CitiusTech

Shaping Healthcare Possibilities

Leveraging predictive analytics to support maintenance of medical services

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Leveraging Predictive Analytics: To support maintenance of medical services

Insights

- MedTech organizations have traditionally followed a reactive approach in servicing medical devices and often face challenges such as unplanned device breakdown, reduced customer satisfaction, and high costs associated with field visits by service engineers.

- A more proactive approach can be adopted where predictive maintenance of devices ensures problems with the equipment are fixed even before they fail.

- Predictive maintenance helps in failure prediction by monitoring device data, analyzing anomalies and providing recommendations to service engineers in real time.

- By adopting predictive maintenance of medical devices, MedTech organizations can reduce field visits and associated costs by over 20%. Besides optimizing costs, predictive maintenance helps improve equipment reliability, enhance service quality, and optimize inventory levels of device parts.

Introduction

With the increasing number of connected medical devices, remote device monitoring has become a strategic area of focus for MedTech organizations to optimize the operational costs of devices in the field. Medical devices require remote device monitoring, and updates to ensure devices are working as desired, device health is a field that should receive more attention from all healthcare entities, including device manufacturers as well as payers and providers. As the industry is in constant demand to adopt emerging technologies to improve overall clinical outcomes and customer satisfaction, having a strategy in place to help providers maintain or upgrade medical devices appropriately will support an ongoing relationship between all parties.

Traditionally medical device maintenance is driven by on-premises maintenance of devices by field service engineers. However, with adoption of connected medical devices, healthcare providers have been seeking ways to rapidly change that approach, which opens the door to make device maintenance a strategic imperative within organizations. Medical device organizations not only want to remotely manage their devices but also want to ensure they can service the devices even before they fail – or provide recommendations regarding available upgrades.

Addressing medical device maintenance challenges

To become a true strategic partner, medical device organizations must first assess how they can evolve their maintenance processes to use technology and predictive tools most effectively. To begin, there must be an underlying understanding of when a device is trending toward a possible failure. By incorporating predictive analytics into servicing strategy, medical device organizations can reduce the number of times a field service engineer must visit provider sites to perform a thorough analysis of the device. This approach will not only improve the quality and reliability of the device itself but extend its "life" and provide additional safety and improved performance. Further, through the adoption of innovative technology solutions, medical device organizations can reduce field service visits by up to 20% while achieving significant savings due to proactive maintenance of devices.

Introducing predictive strategies into medical device maintenance processes can also have a positive effect on compliance with industry regulations related to patient safety. Predicting device failure can help organizations anticipate and address possible safety risks and anomaly detection before they make a larger or more critical impact.

5 Critical steps to properly implement a predictive analytics solution

Implementing an effective predictive analytics strategy into your medical device maintenance processes may seem like a daunting task, but AWS can help simplify deployment of device-agnostic, cost-efficient, and scalable solutions for predictive maintenance using these five critical steps:

1. **Connect devices to analytics platform:** Enable medical devices to stream real-time device health data to a cloud-based analytics platform by ensuring the IoT gateway is appropriately set up. This setup facilitates efficient data exchange between the devices and connected systems. Utilize AWS IoT Core to connect the devices to an analytics platform hosted on AWS. Additionally, AWS IoT ExpressLink can be used to connect devices seamlessly to the cloud, allowing integration with a wide range of AWS services.

2. **Track device KPIs:** Once the devices are connected, they can start using descriptive device analytics to generate business insights. Tracking device health key performance indicators (KPIs) or measures will help ensure overall device performance aligns with the medical Providers' needs. Tracking KPIs should include utilization, downtime, and potential risks due to device failure. Leverage Amazon QuickSight or Amazon Managed Grafana for building and publishing interactive dashboards that can be accessed by field engineers, service managers, or CXOs using mobile devices or web applications.

3. **Identify device anomalies:** Advanced analytics solutions for detecting adverse device behavior can assist in predicting overall device health and proactively monitoring potential risks or threats. Prediction of device breakdown can also help medical device organizations minimize unnecessary field visits. Amazon Kinesis can be utilized to ingest real-time streaming data from medical devices efficiently. Furthermore, to drive analytics, AWS IoT Analytics anaged services

can be used to quickly operationalize preventive maintenance using telemetry data from devices without the complexities of managing the IoT analytics platform.

4. Monitor device health score: Consistently reviewing a device's health score can not only help identify those devices that need additional proactive maintenance but help prevent further deterioration. AWS IoT Events can be used to detect abnormal behavior in devices and send alerts to field service engineers.

5. Build service assistants: Assisting technologies like GenAI can help build chatbots or virtual assistants that can be leveraged to help field service engineers and technicians streamline processes and systems. These operating bots must be nimble and capable of quickly adapting to changes and varying feedback. Service assistant chatbots can troubleshoot device anomalies quickly and can be built using Amazon Lex. AWS also provides managed solutions for addressing the

needs of predictive maintenance of devices. AWS Monitron can capture data from medical equipment, securely send the data to the cloud, and analyze the data for anomalies using machine learning. AWS Monitron includes hardware as well as software solutions: sensors, gateway, anomaly detection service, and mobile app for analytics and real-time alerts.

Using data to effectively drive proactive maintenance depends on the mix of device and operational data currently being generated by medical device service teams and medical providers. Most data will fall in one of two categories:
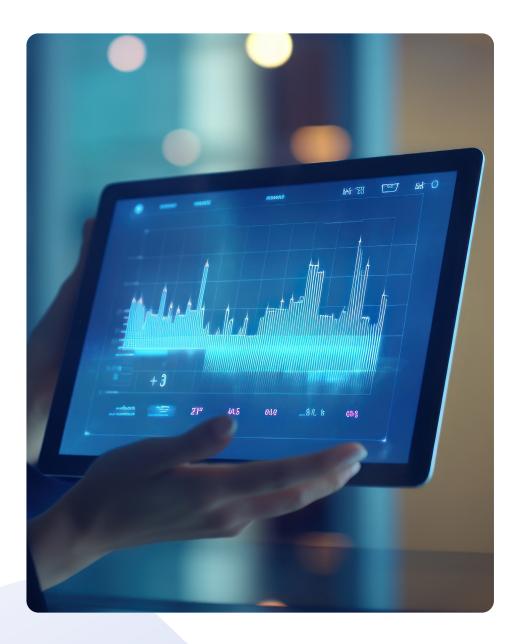
- ShapeStructured Data: The year of production, make, and model of the device, warranty period, machine utilization, inventory, CRM, etc.

- ShapeUnstructured Data: Maintenance history, device or logs, temperature, flow pressure, coolant levels or other sensors data.

By combining the two types of data into highly customized predictive algorithms, medical device companies can identify devices showing deviation from normal behavior based on their age, service history, use and more. Predictive analytics solutions can provide device health alerts days, weeks, or even months before actual failure.

The devices that require maintenance can be proactively scheduled for servicing before they go offline and cause the medical provider unanticipated downtime. In addition, medical device organizations can improve field service engineer's efficiency by providing them AI-enabled service assistant tools.

An added benefit to proactive maintenance is that medical device organizations can help optimize inventory levels of spare parts stocked at facilities. By integrating data from operational systems such as enterprise resource planning (ERP) or inventory management systems, a device organization can limit inventory tie-up while ensuring out-of-stock parts does not occur.

The way ahead for medical sevice maintenance

Medical device organizations need to create a unified device data platform to act as a single source of truth across devices that combine device, clinical and operational data. Once the unified data is available, organizations will be able to generate business insights and understand trends (utilization, downtime, labor cost, shipping cost, etc.) to drive proactive maintenance of devices.

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