SIEMENS Healthineers

White paper

Streamline operations and improve patient experience with RTLS

RealTime Location Solutions (RTLS) provide new insights into operational efficiency and performance

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Value Partnerships

Special Edition



Executive Summary

Healthcare macro trends have led to a heightened interest among healthcare administrators in improving efficiency and optimizing patient experience. The rise of value-based care paradigms like performance-based reimbursement, coupled with constant reimbursement pressures, and the emergence of patients as healthcare consumers are shaping the way hospitals and other provider organizations operate. These factors, along with a short supply of qualified employees, are driving healthcare executives to transform care delivery to increase efficiency while simultaneously improving both patient and staff experience.

RealTime Location Solutions (RTLS) are a group of solutions and technologies that automatically track and locate equipment, material, personnel, or anything else that can be tagged with a Radio-Frequency Identification (RFID), infrared, Bluetooth or similar transmitter.

RTLS data can be used to increase the efficiency of workflows, to streamline patient flow, and to provide insight into the overall performance of the hospital. RTLS offer powerful inventory and equipment management capabilities and can be leveraged to increase patient experience and deliver additional performance benefits to the organization. A successful RTLS implementation requires more than just technology – it requires thorough planning and solution design, as well as ongoing data-based consulting and change management to deliver an RTLS that will fulfill its specific functions and help the healthcare organization achieve its goals.

Establishing RTLS at a healthcare facility can pay enormous dividends, especially when the implementation is performed by a partner that can help navigate the complexities of the solution itself, and the specific requirements of healthcare institutions. Healthcare executives should look for partners with these key qualifications:

- Ability to deliver on the full RTLS value chain
- Deep understanding of clinical and non-clinical healthcare processes
- Provider of reliable technology
- Proactive and preventive service
- Ability to demonstrate return on investment (ROI)

RTLS are delivering tangible results to healthcare provider organizations right now – including increased patient throughput, improved patient experience (e.g., due to reduced wait times), and greater operational efficiency (e.g., through automated processes, reduction of re-purchasing, and less time spent searching).

As the capabilities and roles of RTLS in healthcare continue to grow, provider organizations are seeking partners to co-create solutions that will meet their immediate needs and set them up for long-term success.

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Why are healthcare providers considering RTLS?

In today's cost- and value-conscious healthcare markets, hospitals and other healthcare providers face ever-growing pressure to reduce costs while maintaining or even improving the quality of care they deliver. Most hospital administrators are aware that inefficiency and waste plague many processes and departments, but may have been reluctant to perform cumbersome and imprecise time and motion studies to quantify those inefficiencies. The continued maturation of RTLS technology presents opportunities for healthcare providers to accurately assess and improve the efficiency of their operations and to deliver a high quality of care.

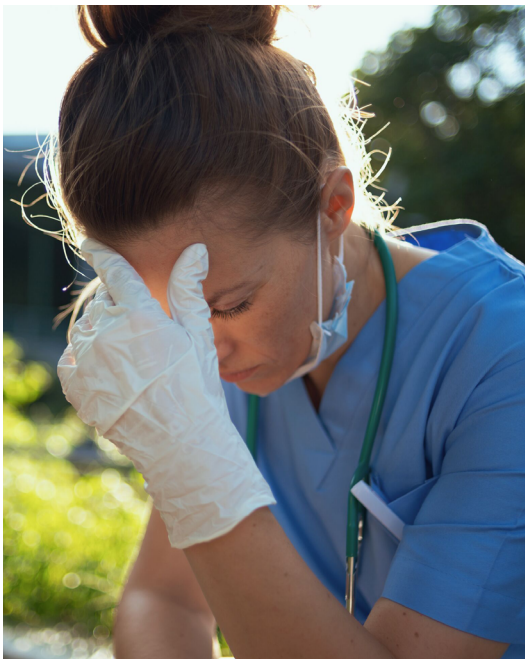
In addition, tightening healthcare labor situation and the rise of consumerism in healthcare markets mean that delivering an optimized experience for both patients and staff is vitally important. An unsatisfactory patient experience can lead patients to seek alternatives for the care they need, resulting in lost revenue and potentially damaging the institution's reputation. Similarly, poor staff satisfaction leads to high turnover, which can have cascading effects including decreased morale among remaining staff, limited capacity, and increased labor costs.

RTLS hold great promise for several important healthcare domains: streamlining processes, tracking equipment, locating personnel, and improving the experience of both patients and staff. These tracking systems provide on-demand information on the location and status of assets, and are also a powerful tool for assessing workflow efficiency, assisting patients and families in navigating facilities, automating quality assurance documentation, and monitoring wait times.

