

Marc B. Westle
Randy Burkert
Clint Stewart



healthcare financial management association hfm.org

improving CAH Medicare Part-A payment accuracy using Bluetooth-based RTLS

Mission Health in Asheville, N.C., implemented a real-time location system (RTLS) using Bluetooth Low Energy technology that enabled it to effectively track availability of physicians to staff the emergency departments in its critical access hospitals.

AT A GLANCE

- > Mission Health implemented a real-time location system (RTLS) using low-cost Bluetooth Low Energy technology to track physician availability time for delivering emergency department (ED) coverage in the health system's critical access hospitals (CAHs).
- > By better tracking ED physician availability time, the health system hoped to improve the accuracy of its reporting in its CAHs' Medicare cost reports and, thereby, increase its Medicare payment levels.
- > An analysis found the increased accuracy in reporting made possible by the RTLS solution would result in increased payment levels far surpassing the cost of implementing the system.

Hospitals that constitute the nation's rural health safety net deliver health care to more than 60 million Americans, including 23 million seniors.^a Yet these hospitals, called critical access hospitals (CAHs), face numerous challenges in their ongoing struggle to operate in a complex socioeconomic, demographic, regulatory, and payment environment—to the point that 118 rural hospitals were permanently closed over the period of January 2005 to July 2016.^b Increasing financial distress is a contributing factor to the accelerating trend of closures. In short, despite being critical access points for medical care and economic engines for their communities, these rural health safety net hospitals are financially vulnerable.

A Key Financial Success Factor for CAHs

Strong financial performance is vital to CAHs' long-term sustainability. In particular, CAHs face a significant financial challenge—unique among provider organizations—in managing physician staffing in the emergency department (ED). This is due, in part, to a criterion they must meet to be designated by the Centers for Medicare & Medicaid Services as a Medicare-participating CAH, which is to be able to furnish 24-hour emergency care

a. United States Census Bureau, "New Census Data Show Differences between Urban and Rural Populations," press release, Dec. 8, 2016.

b. Kaufman, D., Randolph, R., Pink, G., and Holmes, M., *Trends in Risk of Financial Distress Among Rural Hospitals*, North Carolina Rural Health Research Center, The Cecil G. Sheps Center for Health Services Research, October 2016.

services seven days a week.^c Given that patients with a variety of injuries and illnesses can arrive in the ED any time of the day or night, there is a value to the community and the nation in maintaining these readiness capabilities. Yet the unscheduled nature of emergency medicine means emergency physicians may spend a portion of their time in various states of preparation for the arrival of patients—states commonly referred to by terms such as *availability time*, *readiness*, and *stand-by*. Moreover, this challenge is compounded by the limited supply of physicians typically available in rural areas at all to deliver emergency care.

The total amount of Medicare Part-A ED physician *availability time* a CAH can accrue annually is both substantial and highly variable, and paying ED physicians for such time can create a significant overhead expense for the CAH. Because CMS acknowledges the financial challenge that this model poses for CAHs, it considers ED physician availability services to be an allowable cost that can be documented and included on the CAH's annual cost report, provided certain conditions are met. Specifically, CMS states that reasonable compensation is an allowable cost "to the extent the costs are found to be reasonable under the rules specified in paragraph (b)(2)."^d CMS provides guidance on reviewing ED physician availability service costs in *The Provider Reimbursement Manual*, 15-1, Section 2109.

Approaches to Capturing Availability Time

CAHs may use a variety of methods to capture and report ED physician availability time. Among the most common are the following.

Manual time and motion studies. Designated hospital staff or third-party consultants are assigned to follow ED physicians 24/7, manually allocating and recording time as either patient time or availability time. This surveillance

typically is performed eight weeks per year (two weeks per quarter), and it is expensive, resource-intensive, and highly prone to human error. Moreover, the small data set makes it incapable of capturing seasonality of patient volumes.

Electronic health record (EHR) data. This method uses login records from the ED EHR to estimate the amount of time a physician spends with patients. Yet because one can only infer from the EHR data the actual Part-A time involved, the calculation of physician availability time may not be totally accurate.

