Is a robotics program right for your ASC?

Global adoption of robotics technology has exploded in healthcare institutions, promising a less invasive and more precise means of conducting procedures. Although hospitals command the largest share of this market, analysts predict that ambulatory surgery centers (ASCs) will adopt this technology at a rapid clip.

Robotics are attractive to surgeons and patients alike.

Andrea Lessner, BSN, RN, CNOR, TNCC

Robotics technology has changed greatly since its introduction into the healthcare market, says Andrea Lessner, BSN, RN, CNOR, TNCC, senior director of perioperative services for OASIS Hospital in Phoenix, which is jointly owned by United Surgical Partners International (USPI) and Dignity Health.

Robotics started with large footprints, complicated workflows, and limited access because of the significant cost of the technology.

"Gone are the days that robotics programs only existed at academic institutions. In fact, their utilization is driving toward greater efficiency in specialty hospitals and surgery centers," says Lessner, whose facility is expanding its robotics program to meet demand for the technology from surgeons and patients alike.

"Currently, we have four robotic platforms at our facility, two Omnibots (OMNIBotics, Raynham, Massachusetts) and one Mako (Stryker, Kalamazoo, Michigan)," she says.

Robotics programs promise to drive efficiency across the entire service line, Lessner says. Precision in bone resection and component placement, soft tissue balancing, use of fewer instruments, decreased surgical times, and implant longevity are the surgical goals, she says.

Purchasing a robot is just a first step, however. Other factors to consider are program infrastructure, development, and the learning curve for surgeons as they adapt to robotic surgery.

"You have to be able to support the service line. Robotics programs require preoperative screening for previous implants and advanced imaging such as computed tomography to integrate into the software," Lessner says. Surgical departments also need a highly integrated team that is committed to evidence-based standardized care to achieve good outcomes.

Robotics are in demand, servicing many areas of surgical procedures (sidebar, "Robotics: A diverse portfolio"). In the age of COVID-19, robotics offer the advantage of non-human contact in surgical procedures. "The integration of a robot as a shielding layer, physically separating the healthcare worker and patient, is a powerful tool to combat the omnipresent fear of pathogen contamination and to maintain surgical volumes," notes a recent analysis in Nature.

ASC adoption rates

A live poll conducted at the 2019 Association of Hip and Knee Surgeons annual meeting indicated that 40% of surgeons are using robotics for total joint arthroplasty in both inpatient and outpatient settings. With this rate of adoption, Lessner says, "we are accelerating to the apex of robotic adoption and a growing population needing surgical care. If we look at new technology product life cycle adoption, we can see that we have reached the tipping point for robotics."

John Cherf, MD, MPH, MBA

ASCs are getting into the robotics business for several reasons, notes John Cherf, MD, MPH, MBA, chief medical officer at Lumere, a data and analytics solutions firm in Chicago. "First, the market is pushing patients to the outpatient space because it's less expensive and more patient-centric," he says. Robotics are also a tool to attract

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Robotics: A diverse portfolio

Developers of robotics technologies are positioning for a competitive spot in a rapidly growing market that is anticipated to reach $16 billion by 2025. Andrea Lessner, BSN, RN, CNOR, TNCC, senior director of perioperative services at OASIS Hospital in Phoenix, a USPI and Dignity Health joint venture, summarized the leaders of the robotics race during the 2020 ASCA Virtual Conference & Expo.

Intuitive's Da Vinci surgical systems, which minimize invasive surgery by providing a 3-D view of the surgical area, have essentially pioneered the robotics field in four areas: general surgery, OB-GYN, urology, and cardiology, says Lessner.

Medtronic's Hugo RAS system is available in Europe but has not yet received Food and Drug Administration (FDA) 510(k) clearance. "It's modular and has different arms, and technically you can run two different robotics rooms with the same system," says Lessner. Medtronic's portfolio includes Covidien, which provides equipment including suture, staplers, trocars, retrieval devices, and surgical energy products. "This gives Medtronic the opportunity to compete with Intuitive with both their capital and disposable surgical products, which may lead to advantageous pricing contracts with the aggregation in spend," Lessner says. "This type of competition will provide needed competition for pricing concessions."

