Executive Summary
Revenue leakage has turned into patient “keepage,” as Integrated Health Networks—forged through mergers and acquisitions—work to keep patients in their broadened health systems. A central tenet is patient satisfaction. With this, maintaining quality has become more challenging. Nowhere is this more apparent than in MR imaging.
High-field open MRI provides high-quality images with a design that can meet the needs of MRI’s most challenging patients—large patients ranging from the 600-pound morbidly obese to broad-shouldered athletes; the very young to very old; claustrophobic to the otherwise anxious.

Inability to achieve a diagnostic MRI scan due to size, age or fear can cause the health system to lose patients and associated revenue streams not only from the diagnostic phase but through patient management.

University Hospitals (UH), which serves Northeast Ohio and annually performs thousands of MRI scans, was unable to accommodate some patients for this reason. The health system now addresses the problem with an open MRI scanner sited at a UH outpatient center. The scanner, which operates at 1.2T, delivers high-field, high-resolution images that UH physicians agree meet the quality standards of the Integrated Delivery Network.

Oasis suits the needs of challenging patients, helping UH keep these patients—and their revenues—in the system. At the same time, its high-field, high-quality imaging boosts revenue by increasing capacity to routinely scan all patients.
The Changing Healthcare Landscape

Over the past decade, hospitals and chains have increasingly used mergers and acquisitions (M&A), and other forms of partnerships to expand their reach, achieve economies of scale, and enhance offerings.

In 2015, M&A rose 18 percent compared with the year earlier. It rose 70 percent compared with 2010. In 2015, 112 hospital transactions were announced compared with 95 transactions in 2014 and 66 in 2010. Consolidation continued on pace in 2016, as Kaufman Hall identified 77 transactions in the first three quarters of last year, compared with 78 transactions in the same 2015 period.

This consolidation has led to the construction of Integrated Health Networks, comprised of dozens of hospitals and outpatient facilities. Also called Integrated Delivery Networks (IDNs), these networks exert significant influence over acute care, long-term health, specialty clinics, primary care and even home care services.

Strategic Siting
IDNs typically offer a full complement of imaging services—CT, MRI, nuclear cardiology, PET/CT, X-ray and ultrasound. They may provide several at any single facility and all of them collectively through the network.

To ensure a steady stream of diagnostic revenues as well as downstream revenues from therapy and patient follow-up, complementary diagnostic services must be assembled and located strategically. UH has done so with its MRI scanners, locating them at key points across its network of hospitals and outpatient clinics. (The UH high-field open Oasis is located strategically at an outpatient center at the junction of two major highways in the south central metropolitan Cleveland area. The center is 9 miles from downtown Cleveland.)
Revenue Loss
If patients are lost during the diagnostic phase, revenues may also be lost not just from diagnostic procedures but during patient management as well. This loss, initially labeled “revenue leakage,” may occur when patients referred for an MRI cannot physically fit into a conventional scanner due to their large size (even ones with wide bores), or when patients’ fear of tight spaces prevents them from having a diagnostic MRI scan.

The consequent revenue leakage is defined as “the loss of revenue, volume and consumer engagement as a result of your patients being referred outside of your system – by your own referral sources,” as stated in the Springboard article Turning Brand “Leakage” into Brand “Keepage”.

Whereas administrators at University Hospitals once spoke of revenue leakage, they now refer to “keepage.” This is so “because you want to keep everything that you have,” said Dr. Pablo Ros, UH Radiologist-in-Chief and Chairman of the Department of Radiology at UH Cleveland Medical Center.

The Hitachi Oasis was acquired to increase patient keepage. “With Oasis, we have an open scanner to keep some of the business that we used to lose,” said Himanshu Pandya, Vice President of Radiology at UH.
Evolution of an IDN

University Hospitals is one of the nation’s leading healthcare systems, providing high-quality, patient-centered medical care at locations throughout Northeast Ohio. Its evolution into an Integrated Delivery Network (IDN) began in the early 1990s with an initiative to expand geographically and in types of service being offered. The consolidation that followed foreshadowed the present day M&A trend.

