Medical Informatics Corp. Recognized for

2021

Product Leadership
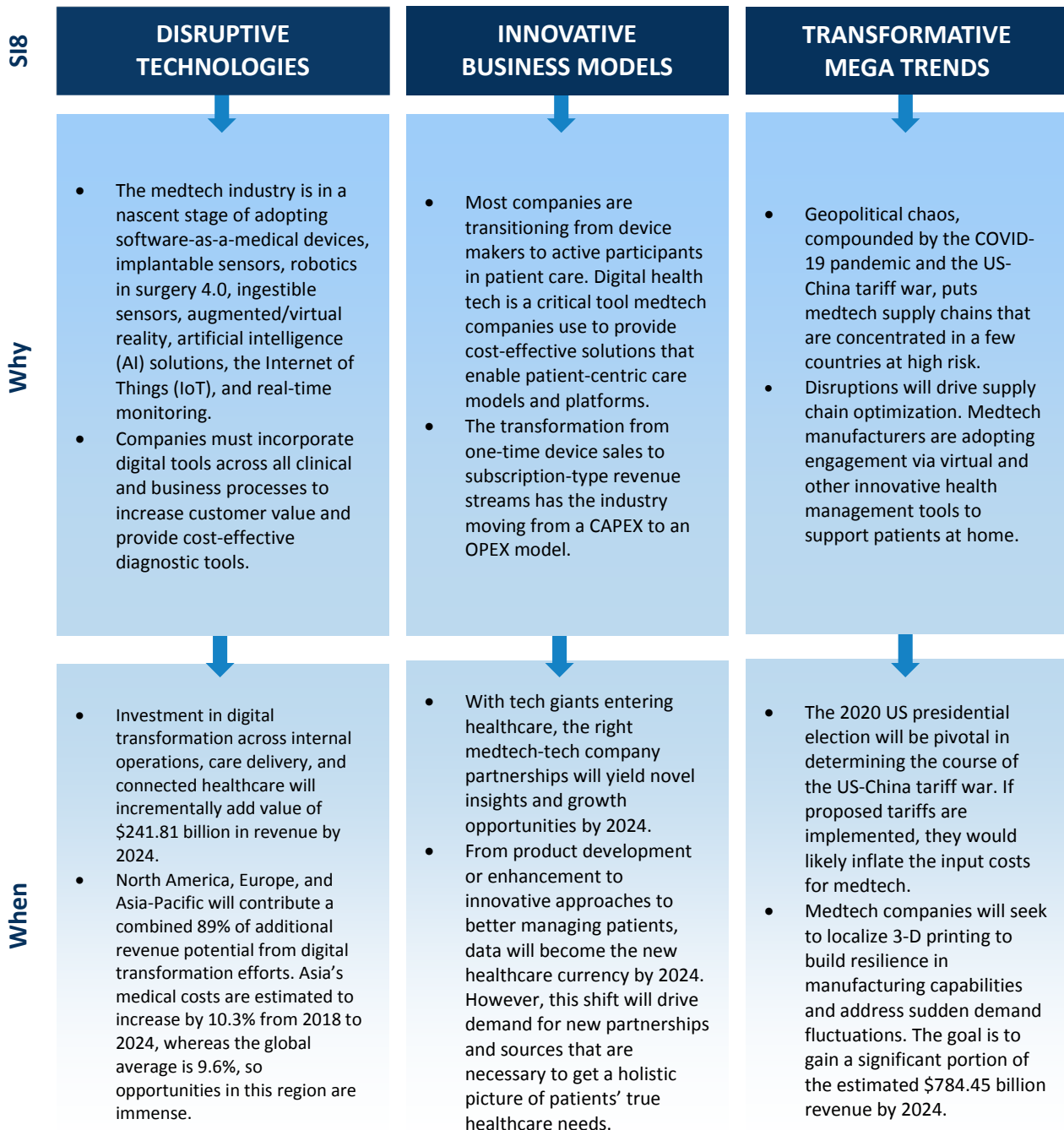
United States
Virtual Critical Care Industry
Excellence in Best Practices

FROST *&* SULLIVAN

Strategic Imperatives

Frost & Sullivan identifies three key strategic imperatives that impact the medtech industry: disruptive technologies, innovative business models, and transformative Mega Trends. Every company that is competing in the medtech space is obligated to address these imperatives proactively; failing to do so will almost certainly lead to stagnation or decline. Successful companies overcome the challenges posed by these imperatives and leverage them to drive innovation and growth. Frost & Sullivan's recognition of Medical Informatics Corp. (MIC) is a reflection of how well it is performing against the backdrop of these imperatives.