Physician estimates. This method calls upon physicians to recall and record their time spent with patients. Because such estimates rely solely on the physician's memory, they can be extremely

CAHs and Cost Reports

Congress, in the Balanced Budget Act (BBA) of 1997, authorized states to establish a State Flex Program under which certain facilities participating in Medicare can become critical access hospitals (CAHs). CAH Conditions of Participation are codified in the Code of Federal Regulations (CFR).^a CAHs receive cost-based payment for inpatient and outpatient services provided to Medicare patients (and Medicaid patients depending on the policy of the state in which they are located). CAHs are paid at 101 percent of the costs on all their Medicare business. And a 2 percent sequestration is applied after all deductibles and co-insurance are removed from the allowable cost.^b

The cost of providing care to Medicare patients, including the cost of providing 24/7 emergency care coverage by physicians in the emergency department, is estimated using the cost accounting data that all Medicare-certified institutions—including hospitals, skilled nursing facilities, home health agencies, rural health clinics, federally qualified health centers, and hospice agencies—are required to submit annually to the Centers for Medicare & Medicaid Services. Although cost reporting affects payment, it does not always result in a full settlement, which makes it critically important for filing organizations to ensure accuracy of all their charges, billing, and coding methodologies.

c. CMS, "Critical Access Hospitals," Quality, Safety & and Oversight—Certification & Compliance, CMS.gov, page last updated April 9, 2013.

d. Code of Federal Regulations, 42 C.F.R. §413.70, "Payment for Services of a CAH," Government Publishing Office, Oct. 1, 2003.

a. Code of Federal Regulations 42 C.F.R. § 485.601-647, "Subpart F—Conditions of Participation: Critical Access Hospitals (CAHs)," Government Publishing Office Oct. 1 2016.

b. Budget Control Act of 2011, S.365 - 112th Congress (2011 - 2012), Public Law 112-25, Available at www.congress.gov/bill/112th-congress/senate-bill/365/text.

inaccurate, and there is a lack of verifiable data for auditing purposes.

Each of these methods has known limitations and potential inaccuracies, which could result in CAHs under-reporting ED physician availability services.

RTLS: A Tool for Better Tracking Physician ED Availability Time

A healthcare organization can gain a more accurate view of physician availability for ED coverage using a real-time location system (RTLS). An RTLS is a system used to provide immediate or real-time tracking and management of medical equipment, staff, and patients within all types of patient care environments. It can be thought of as an “indoor GPS” for hospitals—and it is a particularly useful tool for CAHs. In many cases, the technology platforms require installation of expensive proprietary excitors, readers, middleware, and other components. Many of these solutions may not reliably track to a level of accuracy necessary for the use case described in this article.

Case Study: Mission Health's BLE Solution

The benefits of RTLS for tracking physician ED availability time are exemplified by the experience of Mission Health in Asheville, N.C. The health system sought to improve its tracking of physician availability time for delivery of ED care in its CAHs by developing and implementing a reliable, low-cost wireless RTLS solution capable of tracking the location of people (and equipment) within a hospital using Bluetooth Low Energy (BLE) technology.

BLE is still a relatively new technology, first introduced in 2010, but with limited applications. An open-source protocol makes it possible for developers to leverage the core technology for specific uses, as Mission Health did for this project. The goal was to test the BLE-based technology and verify its capacity for accurately capturing, categorizing, and reporting ED physician availability time in compliance with CMS requirements.

The automated solution uses a network of small beacons worn as badges that are tracked by receivers installed throughout the designated coverage area. As clinicians move through the ED, unique algorithms enable the system to separate Medicare Part-A and Part-B time classifications based on location context. The algorithms accurately detect where the provider is located within the ED along with the precise length of time in that location. As an example, when a provider is seeing a patient in a patient room, the time will be allocated to Part-B time, which is time with patient. When the provider is in a non-patient-care area, the time will be allocated to Part-A time. The solution also integrates with the EHR to capture the amount of time a provider is actively in the patient chart, which is allocated to Part-B time.

The system runs continuously in the background, capturing data to provide an accurate and compliant full-year view of physician time allocations. By replacing manual time and motion studies with precise data, a CAH can more precisely determine ED physician availability time for Part-A payment purposes and have defensible data in the event of an audit. The system also has a web-based application, allowing for customizable data reports to be queried. This on-demand reporting tool makes it easy to extract the data needed for inclusion in the CMS cost-reporting process. End users can pull summary reports, for example, for a quarter or a year-end roll-up. Detailed reports can show time allocations by physician or shift schedule.