On its Cleveland campus today UH operates four hospitals—the 1032-bed UH Cleveland Medical Center (formerly UH Case Medical Center), an affiliate of Case Western Reserve University; UH Rainbow Babies & Children’s, among the nation’s best children’s hospitals; UH Seidman Cancer Center, part of National Cancer Institute-designated Case Comprehensive Cancer Center at CWRU; and UH MacDonald Women’s, Ohio’s only hospital for women.

Also in the network are 11 community hospitals, 27 UH Health Centers, three surgery centers, 12 emergency rooms, a partner hospital (Southwest General Health Center in Cleveland), 118 primary care practices, 12 urgent care centers, two rehabilitation hospitals and one home care center.
Together these facilities annually serve more than 60,000 inpatients and conduct 4.5 million outpatient procedures. Their 30 MRI scanners include 3T and 1.5T, many of which are “wide-bore” cylindrical units, as well as a 1.2T high-field open. Together they perform about 100,000 scans per year.

Although wide-bore scanners are designed to accommodate patients better than previous generations, they are still too confining for some patients. One broad-shouldered patient, successfully scanned on the 1.2T open Oasis, said his arms fit physically into the tube of a wide-bore scanner, “but my nose was almost on it. I couldn’t move at all. So it was really uncomfortable. It wasn’t going to work.”

UH kept the patient by referring him to the UH Oasis operating at the nearby outpatient clinic in Independence, Ohio. “As MRIs go, it’s as good as it’s going to get, I think,” the patient said.

Pioneering Value
University Hospitals was among the first providers in the world to offer MRI. In 1982, UH conducted the first routine whole body scans at a U.S. hospital with a superconducting Nuclear Magnetic Resonance Scanner (as it was then called). Sixteen years later UH conducted one of the world’s first intraoperative MRI scans. In 2008, UH research led to the development of a parallel imaging technique for MRI, which—compared with conventional methods—produced clearer, more accurate images in less time.

In 2012 UH’s commitment to the patient was recognized nationally when the American Hospital Association-McKesson Quest for Quality Prize was awarded to the UH Case Medical Center (since renamed UH Cleveland Medical Center) as the nation’s top hospital for leadership and innovation in quality improvement and patient safety. The next year UH Case Medical Center was named to the U.S. News & World Report’s exclusive Best Hospitals 2013-2014 Honor Roll.

Stemming Patient Loss
In 2014, UH administrators became concerned about the loss to other health systems of some patients who had been referred for
MRI scans. UH administrators determined that as many as five or six patients daily were being lost because they could not be examined with conventional wide-bore MRI scanners.

To stem the consequent “revenue leakage,” UH administrators considered acquiring low-field open scanners. But, citing image quality issues, they instead acquired the high-field open Oasis from Hitachi Healthcare Americas. The decision was made after evaluation of test images by UH physicians and the UH physicist, the holder of an M.D./Ph.D.

Quality was a key consideration. “We want to make sure that everything we do is good quality,” Pandya said. “Talk to any of our physicians, they now say that we made a good decision (in acquiring the Oasis). For me, on the financial side of keepage, we made a good decision.”

Dr. Christos Kosmas, a UH specialist in musculoskeletal (MSK) radiology and a member of the committee that evaluated Oasis, noted initial resistance. This was due, he said, to a perception that open scanners deliver poor quality images. (All open scanners other than the Oasis are low-field scanners.) Research has documented that high-field MRI scanners provide better spatial and contrast resolution and allow more accurate interpretations than machines that operate at low field strengths.)
Hitachi’s 1.2 T Oasis delivers images equivalent to those of cylindrical high-field scanners, Dr. Kosmas said. This is due to the high Tesla magnetic field of the scanner.

The unusual configuration of Oasis’ superconducting magnets is patient friendly. The magnets are contained in two disks, one above the patient table, the other below. These disks are supported by offset pillars that are diametrically opposed so patients can see out. This allows them to look at friends or family, even easily hold a hand during the exam, neither of which can be done in a cylindrical scanner. Similarly, technologists have a direct line-of-sight to patients, regardless of how they are positioned.

“Oasis makes for a totally different experience for the patient.” Dr. Kosmas

“Oasis makes for a totally different experience for the patient,” Dr. Kosmas said. “Oasis might be used for patients who fear tight spaces, as well as those whose physical size may prevent them from fitting into a cylindrical system, he said.