Medtronic also created the Mazor guidance system, competing with its portfolio in spine and biologics. ExcelsiusGPS by Globus hit the market first on spine and neurosurgery robots.

Auris Health's startup company created The Monarch Platform for diagnostic and therapeutic bronchoscopic procedures. "This technology was recently bought by Johnson & Johnson and may cross over to other procedures and service lines," says Lessner.

Zimmer Biomet's Rosa Robotic System offers two different platforms, one for knee replacement and one for cranial cases. The knee replacement system uses x-ray to navigate the robotic arm, and the cranial robot uses stereotactic assistance. After the FDA issued a Class I recall in late 2019 for issues related to the software, Zimmer released new software that its engineers installed for each customer.

Stryker's Mako technology was the first robot on the market for unicompartmental, total knee arthroplasty (TKA), and total hip arthroplasty, but Smith & Nephew's hand-held NAVIO robotics technology has since become a competitor. Smith & Nephew plans to rebrand its robot as "CORI," updating platforms for unicompartmental arthroplasty and TKA.

Corin Group manufactures OMNIBotics, a robotics technology designed for TKA. The company says its technology is the first soft-tissue balancing robot. Surgeons use a 3-D model of the patient's bony anatomy to assess the positioning of an implant. Its cutting hide also helps inform planned bone resections. According to Corin Group, many ASCs across the US have adopted this system, which has been used in more than 25,000 TKAs globally.

VELYS, from Johnson & Johnson, is a shoebox size robot that attaches to the bed. It has been suggested that the placement for this robotic system will be tied to implant utilization to gain traction in ASCs with more limited capital budgets.

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surgeons who want to use the technology, he adds.

Patients are also driving the push toward robotics. "There's a significant element of consumerism in some markets, where consumers are driven to providers that offer the latest and greatest technologies," Dr Cherf says.

Weighing the benefits, disadvantages

"Technically, there is no doubt about it as far as new technology and accuracy are concerned. You just can't beat a robot," says orthopedic spine surgeon Stephen Hochschuler, MD, cofounder of Texas Back Institute in Plano. For spinal procedures, a robot has approximately a 0.05-centimeter accuracy, says Dr Hochschuler, who helped launch several major robotics systems, including the Mazor (Medtronic, Dublin, Ireland) guidance system and the ExcelsiusGPS by Globus Medical, Inc (Audubon, Pennsylvania).

Robotic-assisted total knee arthroplasty (TKA) platforms enable surgeons to accurately achieve an implant alignment and position target with 1 millimeter or degree of accuracy, says Edgar Wakelin, PhD, a clinical research scientist at Corin Ltd (Corin Group), which manufactures the OMNIBotics and BalanceBot system (Raynham, Massachusetts). "Surgeons are able to accurately target component alignment to achieve optimal soft tissue balancing," he says.

Patients with this technique report fewer complications and excellent outcomes compared to other models, he adds.

The downside of robotics is the cost. A robot usually requires a $1 million capital investment. The challenge is proving the return on investment—and the benefits of using this technology in surgery, Dr Hochschuler says. Offering

Do robotics improve clinical outcomes?

Some ambulatory surgery centers (ASCs) report promising outcomes with robot-assisted platforms, yet other experts question their efficacy in comparison to more conventional surgical methods.

Robots offer short-term benefits such as less invasive surgery, leading to reduced pain and need for care following surgery. "By making smaller incisions in properly selected patients with the robot, you can move certain patients to an ASC that has no capability for overnight care," says John Cherf, MD, MPH, MBA, chief medical officer at Lumere, a data and analytics solutions firm in Chicago.

What's less clear are the long-term benefits of robotics technology, Dr Cherf says. Robots are still relatively new technology, and there are no long-term data that definitively say robots are beneficial, he notes.

Clinical research on robotics technology has yielded mixed results. One study that compared robotic-assisted implantation and standard techniques in unicompartmental knee arthroplasty patients reported no clinical or radiographic differences among the two options. In a 2020 study of 40 total knee arthroplasty (TKA) patients, researchers found that image-free robotic-assisted TKA resulted in higher blood loss and longer operative times, although it did seem to improve prosthetic alignment in mechanical and rotational axis.

