ventilation technology. Time and again, healthcare providers stick with the Dräger brand not just for meeting their clinical requirements, but also on account of Dräger's technology prowess, which can effectively help customers meet a quadruple healthcare aim and value-based care objective. In fact, a number of case studies indicate that use of Dräger's advanced ventilation systems embedded with sophisticated algorithms to achieve better patient breathing synchrony helps in early weaning and recovery.[7] Moreover, Dräger ventilators aid in value-based care by allowing better compliance to therapy and less disruption to respiratory therapist workflow, which might not be a possibility with use of low-cost ventilators that could eventually increase the cost of therapy and decrease the quality of care.

In addition, Dräger offers comprehensive and best-in-class services for healthcare providers with respect to ventilation along with digital solutions for connected care and data insights, which many competitors are striving to match.

These services include:

[6] https://www.hamilton-medical.com/en_IN/E-Learning-and-Education/Knowledge-Base/Knowledge-Base-Detail~2019-02-04~Translating-competitors%27-ventilation-modes-into-Hamilton-Medical-modes~9be2f9a2-f954-4ffe-80e4-f2061cfe5692~.html

[7] https://www.Dräger.com/en-us_us/Hospital/Onlineservices/Case-Studies#Streamlined-Clinical-Workflow-Advances-Quality-of-Care

- Product Service: device maintenance
- Professional Service: IT consulting and system integration
- Products and Services Training: application training
- Multivendor Service: maintenance for entire hospital medical equipment regardless of manufacturer
- Digital Services: network-based services and analysis of device data

Frost & Sullivan is further impressed with Dräger's commitment to addressing clinical variability and provision of better access to training. For instance, the company has collaborated with other leading manufactures to form the Ventilator Training Alliance (VTA), a consortium that created a mobile app for frontline healthcare providers that gives them access to a centralized repository of ventilator training resources. In addition, for better awareness and engagement of neonatal professionals and parents of preterm babies, Dräger provides a neonatal clinical and information knowledge base through its website www.babyfirst.com. For Respiratory Care professionals, a dedicated knowledge portal has also provided adult and neonatal ventilation education at www.draeger.com/abreathahead .

Finally, during the COVID-19 pandemic, Dräger is making its ventilators available to hospitals in North American hotspots through its Intensive Care Online Network (ICON) emergency program. The program offers Dräger customers online continuing education and a 24/7 real-time support system staffed by a team of multidisciplinary clinicians. Initiating these customer and patient focus outreach programs helps Dräger foster its strong customer engagement approach and fortify long-term client relations for future commercial success.

Conclusion

On account of an industry shift towards value-based care and growing awareness about ventilator-associated complications, hospitals are under severe pressure to improve health outcomes as well as quality of patient care, and subsequently improve reimbursement rates. These changes have intensified the need for ventilator solutions that are not simply based on incremental innovation - but are able to deliver substantial clinical value improvement.

Dräger has successfully pioneered innovative clinical protocols for consistently improving its ventilation technology to enhance patient safety and expedite recovery. Compared to other competitors' products, Dräger's Evita ventilator models offer superior technology benefits for both patient safety and user flexibility (i.e., intuitive design). In addition, Dräger has upheld is guiding principle "Technology for life" during the COVID-19 pandemic, helping countries around the world to maintain the functionality of critical infrastructure as well as ensuring that the demand for ventilators is met across the globe by significantly increasing its production.

On the merits of its technology advancements, clinical value excellence, innovative product design, and overall strong performance, Dräger has earned the 2020 Frost & Sullivan Global Technology Innovation Leadership Award.

Significance of Technology Innovation Leadership

Technology-rich companies with strong commercialization strategies benefit from the demand for high-quality, technologically innovative products that help shape the brand, resulting in a strong, differentiated market position.

Understanding Technology Innovation Leadership

Technology innovation 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 it has on growing the business.

Key Benchmarking Criteria

For the Global Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated 2 key factors—Technology Leverage and Business Impact—according to the criteria identified below.