Dr. Ros described the Oasis design as “elegant.” It features, he said, the “openness that patients require, yet (is) tight enough that its high-field images are very acceptable.” The distance from patient to coil is a major determinant of image quality, he noted.

Keeping Patients in the IDN
Patient keepage maintains the revenue stream from the diagnostic phase through treatment and follow-up. “Now we can keep our patients in our system,” Pandya said.
Because Oasis delivers image quality equivalent to that of cylindrical 1.5T scanners, which is widely considered the MRI workhorse, the open high-field scanner can be used for exams throughout the body. High-resolution, motion-compensated neurological images of the brain and spine are readily achieved in multiple planes. Shoulder imaging with RF (radiofrequency) fat saturation delivers consistent uniform fat suppression. Fast spin echo provides images of the knee with high resolution images from tissue even near prostheses. Changes in T2 values in quantitative T2 imaging suggest changes in cartilage fibers indicative of injury and/or arthritis.

Pancreatic and biliary ducts in the abdomen can be scanned with MR cholangiopancreatography rather than radiographic visualization, which requires endoscopic injection of a contrast medium. Dynamic studies of the breast, liver, prostate and kidneys are achieved with fast T1 fat suppressed gradient echo. Vascular scans can be done with or without contrast. Prostate scans use T2 fast spin echo; diffusion weighted imaging enables critical differential diagnosis.

Expanding Revenues
Confident that the use of the Oasis imposes no diagnostic trade-offs, UH administrators instruct their “central schedulers” to assign patients to Oasis like they do any other high-field scanner. Through this central system, challenging patients are automatically given the option of being scanned with the Oasis at the UH Independence Health Center, an outpatient center.
“If patients (seeking appointments) mention that they are claustrophobic or obese or for some reason want an open scan, we send them to the Oasis,” said Dr. Kosmas. “But having it at an outpatient center, you do everybody who shows up.”

Open slots in the Oasis schedule are filled with routine cases, typically MSK scans, which tend to dominate scans performed at outpatient centers, he said.

The Independence Center excels at shoulder and extremity imaging. “If nobody told you it was an open magnet, you’d never know the difference (in the images) from (those of) a 1.5 Tesla,” Dr. Kosmas said.

When performing MSK scans, “signal is king,” Dr. Kosmas said. Positioning plays a big role. The shoulder can be exactly centered on the Oasis to achieve the best view of the region of interest (ROI). This can’t be done on cylindrical systems.
Oasis at University Hospitals: A Case Study

UH administrators have identified high-field open MRI as a “revenue keepage” technology, one that allows UH to adhere to long-standing standards for quality while addressing patient comfort.

Because its open design is more inviting than that of cylindrical scanners, patients who might not otherwise consider even beginning an MRI scan are at least willing to try, said Ronald Collister, UH Supervisor of Ambulatory Imaging.

The support that technologists give patients is critically important, Collister said. “We pride ourselves on taking care of patients,” he said, noting that the trick is to make the imaging center part of the patient’s comfort zone.

Oasis “allows us to get these patients on the table,” said Laura Mausar, chief technologist at the Independence Imaging Center.

Bariatric patients may require advance planning. “We have the coils we will need in mind before we start the exam preparation,” Mausar said.

Claustrophobic patients also may require special coils. These patients, for example, typically are not candidates for “bird-cage coils,” which encase the entire head. For these patients, Oasis offers a “halo” coil, which fits just on the top of the head, leaving their line-of-sight to the technologist unobstructed.

Oasis coils are designed for easy positioning. The shoulder coil, for example, slips over the hand and up the arm. (The staff may place an oval solenoid coil on the shoulders of patients too large for the standard shoulder coils to fit. Similarly the wrist coil may be wrapped around the foot to enhance foot and ankle imaging.)
Oasis flex coil is designed to fit around even the largest patients.

Getting a good signal is especially difficult when scanning obese patients. “The bigger the patient, the more difficult to image,” Dr. Kosmas said.

The closer the coil is to the ROI, the better the image. “And the Oasis coils are good,” Dr. Kosmas said.

