Market Intel: Medtech Giants Ready To Battle Frontrunner Intuitive Surgical In ‘Soft Surgery Robotics’
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Executive Summary
The global market for robotic surgery systems is expected to reach $9.7bn by 2023. With medtech giants Medtronic, Johnson & Johnson and Zimmer Biomet launching robotic platforms in 2020, this market is set for a major shakeup.

The global market for robotic surgery systems is expected to see double-digit, year-on-year growth, reaching more than $9.7bn by 2023. Pioneering robotics surgery firm Intuitive Surgical Inc. continues to dominate the overall robotics surgery market, accounting for more than $3.7bn in sales of its da Vinci systems, instruments and accessories.

This year, however, several major medtech players, Medtronic PLC, Zimmer Biomet Holdings Inc. and Johnson & Johnson Medical Inc., as well as smaller companies like CMR Surgical Ltd., are vying to carve out market share by introducing competing platforms, according to “Robotically Assisted Surgical Devices,” an analysis by Informa’s Meddevicetracker.

“It’s an interesting time in medical technology,” Ryan Zimmerman, a medical technology analyst with the global financial services company BTIG Research in New York told Medtech Insight. “You’re seeing automation of procedures and the introduction of more advanced enabling technologies that drive usage of more consumable-type implants [and] that can take some variability out of the procedure by automating certain components of it.”

The market for robotic-assisted surgery systems totaled about $4.6bn in 2018. Robotic procedures worldwide made up only 2% of all surgeries while traditional minimally invasive surgery accounted for about 30% to 35% of all surgeries, according to Meddevicetracker. The majority of surgeries are still performed with traditional open approaches.

However, as Robert White, Medtronic’s executive VP for minimally invasive surgeries, noted during an investor briefing last September, open and traditional minimally invasive surgeries will “be drawn into robotic-assisted surgery.”

Zimmerman agreed that penetration of surgery robotics was low but said that Intuitive’s success in building soft tissue robotics is fostering interest from large companies like Medtronic and J&J.

In the orthopedics sector, Stryker Corp.’s MAKO robot is leading the pack with some 850 units placed in the US alone, and given that there are about 5,000 US hospitals with orthopedic programs that could benefit from a robot, there is ample room for growth, Zimmerman said. Similarly, in the robotics market in spine, which Zimmerman valued at about $400m to $450m globally, there are only 300 to 400 surgical robots in place today.

“All of these areas have room for growth,” he said.

Growth Drivers Versus Barriers
Several factors are driving growth in robotic surgery. One is patients’ demand for less invasive procedures. On the orthopedics side, steady-state pricing pressures have pushed prices down in recent years. And surgical robot manufacturers have found that knee replacements, in particular, offer a good opportunity for revenue growth,
given that clinical outcomes have proven to be very good with low mortality rates, he said.

Brian Chapman, a principal with consulting firm ZS Zurich, also believes that in orthopedics, surgery robots will create value, because when robots do the cutting, physicians can measure outcomes much better. (Also see “Medtech Companies Must Adjust To Growth Of Outpatient Centers, ZS Consultant Advises” - Medtech Insight, 2 Mar, 2020.) “Where I think we’re going to get some better answers in the short-term is in orthopedics,” Chapman told Medtech Insight.

“They’re not doing the whole procedure. They’re simply doing the cutting. They have a specific role that the physician is working with and then, you can actually measure the outcome much better of an orthopedic procedure because of course, the goal of an orthopedic procedure, in many cases, is mobility.”

While there is only limited data on orthopedics applications to date, some studies have shown that patients could benefit by recovering faster and having shorter hospital stays. Meanwhile, hospitals and ambulatory centers tend to view surgical robots as marketing tools that can attract patients to their facilities.

“Surgeons [who] weren’t planning on becoming [users of robotic-assisted systems], but were forced into it, because patients may go to a physician who does robotic surgery, has driven Intuitive’s growth for many years,” Zimmerman said. More surgeons are also looking at the advantages that robots can offer during surgery, such as greater visibility and precision, that could lead to better outcomes.

In a Meddevicetracker survey of selected gynecologic surgeons in the UK and US, who performed robotic surgery, 75% of respondents said procedure volumes had risen 1% to 25% since they bought a robotic system with 25% of surgeons saying that procedure volumes had risen by 26% to 50% since they brought in a robot. That said, barriers to entry are high.

With the average cost of $1m for one robotic system, many facilities don’t have the capital budget to take on those costs, Zimmerman said.

“That hasn’t stopped Stryker and others to find early adopters and many physicians are making a brand out of being a robotic-based surgeon,” he said.