"The need to manage hospital workflows more efficiently and effectively has become more critical since the COVID-19 pandemic. Digital tools such as RTLS are attracting a lot of renewed interest."

Alex Byrne, Vice President,
Head of Asset Management Services at Siemens Healthineers







Simplifying asset location and improving operational performance with RTLS

RTLS emerged in the late 1990s, with systems that displayed the location of RFID tags on a computer screen in real time.[1] Since then, RTLS technologies have multiplied, with Bluetooth, RFID, infrared, and WiFi-based systems vying for share of an increasingly competitive market.

RTLS technology has proven to be reliable and valuable in a variety of industries, including warehouse logistics, where it can be used to quickly locate items and equipment and generate a shipping manifest when those items are loaded onto a vehicle or container. Similarly, for maintenance service providers, RTLS can replace error-prone and time-consuming manual checklists by ensuring that all the tools and material needed for a specific service call are present on the service vehicle.

In manufacturing, RTLS are used to track workers, equipment and visitors, since many manufacturing facilities can be hazardous. RTLS can also be leveraged to monitor vital signs for workers in high-risk areas, optimize maintenance procedures and more.[2] Potentially dangerous workplaces like construction sites are using RTLS for collision avoidance, enhancing worker safety, and loss prevention.[3] These demanding environments have established the value and reliability of RTLS in industry.

Given the complexity of modern hospitals, and the vast array of equipment that needs to be prepped, cleaned, and serviced for patient use, hospital administrators have naturally looked to RTLS as a way to streamline their operations.

The following are some of the most frequently cited reasons for pursuing an RTLS implementation in a healthcare facility:[3]

- Spending too much time locating medical equipment
- Paying too much for equipment rentals or purchases due to sub-optimal utilization rates
- Long patient wait times
- Spoilage of vaccines, specimens, and blood products

Asset tracking and management

Some of the earliest roles for RTLS in healthcare surrounded asset tracking and asset management. These continue to be valuable in helping healthcare providers get the most from their high value medical devices. RTLS can provide important contextual information about medical equipment. For example, its current location and status can indicate that a hospital bed is empty, or that an item of equipment is clean and ready for use. This, in turn, gives administrators a clearer view of asset utilization, drives process efficiency and informs decisions about procurement.

"Through the COVID-19 crisis, respirators have become super valuable, and the hospital staff requires knowing where these assets are in order to provide effective care to the patients."

Armando Avila Maurer,
Global Strategy & Business Development Manager, Siemens Healthineers

Quality and safety

RTLS can support quality and safety processes and procedures. For example, medical device recalls for the purposes of emergency fixes or software updates can be handled much more efficiently if you know exactly where each device is. Without RTLS, finding every device of a certain type can take weeks. With RTLS, the locations can be determined in a matter of seconds. The use of patient tags can also assist with infant security and the care of vulnerable patients, giving hospital staff greater peace of mind.

Increase staff efficiency and safety

Tracking the movements of people can also pay important operational dividends. Simple changes like moving a storage area closer to patient beds can result in less time spent walking to get material from the closet and more time spent with patients. RTLS provide an important tool to identify such opportunities and to quantify the results of improvement efforts.

RTLS can also be used to increase staff safety. A small transmitter with “emergency” buttons can quickly notify security personnel that a staff member is under duress and provide accurate location information.

It is important to note that RTLS help uncover and solve workflow inefficiencies, and are not used to micro-manage staff, breaks, etc. The benefits, including safety, data transparency, automation of some processes, and efficiency, should be clearly explained to staff, along with the limits on the data collected and its uses. When the staff understands and supports the goals of the RTLS program, they are more likely to welcome the benefits it delivers to their work environment and to contribute to its success.

Improve patient experience

Patient wait times are a key concern for healthcare providers. Patients who are dissatisfied with what they perceive as long wait times will be more likely to seek alternative care locations in the future. Beyond mere inconvenience, missed or delayed appointments can jeopardize the patient care path. RTLS can be used to map the patient journey in great detail, identify bottlenecks, and provide improvement solutions. In addition, RTLS can be used to automate some processes, like notifying patients that they should proceed to an exam room or otherwise proceed on their care journey, without having to wait for busy staff to notify them.



On a more immediate and individual level, RTLS can notify staff that a patient has been, for example, waiting in a treatment room for 30 minutes without seeing a healthcare professional. Then they can take immediate action, e.g. investigate the source of the delay, call an appropriate physician or other caregiver, or update the patient on the reason for the delay and set expectations.