Technology Leverage

Criterion 1: Commitment to Innovation
Criterion 2: Commitment to Creativity
Criterion 3: Technology Incubation
Criterion 4: Commercialization Success
Criterion 5: Application Diversity

Business Impact

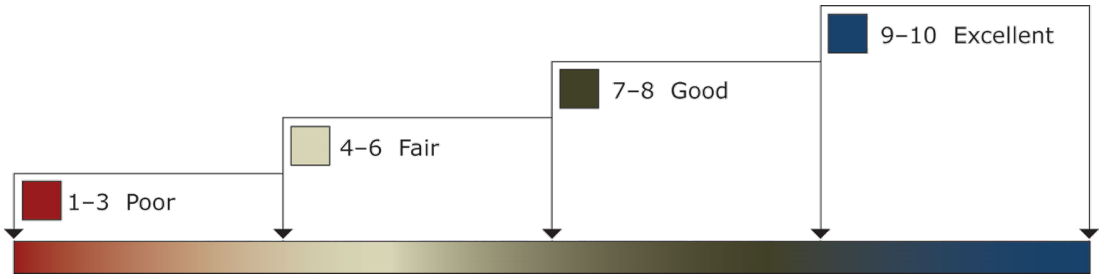
Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Operational Efficiency
Criterion 4: Growth Potential
Criterion 5: Human Capital

Best Practices Award Analysis for Dräger

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows research and consulting teams to objectively analyze performance according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

RATINGS GUIDELINES



The Decision Support Scorecard considers Technology Leverage and Business Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, Frost & Sullivan has chosen to refer to the other key participants as Competitor 2 and Competitor 3.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Technology Innovation Leadership	Technology Leverage	Business Impact	**Average Rating**
Dräger	**10.0**	**9.0**	**9.5**
Competitor 2	9.0	9.0	9.0
Competitor 3	8.5	7.5	8.0

Technology Leverage

Criterion 1: Commitment to Innovation

Requirement: Conscious, ongoing development of an organization's culture that supports the pursuit of groundbreaking ideas through the leverage of technology.

Criterion 2: Commitment to Creativity

Requirement: Employees rewarded for pushing the limits of form and function by integrating the latest technologies to enhance products.

Criterion 3: Technology Incubation

Requirement: A structured process with adequate investment to incubate new technologies developed internally or through strategic partnerships.

Criterion 4: Commercialization Success

Requirement: A proven track record of commercializing new technologies by enabling new products and/or through licensing strategies.

Criterion 5: Application Diversity

Requirement: The development of technologies that serve multiple products, multiple applications, and multiple user environments.

Business Impact

Criterion 1: Financial Performance

Requirement: Overall financial performance is strong in terms of revenue, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition

Requirement: Overall technology strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency

Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high quality standard.