SI8

DISRUPTIVE TECHNOLOGIES	INNOVATIVE BUSINESS MODELS	TRANSFORMATIVE MEGA TRENDS

Why

• The medtech industry is in a nascent stage of adopting software-as-a-medical devices, implantable sensors, robotics in surgery 4.0, ingestible sensors, augmented/virtual reality, artificial intelligence (AI) solutions, the Internet of Things (IoT), and real-time monitoring. • Companies must incorporate digital tools across all clinical and business processes to increase customer value and provide cost-effective diagnostic tools.	• Most companies are transitioning from device makers to active participants in patient care. Digital health tech is a critical tool medtech companies use to provide cost-effective solutions that enable patient-centric care models and platforms. • The transformation from one-time device sales to subscription-type revenue streams has the industry moving from a CAPEX to an OPEX model.	• Geopolitical chaos, compounded by the COVID-19 pandemic and the US-China tariff war, puts medtech supply chains that are concentrated in a few countries at high risk. • Disruptions will drive supply chain optimization. Medtech manufacturers are adopting engagement via virtual and other innovative health management tools to support patients at home.

When

• Investment in digital transformation across internal operations, care delivery, and connected healthcare will incrementally add value of $241.81 billion in revenue by 2024. • North America, Europe, and Asia-Pacific will contribute a combined 89% of additional revenue potential from digital transformation efforts. Asia's medical costs are estimated to increase by 10.3% from 2018 to 2024, whereas the global average is 9.6%, so opportunities in this region are immense.	• With tech giants entering healthcare, the right medtech-tech company partnerships will yield novel insights and growth opportunities by 2024. • From product development or enhancement to innovative approaches to better managing patients, data will become the new healthcare currency by 2024. However, this shift will drive demand for new partnerships and sources that are necessary to get a holistic picture of patients' true healthcare needs.	• The 2020 US presidential election will be pivotal in determining the course of the US-China tariff war. If proposed tariffs are implemented, they would likely inflate the input costs for medtech. • Medtech companies will seek to localize 3-D printing to build resilience in manufacturing capabilities and address sudden demand fluctuations. The goal is to gain a significant portion of the estimated $784.45 billion revenue by 2024.

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. MIC excels in many of the criteria in the Virtual Critical Care space.

AWARD CRITERIA

Product Portfolio Attributes	Business Impact
Match to Needs	Financial Performance
Reliability and Quality	Customer Acquisition
Product/Service Value	Operational Efficiency
Positioning	Growth Potential
Design	Human Capital

Background

The US virtual critical care solutions market is expected to generate $1 billion in revenue by 2025, from $652 million in 2020, registering an impressive compound annual growth rate (CAGR) of 11.9%. With the COVID-19 pandemic, the demand for virtual intensive care units (ICUs) has been more acute, with the need to manage a large number of critical care patient admissions remotely. Additionally, the shortage of clinicians is estimated to increase from 22% to 35% in the next 10 years, leaving gaps in quality care. Although the virtual ICU concept has been around for more than two decades, adoption/scale up has been slow, mainly because of the high cost of implementation. For example, setting up a virtual ICU usually requires an upfront investment in dedicated infrastructure, which involves hardware, software, and services. Setting up a typical, high-end virtual ICU facility could cost upwards of $50,000 per ICU bed. In addition, managing the data integration, interoperability, and security can be challenging.

> *"The virtual critical care solutions market has long been plagued with a slow adoption rate because of high investments in both money and time. MIC has successfully addressed this key issue by designing the first US FDA-approved, scalable surveillance and analytics platform for ICUs."*
>
> *- Kaustubh Savant, Senior Industry Analyst*

A unique Software-as-a-service (SaaS)-based Solution for Providing Patient-centric Care

