



Proactive Digital Service for MR Scanners: Evaluating User Impact

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When a magnetic resonance imaging (MR) system experiences unplanned downtime, critical aspects of healthcare delivery can be negatively impacted, including:

- Revenue flow and cost control
- Patient convenience and satisfaction
- Timeliness of diagnosis and treatment
- Staff and departmental efficiency

To address these concerns, GE Healthcare developed OnWatch™, a solution that remotely monitors the performance of an imaging device and proactively performs service. This technology has been deployed on various GE devices including MR systems. Using data-driven prediction tools, OnWatch monitors specific system components and alerts GE engineers to variations in performance. It also forecasts maintenance needs to enable reduced disruption to operations. Considering that even a 1% improvement in MR system uptime can protect up to \$20,000 or more of potential revenue, reducing such unplanned downtime remains a key objective for healthcare providers.⁴

In an effort to quantify the user impact of OnWatch proactive digital services for GE MR systems, we evaluated several service performance metrics over a year of operation, comparing data between systems with OnWatch and those without.

Key findings

Among the key findings, OnWatch services:

- Reduced unplanned system downtime by 21%⁵
- Reduced time to service systems by 39%⁵
- Enhanced providers' flexibility to schedule corrective service actions

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⁴Internal calculation based on data from Decision Resources Group (2016) and CMS.gov (2016)

⁵Refer to page 4 for details of methodology

OnWatch Performance Metrics Evaluated

The study focused on 298 GE Signa MR systems: 86 units with OnWatch service and 212 units in the control (non-OnWatch) group. (See fuller discussion of methodology at end of paper.)

The following service performance metrics were measured for each system and compared between the two groups for a full year:

- **Average Planned Downtime:** Time elapsed during a scheduled corrective action service event generated by a system-initiated service request from start of service to completion.
- **Average Unplanned Downtime:** Time elapsed between a user-initiated corrective action request for service and when the system is operating again. It describes the total unplanned time elapsed during which the equipment is not functioning and requires service.
- **Average Total Downtime:** The sum of Average Planned and Unplanned Downtime.
- **Average Time to Service:** Time elapsed between the start and the completion of work for both types of service requests (user-initiated and system-initiated). It is calculated by averaging the times to repair over a specified period.
- **Average Disruption Rate:** The number of corrective service actions needed to bring the system back to operational status after unplanned downtime. Only user-initiated service requests were used for this Disruption Rate as these service events cannot be scheduled to avoid interference with patient workflow.

Results



Control



OnWatch - **21% less**

Average unplanned downtime per system

Average Unplanned Downtime for OnWatch systems averaged 21% less than the Control group over the time period.¹

Average Total Downtime (cumulative service time) per system per year was 15% less for the OnWatch group versus the Control group.



Average planned downtime as % of total downtime

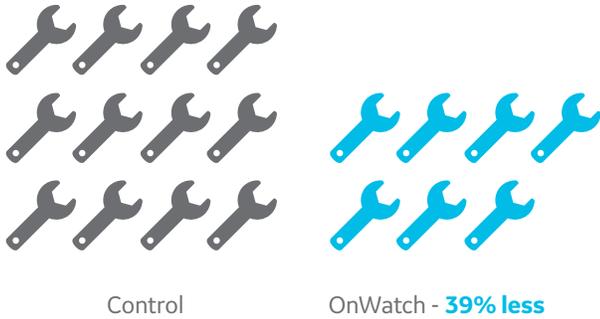
Average Planned Downtime as a percentage of Total Downtime per system is higher for the OnWatch Group (9.5%) than for the control group (3.2%), suggesting that OnWatch enables providers to schedule service actions that end up reducing the overall amount of unplanned downtime in the future.¹

Inside OnWatch Technology

OnWatch is fully automated and powered by GE Healthcare's InSite™ Remote Connectivity Platform. It is equipped with a 24/7 automated technical data push and analysis, automated fault recognition algorithms, and automated service request generation with traceability.