But logistical challenges and interest by physicians are also limiting factors. Zimmerman said companies that introduce a “universal system” that can be used for different indications, and rule out some of the complexities in the operating room, will ultimately be winners. Chapman added that surgeons also can’t be expected to know how to operate multiple robots.

“I just can’t imagine that any surgeon is going to want to know how to do six different robots … I think we have, again, one or two that will dominate in the longer-term, but the ways in which you can differentiate for the procedure, including the robot, are much more numerous than just the implant itself,” he said.

**Market Size**

In the Meddevicetracker analysis, the market for robotically assisted devices is divided into three segments – robotically assisted systems (RAS), instruments and accessories, and services/maintenance contracts. Instruments and accessories ranked first in the overall market and are expected to see the largest growth of 18.3% by 2023, reaching $5.1bn in revenues (see Figure 1).
Sales of robotic-assisted systems ranked second in the market overall and are expected to reach $3.3bn by 2023, a compound annual growth rate (CAGR) of 14.6%. Service revenue is projected to grow at a 11.7% CAGR to reach $1.3bn by 2023. However, service revenue as a percentage of total market revenue is projected to decline as a result of lower-priced surgery systems that are expected to be introduced by the newcomers.

Figure 1. Robotic Assisted Surgical Devices, Global Market Forecast ($m), By Revenue Segment, 2018-23

Meddevicetracker, Robotic Assisted Surgical Devices, Company Financials
Intuitive Surgical
In 2018, Intuitive Surgical dominated the global market for robotic-assisted surgery systems with an 80.6% market share and about $3.7bn in sales of its da Vinci systems, instruments and accessories. (Also see “Rising Procedure Volumes Push Intuitive Surgical Third-Quarter Earnings Above Forecast” - Medtech Insight, 21 Oct, 2019.)

The da Vinci system accounts by far for the greatest share of robotic surgeries, led by general surgeries, as well as prostatectomy, hysterectomy, cardiothoracic surgery and transoral procedures.

Calvin Darling, Intuitive’s spokesperson, told investors during the fourth-quarter earnings call on 23 January that in 2019 1.2 million total procedures were performed using the da Vinci surgical system, an 18% rise from 2018.

In the US, the da Vinci was used to perform about 421,000 general surgery procedures – representing about 48% of overall US da Vinci procedures; 282,000 gynecologic surgery procedures; and 138,000 urologic procedures.

Intuitive’s CEO Gary Guthart told investors that in the fourth quarter, the company placed 336 da Vinci surgical systems, up 290 from the fourth quarter of 2018. Total placements for the year reached 1,119 systems, up 12% from 2018. For 2020, he projects total procedures to grow in the 13% to 16% range, driven by US general surgery and procedures outside the US, where the company is at the earliest stage of adoption. 2019 revenue reached $4.5bn, a 20% growth over 2018.

Intuitive is in the first phase of rolling out its da Vinci SP, or single-port platform and is pursuing additional indications for this platform. Guthart noted that Intuitive has been in discussions with the US Food and Drug Administration about data requirements for a colorectal indication and expects this to require an investigational device exemption (IDE) trial that includes follow-up analysis, making a third indication by 2020 unlikely.

The company is also launching its flexible diagnostics Ion platform for lung biopsies for early diagnosis of suspicious lesions. Guthart noted that 16 Ion systems have been placed thus far and that user feedback during the initial launch has been strong. He expects to see several presentations by publications that are currently reviewing the system to be presented this year.

When asked how Intuitive plans to respond to competitors that are marketing their efforts as “digital surgery” using new technologies such as artificial intelligence, technological advancements and improved connectivity, Guthart’s short answer was, “Welcome to the party,” noting that Intuitive has been working on these issues for more than a decade. (Also see “Exec Chat: Intuitive Surgical CEO Gary Guthart On Expansion, Innovation And Competition” - Medtech Insight, 8 Oct, 2019.)

“We’ve been the Internet of Things in surgical robots for a decade, cloud-enabled for a decade. We are quite deep,” he said. (Also see “Exec Chat: XMed 2019: Intuitive Foundation’s President Catherine Mohr’s Team Jackets Read ‘Plan For 100 Years’” - Medtech Insight, 8 Nov, 2019.)

He outlined four future opportunities: using big data to help customers establish benchmarks to improve upon; using computing power in real-time to help surgeons improve outcomes –as exemplified by Ion – and educate surgeons to reduce surgical variations between patients; and using computing technologies and networking to help hospitals and Intuitive become more productive.
“The winner won’t be the tag line. I think the winner will be those who deliver real value that’s validated against those four categories,” Guthart said.

On 10 February, Intuitive seized on one of these opportunities Guthart outlined during the earnings call when it announced that it acquired privately held New York-based Orpheus Medical, which offers information technology and connectivity and expertise in processing and archiving surgical video.