CAH Pilots

Mission Health initiated its use of the RTLS with pilot implementations at two CAHs, Transylvania Regional Hospital (TRH) and Blue Ridge Regional Hospital (BRRH). Historical Part-A physician availability time included on the CAHs' cost reports for FY15 was used as baseline data. A multidisciplinary project team consisting of software engineers, IT architects, ED physician and nursing leaders, finance analysts, and representatives from Mission Health's Center for

Innovation collaborated to develop a reliable technology solution.

The tracking algorithm was designed to locate physicians with room-level accuracy, allowing a physician's time to be classified as either *Part-A availability time* or *Part-B time providing patient care*, according to the physician's actual location, as discussed below under the heading "Physician tracking calculation."

Further specificity to the Part-A ED physician availability calculation was achieved by integrating EHR reports. The installation was designed to be simple and non-intrusive, with only two primary components to be deployed—the beacon badges and the receivers. Receivers are joined to the hospital's secure wireless network, and the BLE beacons are programmed to specific physicians, who wear them while in the ED.

A proof of concept (PoC) was conducted in the summer of 2016 at the two CAHs operated by Mission Health, with the goals of:

- > Assessing the technology's accuracy and reliability
- > Using the data to calculate physician Part-A and Part-B results
- > Estimating a realistic ROI and value proposition

Accuracy and reliability. To validate location accuracy of the BLE-based RTLS solution, the project team performed a comparative analysis in which trained auditors meticulously recorded 100 hours of manual time and motion study data. Time allocation data for each physician included the following:

- > The ED physician's name
- > The exact time in hours, minutes, and seconds for each movement from one location to another
- > Exact locations and time durations in each location

The manual time and motion data were then compared with the data captured by the BLE-based RTLS solution during the same time period. A comparison of the BLE-based RTLS data with

the manually collected data found less than a 1 percent difference in time allocations.

A second method used to verify accuracy of physician location, as indicated by the BLE-based RTLS solution, involved randomized real-time "spot checks" conducted throughout the pilot. Trained staff would watch movement of physicians in real-time on a laptop application. Carrying the laptop with them throughout the ED, these staff members could verify the actual location of the physicians identified using the BLE-based RTLS solution. The identified physician locations, as measured with these randomized "spot checks," were found to be 100 percent accurate, with not even one failure with transmitting, receiving, or archiving the BLE-based RTLS data during the trial.

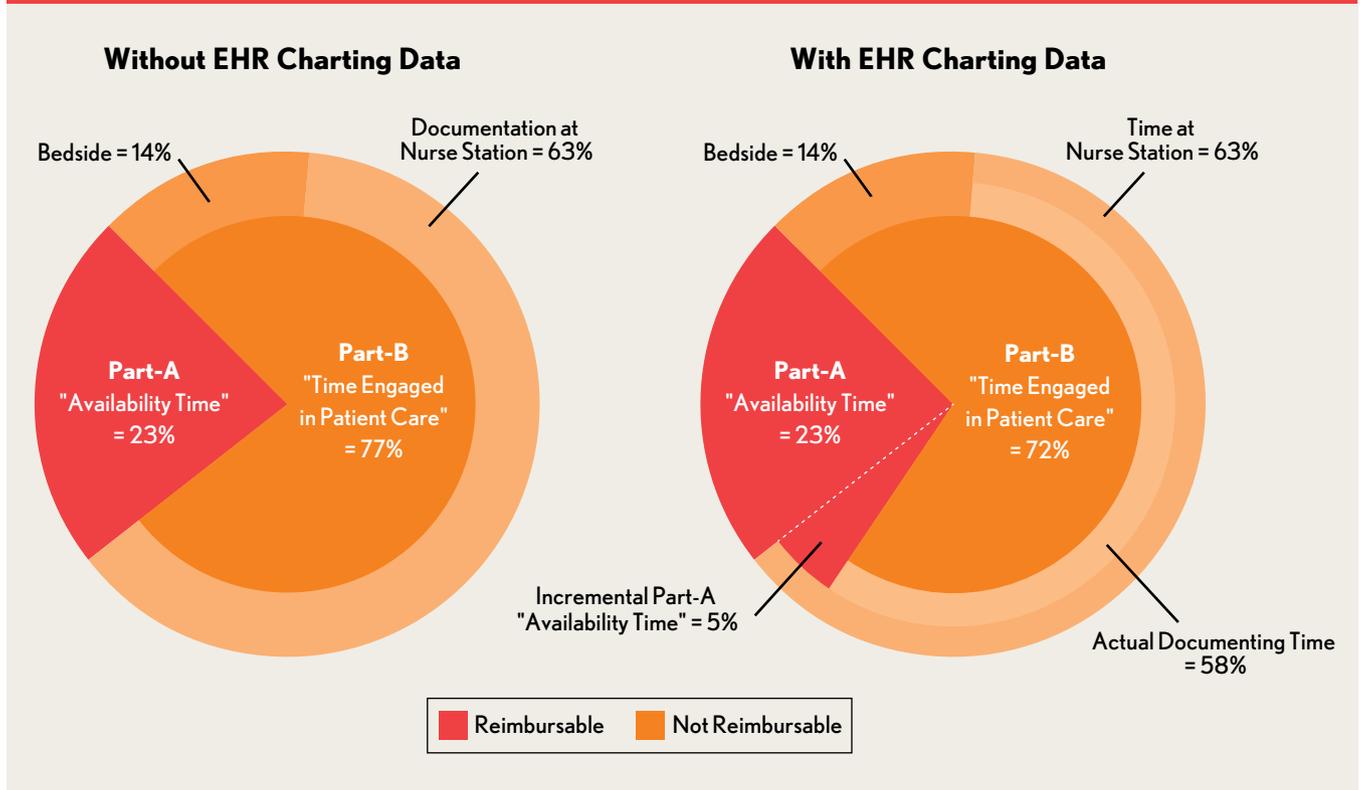
Healthcare finance leaders should understand how emerging new technologies such as BLE-based RTLS can create multiple new opportunities for improving their organization's operational compliance, safety, and financial performance.