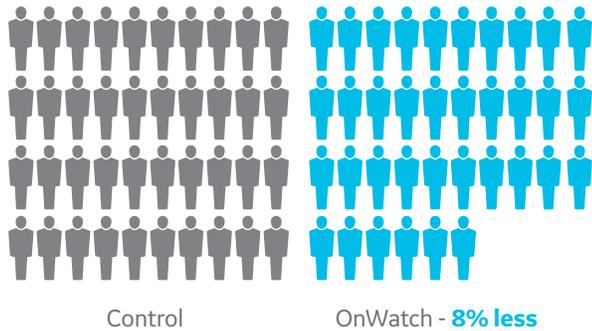
OnWatch continuously monitors various system parameters and signals potential errors and malfunctions often before users are aware of them. On detection of an error, a status message is automatically sent to GE Healthcare online experts, who can then initiate corrective action.

¹Refer to page 4 for details of methodology



Average time to service

Average Time to Service (user-initiated and proactive system-generated service requests) was significantly lower for the OnWatch group. On average, corrective service actions took 39% less time for OnWatch-enabled systems.¹ This difference indicates that OnWatch system-generated service requests are more efficient than customer-initiated service requests, enhancing the ability to proactively troubleshoot, diagnose, order/ship parts, and make repairs in less time. In addition, owing to the planned aspect of proactive service events, the response time and travel time do not impact users.



Disruption rate: average number of service events

The Disruption Rate, as expressed by the Average Number of Service Events, was 8% lower for the OnWatch group versus the Control group.¹ This indicates that OnWatch not only reduces the duration of service events in terms of lower system downtime, but also decreases the frequency of service events experienced by providers.

Discussion

OnWatch is an innovative service technology designed to predict and proactively limit disruptions of systems while providing a less stressful experience for healthcare providers. OnWatch is equipped with proactive and predictive technologies combined with remote support that shifts the risk of unplanned downtime to planned corrective service actions that can be scheduled to reduce disruptions.

The enhanced service performance possible through OnWatch creates value for several operational areas:

Imaging department directors can use OnWatch to:

- Protect patient flow by scheduling service actions for off hours
- Maintain departmental efficiency by reducing unplanned downtime
- Maintain clinical quality by ensuring devices are operating at optimal performance
- Enhance patient and staff satisfaction while helping manage attrition and related recruiting/training costs

Biomed directors can leverage OnWatch to help staff:

- Spot problems early to enable proactive solutions
- Accelerate maintenance by ordering parts and scheduling field engineers in advance
- Enhance system reliability through proactive parts replacement and maintenance planning
- Help improve productivity and gain time to maintain other devices

Hospital and health system administrators can rely on OnWatch to:

- Reduce negative impacts to patients and referring physicians from exam cancellations/rescheduling
- Help protect the organization’s reputation for high quality care delivery
- Widen access to imaging care with the potential to gain incremental revenue
- Support cost control through prevention of unplanned, expensive service events

¹Refer to page 4 for details of methodology



Methods and Metrics

The initial data set included the full US population of GE Signa HDXT systems. As a first step, we focused on systems which were installed and covered under a GE Healthcare service contract for the entire year of 2015. We filtered out systems upgraded to more recent platforms during 2015 to maintain consistency of the targeted MR population of our study. Next, we filtered out systems with service record histories that had data issues, e.g. requests for service never closed or related administrative tasks impacting the measurement accuracy for our study. The final data set yielded 298 systems, including 86 in OnWatch group and 212 in the Control (non-OnWatch) group.

The metrics were measured and compared between the OnWatch group and the Control group over the full year 2015. Service events were defined as corrective action service requests that were opened and closed during the measurement period and included both user-initiated and system-initiated service requests. Service events that were opened during, but closed after the end of the measurement period were excluded.

Limitations of the Study

In this study, all corrective action service events were considered to have equal priority. No sorting was performed to differentiate the level or type of service needed. GE Healthcare internal data show that due to workflow needs regarding MR scanners any type of disruption is impactful because it means you cannot perform scans as scheduled.

OnWatch does not monitor all technical issues occurring in a specific device. Therefore, measuring the OnWatch performance over all sets of devices randomly selected dilutes the performance. A closer analysis of devices that were not operating at optimal performance may reveal more consistent metrics on the intrinsic performance of OnWatch. This study was based on an assumption of uptime covering 24 hours per day, 7 days a week.

Imagination at work

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