**Medtronic**

Meanwhile, Medtronic and J&J are also investing heavily in soft tissue robotic systems.

Medtronic, which ranked in fourth place in the overall robotics surgery market in 2018 with $88.4m in sales, announced on 13 February it acquired privately held Digital Surgery, which develops digital surgical tools to strengthen its surgery robotics platform. (Also see “Medtronic Adds UK-Based Digital Surgery To Support Robotic Surgery” - Medtech Insight, 13 Feb, 2020.)

Omar Ishrak, Medtronic’s CEO, said during the company’s fiscal 2020 third-quarter earnings call on 18 February, “these products can be leveraged to provide insight into the procedure time, cost and process to improve surgical care.” (Also see “More Than Mako: Stryker Delivers Strong Growth In All Three Businesses” - Medtech Insight, 30 Jan, 2020.)

This comes on the heels of Medtronic’s announcement last year that it developed the soft tissue Hugo RAS system, which will compete directly with Intuitive’s da Vinci system for market share in general, urology, gynecology, thoracic, colorectal and bariatric robotic-assisted surgical procedures. (Also see “Medtronic Introduces Hugo To Rival Intuitive’s Robotic Surgery System” - Medtech Insight, 25 Sep, 2019.)

The company hopes to earn a CE mark for the system in late 2020 or early 2021 and expects the FDA to clear Hugo RAS around September 2021. Intuitive has been touting Hugo as more flexible and mobile, which will make it easier for hospitals to use the robot more often, keeping the per-procedure cost down. Zimmerman said Medtronic’s plans to market Hugo in selected markets outside of the US first is a relief for shareholders as Medtronic will not be in the US market so quickly.

Medtronic already markets the Mazor X Stealth platform for spinal surgeries, which it launched after acquiring Mazor Robotics for $1.64bn in late 2018. Surgeons began using the system in January of last year and Medtronic attributed the low-double digits growth in neurosurgery to “strong growth” in Mazor Robotics.

**J&J**

J&J is a relative latecomer to the robotics market but has made a series of acquisitions in the robotic-assisted space to make inroads in several indications. (Also see “J&J Has Big Plans For Robotic Surgery In 2020” - Medtech Insight, 24 Jan, 2020.)

In February of last year, J&J bought Auris Health Inc. for $3.4bn to add the Monarch robotic surgery platform, which was cleared by the FDA for diagnostic and therapeutic bronchoscopy procedures to treat lung cancer in 2018. During the company’s fourth-quarter earnings call, Alex Gorsky, J&J's CEO, said physicians have performed more than 2,000 bronchoscopy procedures using the platform.

BTIG’s Zimmerman said that Auris is ahead of Intuitive’s Ion platform in terms of systems placed and expects that J&J will explore other indications for this system as well.

In 2019, J&J bought out Verily Life Sciences LLC’s
share of Verb Surgical Inc. to develop robotics and machine learning tools. This comes after a successful strategic collaboration with Verily, part of Google's parent company Alphabet, to co-create Verb. (Also see “J&J Takes Full Ownership Of Verb Surgical, Verily Breaks Off Robotics Partnership” - Medtech Insight, 23 Dec, 2019.)

On the orthopedics side, J&J's DePuy Synthes' division also gained an orthopedic robotic platform resulting from the Orthotaxy SAS buy-out in 2018.

The Orthotaxy robot will be much smaller and less expensive than current robots on the market and reportedly doesn't require surgeons to use disposable instruments, saving $1,500-$2,500 per procedure. Gorsky said the company plans a midyear regulatory submission for the robot. Longer-term, J&J plans to bring the next generation of digital and robotics platform into one robotics platform called VELYS.

Zimmerman said for multi-billion general surgery companies such as Medtronic and J&J, investments in the robotics space remain tricky. Intuitive, by comparison, built its entire business around robotics.

“What affect it will have on their core business, which comes at a higher margin than robotics, is something investors and these companies will wrestle with,” Zimmerman said.

**Stryker**

In 2018, Stryker was the second-leading competitor in robotics-assisted surgery with a 9.6% market share and $422m in sales, driven, in large part, by the company’s Mako robotic system for hip and knee indications.

The Mako system has seen steady growth since its introduction in the US in 2017 for total knee replacements. Katherine Owen, Stryker’s VP for strategy and investor relations, said during the company’s fourth-quarter earnings call on 28 January that she expects robust orders for Mako in 2020 and continued share gains in both hips and knees. (Also see “Stryker’s Mako Robot Continues To Bite Orthopedic Surgery Competition “ - Medtech Insight, 1 Nov, 2019.)

Globally, 860 Mako have been installed with 700 being installed in the US, Owen said.