**Better Positioning**

The openness of the Oasis allows technologists to physically position the shoulder, for example, exactly in the center of the field, called iso-center. This provides a very uniform signal. Because patients are completely surrounded by a tube in conventional systems, shoulder and wrist exams are inherently off-center.

On a conventional scanner, iso-center can be adjusted electronically, much like high-resolution digital snapshots can be electronically zoomed. But the best results come when the patient is in the optimal position.

Oasis is also the only high-field MRI system in the world that allows the technologist to maintain visual contact with the patient for every type of MRI exam regardless of how the patient is positioned. The openness allows friends, family—or even a technologist—to easily hold the patient’s hand.
Optimizing Revenue
Although challenging patients are selectively sent to the Oasis scanner at the UH Independence Center, routine cases are sent there as well. This optimizes revenue from the high-field open.

Oasis’ delivery of high-resolution, high-quality images aligns with UH’s commitment to quality. Oasis serves the practical needs of UH, handling difficult patients who might otherwise be lost to UH as it handles routine cases. In this dual role, the Oasis 1.2T scanner not only helps prevent revenue leakage but increases overall revenues.

Adapting to Patient Challenges
Successful scanning on the Oasis often is achieved through the patient skills of the Oasis staff, who are especially supportive of challenging patients. These patients are either unable to fit into or endure being in a cylindrical system. But Oasis can do any type of exam, an important consideration since patients with claustrophobia may require even the most complicated exam.

“We will send the true claustrophobic to the Oasis no matter what part of the body needs to be scanned—lumbar spines to livers,” said Dr. Ros, UH radiologist-in-chief and specialist in abdominal imaging.

“We also (use the Oasis to) do shoulders, knees, heads and spines, particularly the neck,” said Dr. Ros. “There are zero complaints. Some situations, like the shoulders, are marginally better than 1.5T.”

This flexibility and delivery of high-quality images were the principle reasons why UH decided to acquire the Hitachi Oasis.
“It works very well; is very reliable; the attention to customer service is extraordinary,” he said. “I like it very much; it has never ever failed. And it really fits a niche that we didn’t have with any other manufacturer.”

Patient Volume
As many as 12 patients can be scanned in a regular working day at the Independence Center. Daily volume, however, fluctuates. Patient volume is lowest early in the year—as it is elsewhere in the UH system—“because people’s deductibles have reset and they don’t want that big bill after the holidays,” said Ronald Collister, who has been managing the Oasis operation since the system was installed in 2016. Volume peaks in November and December, when typically all available slots are filled, Collister said.

Oasis is serving the function for which it was acquired, said UH Vice President Pandya. “Patients we were losing to outside providers now we are keeping,” Pandya said. MRI referrals come from thousands of primary care practitioners inside UH. Two liaisons from the UH have been assigned to describe to the referral base what UH radiology has to offer.

Revenue Keepage
Some revenue leakage occurred initially because the UH did not have an alternative to conventional MRI scanning. “The call would come in asking for an open MRI scanner; we said we didn’t have one; and the patient would go away,” Pandya said.

Collister recalled that several years ago there was “a big need for an open. Physicians were complaining that we didn’t have an open MRI and we had so much leakage of patients going outside the (health) system.”

To appreciate the scope of the problem, Pandya and colleagues tallied the number of such loses over a typical month. “The number was an eye-opener for us,” he said.
Conclusion

Falling reimbursements make the retention of patients essential. Patients lost in the diagnostic phase may lead to the biggest losses as revenues from therapy and follow-up are in jeopardy.

Oasis can satisfy the demands of some of the patients at greatest risk of leaving the health system. These include bariatric patients and broad-shouldered patients who cannot fit into conventional cylindrical scanners, and those who fear the confines of traditional cylindrical MRI scanners.

Unlike lower field scanners, Oasis not only meets the needs of challenging patients but delivers image quality in line with other high-field MRI systems. In this way, Oasis upholds the high standards of patient care, offering the option of its use in scanning routine cases, as well as challenging patients.

UH utilizes its Oasis scanner in this way—as one in a portfolio of high-field MRI scanners. It is strategically located among facilities; meets the needs of patients who might otherwise be lost to the UH; and provides high-field, high-quality imaging that can be leveraged to serve the routine needs of any patient.