Based on its independent analysis, Frost & Sullivan recognizes MIC for its leading contribution in advancing solutions in the virtual critical care space. Founded in 2010, Houston-based MIC is setting a new standard of care through its SaaS-based solutions. For example, Sickbay™ is MIC's US Food and Drug Administration (FDA)-cleared platform for virtual care and analytics, classified as a class II medical device. Sickbay unlocks and unifies all patient data, including high-fidelity waveforms from networked bedside monitoring devices, such as cardiac monitors and non-networked devices, such as NIRS, cardiac output monitors, and ventilators integrated with other patient data from electronic health record (EHR) solutions (e.g., labs and medications). Sickbay currently offers a variety of web-based modules to transform data into actionable insights:

PatMon

Access real-time waveforms for remote viewing, command centers, and home integration

MultiMon

Create vICUs, patient watch lists, and more for multiple patients - across vendors, units, and facilities

Patient Hx

View patient history from 1 second to 1 year, annotate events and waveforms, and automate ECG strips to your EMR

vICU

Create flexible, scalable vendor agnostic command centers with up to 100 patients across units and facilities

Alarm Manger

Quickly meet NPSG goals, automatically track KPI's across all monitored patients, and reduce alarm noise at the source

CTM+

Monitor up to 100 tele patients on single screen across units and facilities. Automatically update patient status and annotate events and waveforms.

Rapid Risk Scores

Expedite the calculation of common risk scores to decrease patient risk

Rapid Research

Triple your research grant output by manipulating and viewing data on the fly using standard development tools

Source: www.michealthcare.com

Many of these applications are combined to provide a solution suite to solve various clinical use cases on the same platform. For example, the vICU suite for virtual critical care is a combination of MIC's remote monitoring suite (PatMon, MultiMon and PatientHx) and the near real-time risk score calculator built into a patient list from the Rapid Risk Score application to support virtual rounding based on a

measure of near-real-time aggregated risk across all patients. In addition to remote monitoring bundles such as this, MIC has an award-winning patient-centered alarm management suite, which is an analytics bundle that accelerates the ability to do research and algorithm development. Moreover, this solution transforms those algorithms into new software-based risk calculators, protocol monitors, trajectory monitors, and/or patient-specific monitors on the same platform. MIC will continue to release self-developed, partner-developed, and client-developed applications to the platform while also offering an open application programming interface (API) and standard development kit (SDK) to hospitals so they can download aggregated data into their own machine learning (ML) and artificial intelligence (AI) stack. This single-platform approach is designed to help hospitals remove and avoid single-point solutions and create a singular architecture that aggregates, unifies, and time synchronizes patient data that has never been available before, deploy patient-specific applications on top of that platform, and develop and deploy their own patient-centered AI at scale.

MIC has several key strategic alliances that set it apart from others in the space, including alliances with Intel, Dell, and Cisco. MIC specifically designed Sickbay to handle the extreme storage, compute, and scaling requirements of a distributed, clinical platform for remote patient monitoring and real-time analytics. The platform runs on the latest Intel technologies, including Xeon processors; storage solutions, such as Optane; and Intel-optimized python libraries to accelerate ML and AI research for physiologic waveform and other time-series data sets and to demonstrate MIC's ability to integrate and process data from varied sources in different formats. Sickbay's use of hyperconverged, tiered storage architectures enables efficient cost-versus-performance deployments. Sickbay is validated on the latest server hardware from Dell and on long-term storage solutions, such as Isilon and PowerStore. Sickbay's Virtual ICU and Central Telemetry Monitoring solutions are best viewed on Dell's large-scale displays, providing a seamless and elegant web-based workflow. In February 2020, MIC released its latest strategic alliance and partnership with Cisco to leverage the existing networking architecture at hospitals for medical device integration. This revolutionary new design eliminates the need for expensive, dedicated computer hardware to be installed and maintained at every bed in a hospital. Leveraging this design, Sickbay's MDI technology allows a hospital to deploy and scale data collection rapidly from diverse medical devices, ensuring that clinical staff can access near-real-time waveforms synchronized across all medical devices (even non-networked devices such as ventilators) rather than relying on utilizing only poorly sampled, discrete vitals provided from current device connectivity solutions. Access to time-aligned, synchronized waveform data at scale is a foundational requirement for the future of virtual care and patient-centered AI, and the Sickbay platform is the leader in this space.