Other studies have reported improvements in these metrics with robots. For instance, a Canadian study that compared robotic and open surgery for 225 radical prostatectomy procedures reported fewer blood transfusions and less blood loss in the robot cohort, as well as shorter lengths of stay in the hospital. In another study, integrated robotic distal gastrectomy (IRDG) yielded slightly higher surgical success rates in patients with early gastric cancer, compared to a conventional approach. IRDG also led to higher retrieval of lymph nodes, less blood loss, and lower readmission rates.

The Mako Robotic Interactive Orthopaedic Arm (RIO) performed well in a study of 120 TKA patients. Compared with conventional unicompartmental surgical techniques, the RIO improved accuracy of implant positioning.

It may be more expensive to use robotics in certain circumstances. One study compared morbidity profiles and costs between robotically assisted and laparoscopic hysterectomy in nearly 265,000 women, and reported no significant differences in rates of discharge to nursing facilities or transfusion requirements. However, the total costs associated with the robotics approach exceeded laparoscopic hysterectomy by $2,189 per case.

Costs for robotics technology will eventually go down as the technology improves, adds Dr Cherf. "The first computers were heavy and lethargic. But they got much better over time—faster, smaller, and less expensive. With the penetration in the market of the big orthopedic industry players with robotics, it feels like this has longevity," he says.

As newer versions of robotics technology appear in the healthcare space, so will young physicians skilled in using the technology. "That's a part of their training in their residencies and fellowships. I've heard stories where surgeons finish their residency and they want to do a joint replacement fellowship, but only at a hospital that has a robot. As more of our young surgeons become dependent on robot technology, I think it will accelerate adoption," says Dr Cherf.

Johns Hopkins, a leader in robotics, has been developing a single platform system known as the Galen robot. The platform has potentially interchangeable arms for ear, nose, and throat procedures, as well as potentially for neurosurgery, orthopedic surgery, and spine surgery, says orthopedic spine surgeon Stephen Hochschuler, MD, co-founder of Texas Back Institute in Plano.

"The Galen will have different arms for the robot, which you can switch out for different procedures," says Dr Hochschuler. Even with these new developing robotic technologies, augmented reality (AR), a process in which virtual reality glasses guide surgeons through spine implant placements and other procedures, may end up replacing robotics someday, he believes. Companies like OnPoint Surgical are driving this technology.

AR takes up less space than a robot and is a fraction of the cost, says Dr Hochschuler.

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Global robotics market at a glance

Worth:	$16 billion by 2025
Biggest drivers:	Geriatric population, preference for minimally invasive procedures, growth in adoption of robotics, technology advancements and funding for research, and rise in surgeon/patient acceptance of laparoscopic procedures and robotic assistance.
Dominant product type:	Surgical robotics
Largest segment:	Instruments and accessories
Dominant Application:	General and gastroenterology (laparoscopy). Use of orthopedic surgical robots has also increased because of greater demand for robots in knee replacements.
Largest end users:	Hospitals
Prediction for ASCs:	Robotics will grow "at a significant pace" because of the benefits ambulatory surgery centers provide.

Source: Global Medical Robotics Market (By Segment—Surgical Robotics, Rehabilitation Robotics, Hospital and Pharmacy Robotics, By Application & Region), Key Players Analysis, Trends, Key Industry Developments—Forecast to 2025. www.reportlinker.com.

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robotic surgery, however, is a major marketing tool, he believes.

"One of the problems with a robot is the relatively time-consuming preoperative work. In addition, it takes time intraoperatively to set it up, and its bulk can get in the way [during surgery]," he says. These conditions can require a patient to remain under anesthesia for longer periods of time than with nonrobotic surgery, he adds.

Dr Cherf similarly reports that robots are "another piece of equipment" OR suites must accommodate. On average, the clinical literature shows that robots can slow down surgery by 18 to 20 minutes.