With RTLS, waiting times can be estimated, allowing patients to use the time otherwise wasted to take a walk, or get something to drink and eat. The RTLS badge can also notify the patient to return to the care facility when it is time to take the next step on the care journey. Furthermore, always being informed about the what and when of the care journey brings transparency and peace of mind for both patients and relatives.

Perhaps most importantly, analysis of RTLS data collected over time can yield insights into the causes of delays and other factors that adversely affect patient experience, and point the way to improvements that can mitigate or eliminate those factors.

Hospitals are large, fast-paced and often confusing places for patients and their families. RTLS technology, combined with mobile apps, can demystify and automate check-in procedures, simplify wayfinding through the hospital complex, and increase transparency of the care pathway for patients and their families This is of particular value in caring for the elderly or patients with dementia who may become lost or disoriented in the hospital. This delivers benefits to the hospital by reducing paperwork and helping patients get where they need to be on time, and also improves patient experience by providing clear guidance on what the patient can expect.

Bed management

Without real-time visibility into the number of available beds, bed management can create a bottleneck in the admissions process, which can lead to frustration for staff and patients when a bed that was thought to be free turns out to be occupied. RTLS can automate aspects of bed management so that staff will always know the location, and status of every bed in the facility. RTLS data can be used to send notifications of beds that need to be cleaned, identify estimated time of availability for the next cleaned bed, and indicate the location of beds that are clean and available for use.

Transparency on bed availability may enable the hospital to effectively increase its capacity without actually increasing the number of beds, generating additional income and optimizing use of resources.



Additional roles for RTLS

- Temperature monitoring (medications, reagents, samples, etc.)
- Emergency department asset tracking, patient flow, and staff communication
- Operating room area asset tracking and process optimization
- Facilitating staff collaboration
- Implementation of COVID-19 protocols, e.g. contact tracing, and hand hygiene
- Passive and active security for patients and staff
- Theft and loss prevention
- Tracking active sources in nuclear medicine

"Understanding your utilization of exam rooms, surgical suites, or beds and knowing your patient's length of stay are critical. All of that information can be used to build out business models that account for seasonal fluctuations, and to fine tune your staffing plans."

Kristan Henderson, Director of Business Development, Infinite Leap

Exemplary Return on Investment (ROI) of RTLS[4]

Asset tracking

RTLS provides an accurate and efficient way for staff to easily locate mobile equipment that is available to use.

- Thousands of hours saved searching for devices can be devoted to patient care

Asset optimization

With the use of RTLS, healthcare providers can better understand the true asset utilization and make sound business decisions.

- 30% increased asset use
- $500.000 reduction in equipment purchases annually

Preventive maintenance management

Medical devices require periodic inspections or preventive maintenance. RTLS support to round up required equipment faster.

- > $100,000 saved in outsourced manpower
- 95% of on-time preventive maintenance

Shrinkage management

With the use of RTLS, an alert can be triggered once equipment leaves a defined zone, thus minimizing the amount of equipment being lost or stolen.

- 60% reduction of shrinkage
- $200,000 reduction in equipment purchases annually

Choosing an RTLS partner

The criteria for an "ideal" RTLS partner will vary from one institution to the next, but there are a few characteristics that are vital for success in any RTLS partnership.

A partner that delivers the full value of RTLS

Often, a healthcare institution will undertake its initial foray into RTLS to solve a discrete and defined problem such as lost productivity due to excessive time spent locating equipment. But healthcare provider organizations should choose partners who can deliver on the entire value chain of RTLS because very often, having gained positive experience with RTLS, customers will look to expand the scope of their RTLS project to include process and layout optimization, patient flow optimization, and more as described earlier. RTLS can even play a vital role in consulting and change management by benchmarking key processes and providing a real-time data-driven means to test the effectiveness of improvements to those processes. A partner that understands this from the outset will help the RTLS project expand and flourish to serve the institution more broadly.

A partner that understands the specific requirements of healthcare

RTLS have been used for decades in a variety of industries, and there are many partners with extensive experience. However, the specific needs of healthcare institutions and the patients they serve demand a partner with deep and lasting experience and understanding of healthcare.
The complex world of modern healthcare, with its web of privacy, documentation, and quality assurance regulations is best left to healthcare specialists who have a thorough understanding of both clinical processes and RTLS technology.

A partner that provides reliable technology

A partner who can help hospitals choose the right RTLS technology from the array of competing technologies is vital to the success of the project. For example, in cases where accuracy (spatial resolution) is key, some technologies, like infrared or ultrasound, might be more appropriate. In other instances, virtual barriers must be developed, e.g. to separate bed spaces from one another.