Compared to competing solutions in the market, Sickbay offers strong differentiation with multiple factors, including vendor-agnostic multi-patient viewing of up to 100 patients across units and facilities on PCs, deployment of virtual care and AI into other inpatient settings outside the ICU, alarm management applications, apps and open APIs to develop and deploy near-real-time predictive analytics, low up-front investment cost, superior customization, scale-up speed, and an SaaS model solution with an ever-evolving roadmap of applications that can be deployed on a single architecture. With multiple factors, such as dependence on vendor-specific middleware, lack of a unified platform,

and a focus on specific protocols/areas, many market participants are lagging behind in terms of upgrading their solutions to make them more customizable as per clients' requirements.

ECRI, in its evaluation report[1] on MIC's Sickbay solution, highlights the solution's features, which, apart from offering improved clinical and workflow efficiencies, deliver on superior customization, safety, user experience, maintenance, and value for the money. For example:

App-based solution for customization: MIC's Sickbay platform is a compilation of different web-based applications targeting several functions, such as multiple patient monitoring, alarm management strategy, predictive analysis for patient deterioration, and research insights, which can be licensed based on specific hospital virtual care requirements.

Outdated data notification: Outdated data can lead to incorrect clinical decisions. Sickbay's built-in mechanism detects the delay in data transmission and immediately notifies clinicians accessing that data.

Secured communications: Sickbay offers secured password authentication for sharing important clinical information over both mobile devices and computer systems. Additionally, the web-based platform includes several security features, such as SSL encryption, session timeout, and single-sign-on authentication. Strong data security allows for improved communication, and the solution provides metrics for correct patient identification.

Good user experience and low maintenance: The system has a built-in mechanism to monitor the performance of different data-sharing interfaces and notify the vendor in case of any perceived interruption, thus allowing malfunctions to be taken care of in a timely manner. During the platform evaluation survey by ECRI in 2017, users were found to be satisfied with both the solution and the vendor support. In addition, Sickbay offers better value for the money in terms of lower ownership cost, which is estimated to be between $100,000 and $500,000 over 10 years for 100 hospital beds. This cost is comparatively lower than the typical cost of setting up in a conventional infrastructure-heavy virtual care facility, which can cost up to $50,000 per bed per year.

Building Strong Client Relationships and Fostering Revenue Growth

The virtual critical care industry can be demanding, making it vital for successful companies to deliver on their promised solution benefits; there are few, if any, second chances to achieve success in this market. MIC has achieved success by primarily focusing on meeting clients' needs and providing high-quality care solutions. The company views each client's needs as unique problems to solve. For example, as part of its technology advantage and customer-focused efforts, MIC quickly expanded the ICU facility at Houston Methodist Hospital, which is currently recording data and remotely monitoring over 1,400 beds across 7 facilities. The hospital went live with its vICU service line in March 2020, just prior to the pandemic surge, starting with 45 beds in the main hospital and quickly expanding to over 350 beds across 8 facilities, including COVID-19 care units and surge areas such as emergency departments. Integrated data available within the vICU includes real-time and retrospective waveform data from cardiac monitors, ventilators, pulse oximetry, and other

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[1] ECRI; November 16, 2017; "Evaluation: Medical Informatics Corp. Sickbay Clinical Intelligence Platform Remote Viewing Solution"

biomonitoring devices, as well as labs and medications from the EMR. In addition to monitored data, Houston Methodist leveraged Sickbay to create 15 near-real-time acuity scoring algorithms that are combined to create an aggregate measure of risk through the vICU patient list to improve virtual rounding of the most at-risk patients. Houston Methodist is in the process of expanding its Virtual Operations Center functionality to other areas throughout the hospital system, supporting multiple telemedicine service lines and additional monitoring initiatives, such as central telemetry and telesitting.

> *"MIC's Sickbay platform is unique in the industry based on the flexibility and customization it offers to health systems that can build the solution on top of their existing infrastructure, without disturbing workflows, and can incorporate custom modules based on clinical and research requirements."*
>
> *- Kaustubh Savant, Senior Industry Analyst*

Since these deployments, Sickbay is receiving over 2,000,000 hits per month to the system.

To help hospitals enable virtual care monitoring and AI as fast as possible during the COVID-19 pandemic, the company launched its Scale to Serve program, in collaboration with Intel, in April 2020 as part of Intel's Pandemic Response Technology Initiative (PRTI).[2] MIC and Intel have extended this program until the end of 2021 to ensure that hospitals and health systems have the virtual care solution required for the short-term needs of pandemic waves, in addition to creating the ability to pilot and test the SaaS model as an alternative and creating the foundational architecture to support data-driven medicine at scale.