Physician-tracking calculation. ED locations were mapped and codified to indicate one of the following:

- > Physician with patient (e.g., in the patient's room or at the patient's bed)
- > Physician time in patient EHR located at the nurse station, performing active charting and review
- > Physician in a non-patient-care area (e.g., staff lounge, break room, etc.)

The first two items are considered Part-B time providing patient care, and the third is considered Part-A availability time.

EXAMPLE OF INCREMENTAL PART-A TIME CAPTURED WITH INTEGRATION OF PHYSICIAN CHARTING TIME DATA EXTRACTED FROM THE ELECTRONIC HEALTH RECORD (EHR)



Although the nurse station typically is an area where clinicians chart and review patient EHR data (classified as Part-B time), it also is an area where much of a physician’s time can be classified as physician availability time—because not all of the physician’s time at the nurse station is spent in the patient’s chart in the EHR. Thus, instead of classifying all of a physician’s time at the nurse station as Part-B time, a CAH should explore the opportunity to reclassify some of that time as Part-A availability time by differentiating between activities performed in this location. This is an important point given that the hospitals receive Medicare payment only for physicians’ Part-A time.

To address this matter, Mission Health implemented additional software after the initial trial to measure the actual time a physician was in the chart. These data can be integrated into the BLE-based RTLS solution database to accurately

account for actual EHR charting and reviewing (Part-B) time. Subtracting the total amount of active charting time from the total time spent at the nurse station produces an accurate Part-A time. The exhibit above demonstrates the incremental Part-A time captured when charting time is accurately identified.

The two exhibits on page 6 show results using the data collected from the BLE-based RTLS solution as compared with results from the traditional manual data methodology.

ROI estimation and value proposition. Many factors must be considered when calculating the ROI from use of such a solution. The Part-A time calculated from the trial was run through cost reporting software to provide an estimate of the incremental payment amount that would have been received had the RTLS solution data been submitted on the cost report. The estimate of total

cost for installation and implementation of the BLE-based RTLS solution also was calculated. An analysis of the solution’s cost compared with the calculated incremental payment that could have been realized found that the BLE-based RTLS solution would have paid for itself well within the first year. In short, the total cost (up-front and annual) of the BLE-based RTLS solution install was only a fraction of the potential increased payment.

Key Findings

The benefits achieved by the BLE-based RTLS solution can be summarized as follows:

- > The RTLS solution eliminates the time and expense associated with performing tedious manual time studies, data analysis, and timesheet reviews required by CMS for ED cost reporting.
- > The solution maximizes payment potential by constantly aggregating and storing detailed location data that can be easily parsed and visualized. Greater insight into physicians’ Part-A availability time means EDs are less likely to under-report time for which they can receive payment.
- > The solution offers more accurate, compliant, comprehensive data that are easier to defend in the event of an audit.
- > The cost to install the solution can be included as an administrative expense for payment on the cost report.
- > The inclusion of customizable reporting capabilities in the software application reduces burden on the finance team for preparing data to vet and submit.