RTLS technology may also need to be integrated with healthcare enterprise software (HIS, RIS), and potentially with consumer devices (e.g. mobile phones for way-finding applications). The RTLS solution should also be designed and implemented with potential expansion of use cases in mind, so that the hospital can maximize the value of its investment over time. A partner who delivers rock-solid reliability for all technology components of the system is a must.

A partner that delivers great service and support

Like any technology, RTLS implementations require maintenance and service. In addition, the scope and mission of the RTLS system is likely to change over time, in response to long-term trends like the consumerization of healthcare and singular events like the COVID-19 pandemic.
A proactive partner who can help hospitals and other care facilities address planned and unplanned expansions or pivots in the RTLS project is vital for long-term success.

A partner that can demonstrate ROI

The benefits of RTLS may seem obvious, but it is still necessary to quantify return on investment. The technology itself can demonstrate proximal benefits like decreased waiting time, reduction of re-purchasing, decrease in rental equipment expense, faster cleaning and maintenance cycles on equipment, and improved process workflows. A capable partner will help the customer translate those benefits into quantifiable improvements in financial and (in some cases) clinical outcomes.

Case studies: RTLS in healthcare

The following case studies demonstrate the value that RTLS can bring to healthcare institutions around the world

A US academic medical center increases throughput and satisfaction in its Preoperative Assessment Clinic



Challenge

Atrium Health Wake Forest Baptist in North Carolina, USA, had reached maximum throughput in its preoperative assessment clinic (PAC). The administration wanted to explore solutions to increase throughput, but without interrupting day-to-day operations.

Solution

Atrium Health Wake Forest Baptist partnered with a medtech firm that used RTLS data, from an existing extensive RTLS implementation, to create a reliable digital twin of the PAC. The RTLS reduced the need for intensive field observations, saved workdays, avoided service disruption, avoided behavioral bias, accelerated in-depth analysis, and validated the model of the PAC.

Using the digital twin, Atrium Health Wake Forest Baptist was able to evaluate improvement measures before committing to them in the real world.

Results

- 80% of suggested measures were ruled out for implementation after failing the stress test
- 30% increase in PAC throughput possible (best-case scenario)
- Best-performing scenario enables improved throughput with 80 patients/day with no impact on length of stay



"We are very pleased with the results of the digital twin project. This process improvement initiative, which leveraged our RTLS data, helped us to identify strategies to achieve significantly more appointments in the same physical space with minimal additional resources."

Conrad Emmerich, Senior VP Supply Chain, Lab, Imaging & CPO, Atrium Health Wake Forest Baptist

Increasing efficiency and staff satisfaction in a busy radiology department



Foto: Michael Rabenstein/Universitätsklinikum Erlangen

Challenge

The Radiology Department at Universitätsklinikum Erlangen in Germany found that staff members were spending far too much time trying to locate equipment. This wasted time had a negative impact in daily staff routines, who had more important patient care duties to attend to.

Solution

The Radiology Department and its medtech partner deployed RTLS to increase efficiency and improve care provision. Key assets like patient tables and monitoring equipment were tagged, to enable visualization of these specific assets in real time. The goals of the system were to enable uninterrupted workflow, and reduce loss due to theft or other causes. Furthermore, a patient navigation app facilitates wayfinding towards and within the radiology department and will thus improve patient experience.

Results

- Saved 1 hour/day by reducing time spent searching for equipment
- Improved patient experience through digital wayfinding
- Opportunity to improve efficiency and reduce costs through workflow optimization

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"RTLS can offer healthcare providers important and valid information about the location of their assets and patients. This helps them to accelerate and improve processes. It also enables them to increase the quality of care and enhance efficiency – to an extent that wasn't possible before."

Prof. Alexander Cavallaro, MD, Senior Physician,
Radiology Department at Universitätsklinikum Erlangen



Conclusions

Healthcare provider organizations have begun to explore the benefits of RTLS for improving clinical and non-clinical processes, patient experience, staff satisfaction, and documentation. RTLS will continue to gain prominence in healthcare as patients, staff and administrators come to expect RTLS-enabled services. “Every hospital building will provide location data of devices and people and integrate these data into other hospital systems, whether clinical or operational, to provide real-time information on how the hospital is performing. This will have the potential to add tremendous value to patient care overall,” Alex Byrne, Head of Asset Management Services at Siemens Healthineers, said when asked about the future of RTLS in healthcare.