The healthcare space has a large volume of critical patient data; therefore, companies in this industry must provide integrated and positive outcome-backed offerings. MIC's Sickbay platform is easily integrated with multiple devices and can be customizable based on clients' existing infrastructure. In addition, the hospital staff can be easily trained because of the solution's intuitive web-based user interface. All of MIC's solutions offer benefits to diverse health stakeholders, with the following highlighting some stakeholder feedback, as stated on MIC's health website:

"At the bedside, the order and trending of patient signals are important. For example, if oxygen drops before blood pressure, it indicates a different issue than blood pressure dropping before oxygen... MultiMon allows for these patterns to become clearer." – Attending, Cardiovascular Intensive Care Unit (CVICU)

"PatMon allows me to remotely view ventilator data for patients. This is something that I previously could only do at bedside. Now I can call up a patient of interest on my computer in my office, and observe their recovery or deterioration." – Director of Anesthesiology Fellowship

Currently, a large number of hospitals are using diverse platforms and solutions to manage their critical/acute care needs, such as alarm management software and clinical decision support tools. These fragmented solutions result in excessive overall spending and efforts over the long run because each solution must be separately purchased, implemented, and supported/serviced. In addition, multiple solutions are difficult to manage and scale because they create disparate workflows.

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[2] Intel; April 7, 2020; "Intel Commits $50 Million with Pandemic Response Technology Initiative to Combat Coronavirus"

MIC's Sickbay solves this major solution fragmentation problem by providing the following:

- One platform
- One point of integration
- One implementation charge
- Web-based app that can be added at any time without additional integration fees
- Unlimited number of medical devices with no interface fees
- Charged by the bed with unlimited users
- Open API so that hospitals can create their own clinical, operational, or patient-centered analytics

Since receiving Series A funding in 2019, MIC has more than doubled its number of employees and client sites. Many US hospitals have been leveraging Sickbay to expand their ICU bed and staff capacity in critical care units; create flexible virtual command centers with the same clinical workflow in other inpatient care areas, such as oxygen saturation (SpO2) and telemetry, to reduce ICU admissions; enable flexible virtual rounding and mentoring from conference rooms, offices, and homes to expand capacity; develop and deploy real-time patient-centered acuity scores to get ahead of patient health status deterioration; accelerate research and algorithm development; and create new patient-centered analytics.

According to Emma Fauss, PhD, Chief Executive Officer of MIC, "What we've seen across the life of our company is that clinical workflow problems are complex. They are often not one monolithic problem, but a set of interrelated yet distinct problems. We believe that our technology provides a flexible toolset and framework for solving these complex clinical problems in a way that matches the unique needs of a particular institution. The healthcare community embraces our technology because it has an immediate need that requires a flexible and novel approach. If it reduces a problem that existed before, if you have a tool that drives value, people will continue to use it, driving increased efficiencies and value to both patient and provider."

Conclusion

With its FDA-cleared Sickbay platform, Houston-based MIC offers a unified solution for varied clinical requirements and workflow management in critical care units, with the ability to expand across all inpatient settings with a unified workflow that can be scaled with ease. The solution offers a nimble, comprehensive, cost-effective, and easy-to-scale alternative to existing market solutions. In addition, Sickbay's commercial success is evident based on strong backing from technology participants and the fast adoption/scale up from leading health systems.

For its strong overall performance, Medical Informatics Corp. (MIC) is recognized with Frost & Sullivan's 2021 Product Leadership Award in the US virtual critical care industry.

What You Need to Know about the Product Leadership Recognition

Frost & Sullivan's Product Leadership Award recognizes the company that offers a product or solution with attributes that deliver the best quality, reliability, and performance in the industry.

Best Practices Award Analysis

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Product Portfolio Attributes

Match to Needs: Customer needs directly influence and inspire the product portfolio's design and positioning

Reliability and Quality: Products consistently meet or exceed customer expectations for performance and length of service

Product/Service Value: Products or services offer the best value for the price compared to similar market offerings

Positioning: Products serve a unique, unmet need that competitors cannot easily replicate

Design: Products feature innovative designs, enhancing both visual appeal and ease of use

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create on-going growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

Key Impacts:

- **Growth Pipeline:** *Continuous flow of Growth opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our six analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)