**Stryker’s Mako surgical robot**

“We now have nine Mako robots in Japan [where it is now approved for all indications] and continue to believe this represents a significant market opportunity.”

In the US, total procedures exceeded 114,000 in 2019. Knee procedures rose 66% to 75,000 in 2019 and hip procedures grew 40% last year. The fourth quarter represented Mako’s strongest performance to date with Mako procedures rising nearly 50%, the company said.

In the second quarter of 2020, Stryker plans to launch a “user-friendly” software upgrade for its hip application. Owen said Stryker will reveal details about its new hip technology at the annual American Academy of Orthopedics Association (AAOS) meeting, which will be held from 24-28 March in Orlando.

Kevin Lobo, Stryker’s CEO, told analysts during the earnings call that the company is also working on a robotics platform for spine.

“We have two options, one with the Cardan, which came with the Mobius acquisition as well as Mako,” Lobo said, adding that Stryker “is working on those programs, but it’s too early to give a launch date.” (Also see “Stryker Closes Gap With Competitors In Strategic Spinal Robotics Acquisition” - Medtech Insight, 6 Sep, 2019.)
**Figure 2.** Robotically Assisted Surgical Devices Market, Global Share By Supplier, 2018

- Intuitive Surgical: $3,724.2m
- Others: $896.1m

Intuitive Surgical estimated sales in 2018:

$3,724.2

**Meddevicetracker, Robotically Assisted Surgical Devices, Company Financials**
Zimmer Biomet
In 2018, Zimmer Biomet had a small share in the global robotics-assisted surgery market with $13m in sales, well below Stryker, Medtronic and other competitors.

The company received FDA clearance for its ROSA robotic system for spine applications but is focusing its efforts on knee and hip applications, which represents a much larger market opportunity, Zimmerman said.

In the fourth quarter of 2019, Zimmer Biomet saw its knee business grow 7.8%, beating J&J's 1.4% quarter knee volume growth. The growth was largely driven by its ROSA knee robotic surgery system, which accounted for around 50% of the total, and by the Persona “personalized” knee replacement system, the company said. (Also see “Knees Boost Zimmer Biomet; Turnaround Continues, But FDA Woes Linger” - Medtech Insight, 6 Feb, 2020.)

For 2020, it expects continued growth as the company will focus on sales expansion and surgeon training, Zimmer Biomet's president and CEO, Bryan Hanson, said during the fourth-quarter earnings call on 4 February. The company also expects to launch a hip application during 2020. (Also see “AAOS Exec Chat: An Insider Look Into DePuy Synthes' Anterior Approach “ - Medtech Insight, 20 Mar, 2019.)

Other Competitors
NuVasive Inc., which developed a robotic application for spine, told investors it has been working through “beta evaluations” of its technology for the last quarters and plans to introduce its system in 2021. The San Diego company posted revenues of $310.4m for the three months ended 31 December 2019. (Also see “NASS2019: Robotics Spotlight Is On New Platforms By Globus Medical, NuVasive “ - Medtech Insight, 1 Oct, 2019.)

Smith & Nephew PLC’s new CEO, Roland Diggelmann, said during the company's fourth-quarter earnings call on 20 February that in 2020, S&N will launch the next-generation of its handheld CT-free design of NAVIO. He added, this next-gen robot will have an even smaller footprint, which is an advantage for ambulatory surgery centers, and a “very distinct technology around the burring,” which will be faster over time.

“This platform should become the base for a multi-asset offering,” Diggelmann told analysts. He hinted at more announcements being made at AAOS next month.

That said, Diggelmann told analysts that S&N will not give out numbers on NAVIO’s installed base.

Last year, Smith & Nephew acquired Brainlab AG's orthopedic joint reconstruction business, which it folded into its surgical robotics division.

NAVIO differs from Stryker’s Mako in that it is designed to help augment the surgeon's manual capability while the Mako has integrated tools and an articulating arm that takes the place of a surgeon's hand. The smaller footprint of the NAVIO makes it an “ideal solution for all surgical care settings, including ambulatory surgical centers,” the company said.

UK-based CMR Surgical, which developed the Versius surgical robotic system, made great strides recently with the announcement that the Western General Hospital and Milton Keynes University Hospital NHS Trust became the first hospitals in Europe to use the system to perform minimal access surgery. Versius has initially been used to perform a range of colorectal surgeries
for treating patients with serious bowel disease or bowel cancer. The Versius is currently under FDA review. (Also see “European Debut For CMR Surgical’s Versius Surgical Robot In Two UK NHS Hospitals “ - Medtech Insight, 20 Feb, 2020.)

With the massive potential applications of surgery robots and continued innovations by manufacturers, this field will continue to get more crowded and draw increasing attention.