HEALTHCARE INNOVATION FOR A HEALTHY & PROSPEROUS HAMILTON

PHASE ONE: The MAKO RIO Orthopaedic Surgical Robot

February 2019

Update Prepared for:

The Hamilton Future Fund Board of Governors

St. Joseph's Healthcare Hamilton FOUNDATION

HOPE HEALING DISCOVERY

OUR THANKS TO THE HAMILTON FUTURE FUND

St. Joseph's Healthcare Hamilton is extremely grateful for the generous contribution from the Hamilton Future Fund to bring Canada's first MAKO Rio Orthopaedic Surgical Robot to Hamilton and our Hospital. The robot arrived at St. Joseph's on September 27, 2018.

St. Joe's is now one of a select few hospitals worldwide that possess this orthopaedic robotic technology. We successfully completed Canada's first knee replacement in January 2019 using the robot, helping to pave the road for St. Joe's to become the Canadian hub for orthopaedic robotic surgery. The full news coverage of this important milestone achievement is included in the attached Appendix. The investment from the Hamilton Future Fund is pivotal in allowing St. Joe's to forge ahead with our leadership in surgical robotics, while putting the city of Hamilton on the map and creating innovative economic development opportunities for our City.

OFFICIAL GIFT ANNOUCEMENT

The arrival of the MAKO Rio Orthopaedic Robot was officially announced and celebrated on November 22, 2018. We were so thrilled that members of the Hamilton Future Fund Board of Governors, Judi Partridge (Vice-Chair), Sergio Manchia, and Anthony Macaluso, were able to join us for the unveiling of the robot. Over 75 people, including the Hospital's leadership and staff, Foundation board of directors, local media, donors, and community members attended the launch, and heard Judy Partridge's inspiring remarks.

The Hamilton Future Fund's support of this innovative technology will have a profound and lasting impact on the more than two million people served by St. Joe's, including over 530,000 Hamiltonians. Your investment in this initiative will be recognized in perpetuity with a recognition plaque displayed prominently in the Facture Clinic. Both Judi Partridge and Dr. Anthony Adili, Chief of Surgery, participated in the plaque unveiling before the robot announcement.

The official gift announcement event attracted widespread media attention from sources including, CHCH, The Hamilton Spectator, and McMaster University (*see full articles in the Appendix).* The Hamilton Future Fund was also acknowledged in our Foundation's 2018 Donor Impact Report (*attached)*, in a news release on our website and in Hospital e-news letters (*attached).*

ST. JOSEPH'S LEGACY & LEADERSHIP

For decades, St. Joseph's Healthcare Hamilton has been a pillar of healthcare innovation and discovery in our City. Together the City of Hamilton and St. Joseph's, alongside academic partner McMaster University, have been part of the growth of our City into the medical, entrepreneurial and ever-growing hub of innovation that it is today. Our Hospital in partnership with McMaster University stays leading-edge through:

- The recruitment of world-class staff,
- The acquisition of technology and equipment for enhanced patient care,
- Partnerships with industry and vendors that support advancement,
- Research initiatives that aim to uncover new and transformational diagnostic and treatment techniques,
- Educational opportunities that assist in the recruitment of budding clinicians and scientists, and
- Innovative practices that put St. Joseph's and Hamilton on the worldwide stage as a healthcare leader.

Your investment has made it possible for St. Joseph's and Hamilton to take a leadership role in a new field of orthopaedic care on the worldwide stage and leave a lasting legacy for our City and region.

PROJECT VISION

Currently, one in five patients report being unhappy with their knee replacement surgery, the idea with the robot is for that number to improve. Our expertise in orthopaedics and successes in prostate and lung robotic surgery have established our Hospital as a world-renowned expert in robotic care and have positioned us for the next frontier in robotic patient care: **An Orthopaedic Robotic Surgery Centre.**

Our vision is to forge ahead into the new field of orthopaedic robotic surgery and research to transform care and offer hope to patients who suffer from debilitating joint pain and musculoskeletal injuries through the creation of an Orthopaedic Robotic Surgery Centre.

We have completed the first phase in our vision by bringing Canada's only orthopaedic robotic surgery system to Hamilton. This investment, made possible by the Hamilton Future Fund, Brenda and Terry Yates, and a local donor, will enhance our community's economic prosperity, develop key economic clusters, support job creation, enhance community life and build upon our City's legacy of healthcare innovation.

The MAKO Rio surgical robotic system will translate into reduced hospital stays, faster healing and, ultimately, a faster return to life before illness. The Arthritis Society estimates that the impact of arthritis on the Canadian economy, through healthcare costs and lost productivity, is close to $33 billion annually. This technology will enable St. Joe's to advance arthritis research, a disease which affects one in five Hamiltonians, creating healthier and happier community members who are able to participate as active and contributing members of Hamilton's social and economic fabric. The technological benefits to patient care, coupled with partnerships in industry and big business are a sure way to enhance Hamilton's reputation and expand St. Joseph's as a centre of excellence in robotic surgery, and as an orthopaedic leader provincially, nationally and internationally.