Criterion 4: Growth Potential

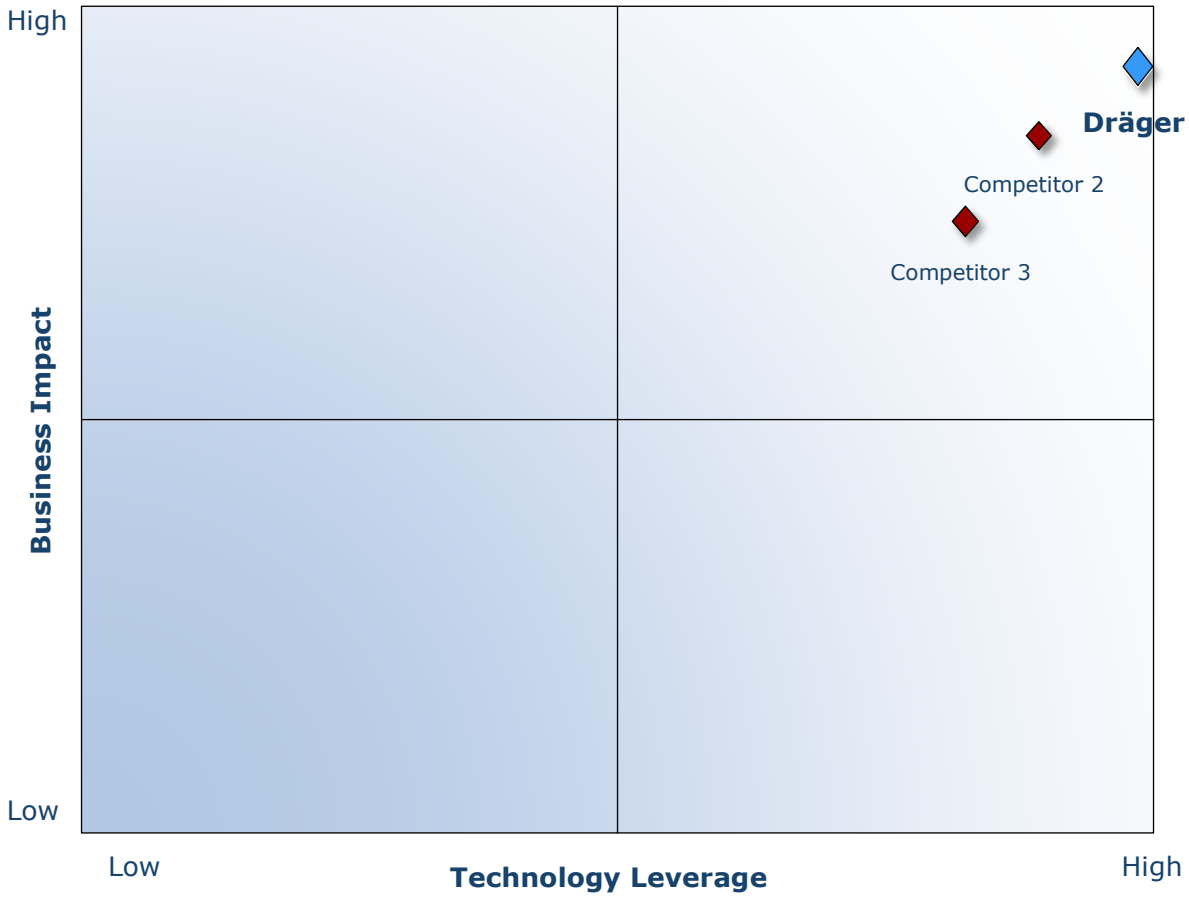
Requirements: Technology focus strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to customer impact through technology leverage, which enhances employee morale and retention.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



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

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

STEP		OBJECTIVE	KEY ACTIVITIES	OUTPUT
1	**Monitor, target, and screen**	Identify Award recipient candidates from around the world	• Conduct in-depth industry research • Identify emerging industries • Scan multiple regions	Pipeline of candidates that potentially meet all best practices criteria
2	**Perform 360-degree research**	Perform comprehensive, 360-degree research on all candidates in the pipeline	• Interview thought leaders and industry practitioners • Assess candidates' fit with best practices criteria • Rank all candidates	Matrix positioning of all candidates' performance relative to one another
3	**Invite thought leadership in best practices**	Perform in-depth examination of all candidates	• Confirm best practices criteria • Examine eligibility of all candidates • Identify any information gaps	Detailed profiles of all ranked candidates
4	**Initiate research director review**	Conduct an unbiased evaluation of all candidate profiles	• Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles	Final prioritization of all eligible candidates and companion best practices positioning paper
5	**Assemble panel of industry experts**	Present findings to an expert panel of industry thought leaders	• Share findings • Strengthen cases for candidate eligibility • Prioritize candidates	Refined list of prioritized Award candidates
6	**Conduct global industry review**	Build consensus on Award candidates' eligibility	• Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates	Final list of eligible Award candidates, representing success stories worldwide
7	**Perform quality check**	Develop official Award consideration materials	• Perform final performance benchmarking activities • Write nominations • Perform quality review	High-quality, accurate, and creative presentation of nominees' successes
8	**Reconnect with panel of industry experts**	Finalize the selection of the best practices Award recipient	• Review analysis with panel • Build consensus • Select recipient	Decision on which company performs best against all best practices criteria
9	**Communicate recognition**	Inform Award recipient of recognition	• Announce Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10	**Take strategic action**	Upon licensing, company is able to share Award news with stakeholders and customers	• Coordinate media outreach • Design a marketing plan • Assess Award's role in strategic planning	Widespread awareness of recipient's Award status among investors, media personnel, and employees

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The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of the 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, resulting in 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, helps clients 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 nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit http://www.frost.com.