Some hospitals and ASCs are reporting more efficient results with robotic platforms. In an economic study conducted by Corin Group, TKA procedure volumes increased by 24% over 2 years after the introduction of the OMNIBotics platform. "Patients in a multicenter prospective study reported satisfaction of more than 96% at 1 year postop," says Wakelin.

Analyze the needs of your local market.

The system's small size is also ideal for ASCs, he adds. "It can move easily from one OR to another, and its intraoperative bone morphing technology eliminates the need for preoperative imaging."

Robotic technology has a learning curve, Lessner says. "It takes about 20 cases for the surgeon to get back to former operative times." In her experience, many surgeons who continue to use robots can reduce their operative times to fewer minutes than are needed for manual joint replacements (sidebar, "Do robotics improve clinical outcomes?").

"With experienced teams, the amount of setup time is actually less," says Lessner, whose team transfers its four robots from room to room through substerile entrances.

Justifying costs

As with any major purchase, specialty hospitals and ASCs should first do research to see if a robot makes sense in their facilities and in their local markets.

It's important to layer disease incidence, population health statistics, and local demographics, Lessner notes. In 2018, for instance, The Arthritis Foundation reported that 37% of Americans had been diagnosed with arthritis. More than 1 million TKAs and 646,900 total hip replacements were performed that year. The foundation also projected a need for 4 million total joint replacements by 2030.

Managers need to ask themselves why they want a robot, says Dr Cherf. "Do you want it to generate patient volume, or recruit surgeons? Do you feel you have to [purchase a robot] because there's an arms race in your community? Does the facility plan on a capital loan or cash to finance it?" Managers should also be wary of pressure from robot vendors to use their implants, which can be costly, he adds.

Case costing is an important step to take before negotiating payer and vendor contracts, notes Lessner. It involves figuring out implants, disposables, medications, and surgical supplies. Launching a robotics program will require budgeting for additional staffing and education.

This isn't just about the capital investment, "it's everything that comes with the program," Lessner says. ASC

leaders should determine how the technology will grow with the facility and how to protect it against rapid depreciation. "What does the technology do without the software? Does it become obsolete?" are questions managers should consider.

"Consider the maintenance agreement and software agreements," Lessner adds. "The maintenance agreement protects against depreciation of the asset. Find out if the company selling the robot has a new software or hardware update—and make sure your agreement covers that."

Other line-item considerations include:

- Instrumentation. Many times, the quote includes just one or two robotic instrument trays. For each procedure, surgical departments will need at least three complete sets. Most robotic trays run from $20,000 to $40,000.
- Robotic trays. ASCs should ask vendors during negotiation of the robotic system if they are willing to consign the robotic trays.
- Implant costs. Decide whether it is possible to negotiate the capitated pricing on implants.
- Cost of disposables. Robotic disposables can run from $600 to $1,700 per case.

An integrated team

Facilities own the robots they purchase, Lessner points out. "Teach staff to take the robot out, run calibration tests, and practice setting up the system to gain familiarity and confidence," she says.

The team has to mimic the robotic precision and follow detailed clinical pathways so that every intervention drives an outcome, she says. This starts when the patient is seen and educated in the office, and continues for 60 days post procedure.

Anesthesia care coordination is essential. For example, in a multimodal pain management protocol, "we involve our anesthesia providers in creating standardization in care with blocks, spinal dosages, induction agents, and, of course, reduction of narcotics," says Lessner.

Surgeons need to be on board. "The 'build it and they will come' [strategy] may result in a dusty robot. You need surgeons that will commit to and advocate for the program, are willing to teach and train, and will get input from their colleagues about their experiences," she says.

"Getting into robotics is a strategic initiative," she notes. "Everyone in the building needs to be energized about the technology." To build enthusiasm and help staff understand the technology, Lessner holds "whole house" in-services that include staff from registration, the preoperative area, the postoperative recovery unit, and food services.

Community outreach and education about the new robotics service line are also important. "Host events and ask former patients to come and provide testimonials for patients who are educating themselves on the technology," Lessner says. "I have had patients who did sawbone labs with robotic technology used on their own knees. They became enthusiastic about sharing their experience with others."

Jennifer Lubell is a healthcare writer based in Rockville, Maryland.

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