Steps Toward Making RTSL Operational

The results and findings of the pilot project far exceeded Mission Health’s initial expectations. The BLE-based RTLS solution proved accurate and reliable, and capable of meeting the health system’s primary goals of having a compliant, comprehensive, and verifiable method for capturing and reporting CAH ED physician availability time. And the financial impact was significant. The data, analysis methodology, and results were carefully vetted with internal finance

COMPARISON OF BLE-BASED RTLS SOLUTION DATA VERSUS MANUAL TIME AND MOTION STUDY DATA

	Part-A ED Physician Availability Time with BLE-Based RTLS Solution FY17	Part-A ED Physician Availability Time with Manual Time and Motion Study FY15
Transylvania Regional Hospital	43%	6%
Blue Ridge Regional Hospital	44%	16%

BLE = Bluetooth Low Energy
RTLS = Real-time location system

and payment subject matter experts. The team further consulted with an outside accounting firm, which validated that the methodology and data were sound, accurate, and defensible in the event of an audit.

The executive leadership team therefore approved capital funding to adopt the new system and to scale it for operations at each of the health system’s four CAHs. The time frame for installing, setting up, and launching a solution at each CAH was set at less than one month per facility.

Every new system always comes with some limitations, and in this case, the limitation was due to a human factor: The health system could capture accurate Part-A time for each ED physician on each shift (365 days a year) only if all physicians wore the designated badge at all times during their scheduled shift and if badge battery life was properly managed. Thus, during the

INCREMENTAL PAYMENT FROM BLE-BASED RTLS SOLUTION (FY17 RESULTS RELATIVE TO FY15)

Transylvania Regional Hospital, FY17	Blue Ridge Regional Hospital, FY17
37% Increase in Part-A Availability Time	28% Increase in Part-A Availability Time
\$490,000 Additional Payment	\$327,000 Additional Payment
2015 ED visits = 16,177 2017 ED visits = 16,098	2015 ED visits = 14,587 2017 ED visits = 14,522

CASE STUDY

initial trial, data gaps occurred primarily for two reasons: because some physicians were not wearing the badges, and because the batteries in a few of the badges expired and were not immediately replaced.

To address these limitations, the solution was enhanced to provide alerts to ED nursing managers for times when data were not being captured during the shift, thereby prompting the unit manager to investigate and correct the root cause.

Nonetheless, it is unrealistic to expect that data for every second of the year will be captured. That said, the amount of data collected and reported with the BLE-based RTLS solution was significantly more than any data captured through alternate methods.

The Broader Potential for RTLS

There are many use cases by which an RTLS solution can deliver value. While the significant ROI realized with the ED Physician Part-A available time reporting allows for the installation of an RTLS infrastructure, this infrastructure also can be easily and cost effectively expanded throughout the entire CAH for other purposes. Moreover, the solution can be easily adapted to the various needs of all kinds of healthcare facilities, including rural health clinics, skilled nursing facilities, primary care practices, as well as hospitals.

Just a few of the possible extended use cases include the following:

- > Providing an alarm to alert ED security to when ED staff are under duress
- > Tracking utilization of medical imaging
- > Tracking clinician activities in rural health clinics
- > Automating long-term care time studies
- > Maintaining infection control
- > Tracking assets
- > Managing supply par levels

- > Monitoring patient flow
- > Performing housekeeping time studies
- > Delivering proximity-based messaging
- > Way-finding

Each use case has its own value proposition, yet all are achievable with the same basic platform that Mission Health used for ED Physician Part-A time reporting. Healthcare finance leaders are charged with keeping informed of technologies that can have a meaningful impact on the financial well-being of healthcare organizations. And they therefore should understand how emerging new technologies such as BLE-based RTLS can create multiple new opportunities for improving their organization's operational compliance, safety, and financial performance. ■

About the authors



Marc B. Westle, DO, FACP,
is senior vice president, innovation,
Mission Health, Asheville, N.C.



Randy Burkert
is department manager, Mission Health
Center for Innovation, Asheville, N.C.
(Randy.Burkert@msj.org).



Clint Stewart, CPA, CHFP,
is former regional finance director,
Mission Health critical access hospitals,
Asheville, N.C.

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