Kristan Henderson, Business Development Director at Infinite Leap, an RTLS consulting company, views integration with patient and staff mobile devices as a key to the future of RTLS in healthcare: “I see a future state where all mobile devices are able to provide meaningful data for hospital operations. This goes beyond simple wayfinding – the mobile device will also feed data back into the system, so administrators will know where a patient is and where they’re heading, and also know where staff members are in their workflow,” she said.

Helping hospitals and other care facilities achieve that level of integration calls for lasting partnerships with companies that understand healthcare as well as they understand RTLS technology.

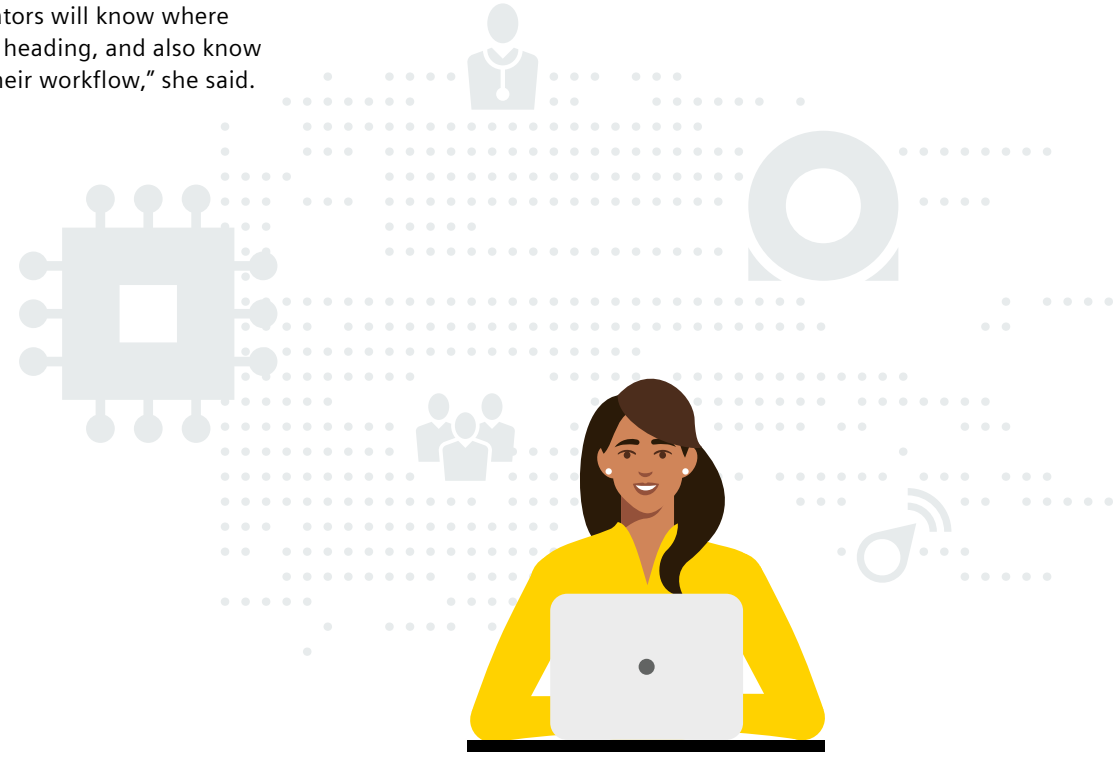
Want to learn more about RTLS?

Contact us to hear what Siemens Healthineers can do for you.

RTLS contact

Or visit our RTLS website

siemens-healthineers.com/services/realtime-location-solutions



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Our portfolio, spanning in vitro and in vivo diagnostics to image-guided therapy and cancer care, is crucial for clinical decision-making and treatment pathways. With the unique combination of our strengths in patient twinning[1], precision therapy, as well as digital, data, and artificial intelligence (AI), we are well positioned to take on the greatest challenges in healthcare. We will continue to build on these strengths to help overcome the world's most threatening diseases, enable efficient operations, and expand access to care.

We are a team of more than 73,000 Healthineers in over 70 countries passionately pushing the boundaries of what is possible in healthcare to help improve the lives of people around the world.

1 Personalization of diagnosis, therapy selection and monitoring, aftercare, and managing health.

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Siemens Healthineers Headquarters
Siemens Healthineers AG
Siemensstr. 3
91301 Forchheim, Germany
siemens-healthineers.com

USA
Siemens Medical Solutions USA, Inc.
Healthcare
40 Liberty Boulevard
Malvern, PA 19355-9998, USA
siemens-healthineers.us

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