The MAKO Rio System will ultimately lead to the following key elements of our vision for an Orthopaedic Robotic Surgery Centre:

- Enhanced patient care and new surgical procedures that will increase patient satisfaction,
- Ground-breaking research that will continue to change the way we care for patients,
- Knowledge translation efforts that expand Hamilton's international renowned reputation, and
- Opportunities to partner with industry to build Hamilton's economy and our healthcare economic cluster by developing research infrastructure within the rapidly growing field of robotic surgery.

Your investment will also help kick-start phase two of the project and leverage additional support for our vision of an Orthopaedic Robotic Surgery Centre that will support exceptional patient care and also bring expanded business partnerships and an enhanced healthcare economic opportunities to our region. This project is truly a **"Made in Hamilton**" solution for our community.

MILESTONES AND CRITERIA FOR SUCCESS – YEARS 1 TO 5

With the tremendous opportunities that this technology has brought to Hamilton, St. Joseph's looks forward to updating you on our future successes with the implementation of our now enhanced surgical robotics program.

As the robot arrival was only announced late November, and initial research procedures have only just begun, we anticipate that starting 12 months from the purchase of the MAKO Rio System, we will be better able to report in full on outcomes 1, 2, and 3. In 18 months' time, evaluations will also include more detailed reporting on outcomes 4, 5 and 6, as clinical care, research and business partnerships grow and opportunities to further expand our reach become feasible. Below, please find an update on each of the outlined indicators:

OUTCOME	UPDATE AS OF FEBRUARY 2019
1. Clinical Outcomes	In the fall of 2018, a member of the St. Joseph's Healthcare Hamilton team completed three months of intensive training in the United States for the use of the MAKO technology. This individual is now the first certified MAKO product specialist in Canada and must be present at each procedure involving the MAKO Rio robot. In addition, US MAKO experts visited St. Joseph's to set up and test the machinery prior to use. On January 18, 2019, with support from these product specialists, Dr. Anthony Adili completed the first three surgeries with this technology. The procedures were a partial medial knee replacement, a partial knee replacement under the kneecap, and a total knee replacement. Dr. Adili completed one of each type of surgery to work through all procedure types, including the associated risks and potential errors. On January 21, 2019 Dr. Adili and his team completed the first solo partial knee replacement surgery. The procedure, guided by Dr. Adili's expertise and leadership, was a huge success and a milestone for the future of orthopaedic surgeries at our Hospital.

	Dr. Adili recently met with his first robotic knee replacement patient for their six week follow up (*see articles in Appendix).* This patient was in need of a partial knee replacement; part of his knee was damaged but the rest of his knee was in good condition. Without the robot, the patient would likely have had his entire knee replaced, but this technology enabled Dr. Adili and his team to do a partial knee replacement and leave the good parts of the knee intact. Partial knee replacement surgeries are difficult to do but the robotic technology enables more precision accuracy by knowing specifically the right amount of bone to cut. The next step is to review the remaining completed procedures to analyze areas for refinement and further research. Review and analysis of patient outcomes is completed at the six week follow-up, at which point patients are able to regain care of themselves and resume most of their regular activities. Once the review is complete, additional surgeries will be planned. Clinical outcomes, including surgical volumes, patient satisfaction, quality of life and success of surgery, will be tracked, reviewed, and reported on as more procedures are planned and completed. The success of surgeries completed so far are a great indicator of the potential for patient care and outcomes available with this technology.
2. Reputation of St. Joseph's, McMaster and Hamilton	The arrival and announcement of the orthopaedic robot received exceptional media attention and coverage (*see full articles in the Appendix)*. The achievement was shared with community supporters and the public through our website, e-news, and a fulsome communications plan, which includes a strategy to present published research to others. The excitement about the opportunities available with this technology will help us extend our reputation as a world-leading healthcare and education facility, and form beneficial partnerships to optimize our robotics program at St. Joe's. As more procedures are completed and we are able to better gauge the patient impact, our next priority will be highlighting our robotic surgery program on the national stage, by sharing success stories with news interests such as CTV and the Globe and Mail to engage new stakeholders, partners, and healthcare practitioners. The acquisition of the MAKO Rio Surgical Robotic System, supported by the creation of an Orthopaedic Robotic Surgery Centre of Excellence will yield tremendous opportunities to bolster our reputation and attract business and industry to our region. This will build economic development opportunities and strengthen healthcare's key economic cluster in our City through the attraction of professionals and business, education opportunities, and research infrastructure.

3. Development of Partnerships that Optimize the MAKO Rio Robotic System	As this is the only orthopaedic surgical robot of its kind in Canada, we will leverage this technological advancement along with our continuum of care and research in robotics surgery to build successful partnerships across the country and beyond. Our partnership with McMaster spans generations and is already well established through our centres of excellence like the Firestone Institute for Respiratory Health and McMaster Institute of Urology. Stryker, one of our key partners and the worlds' leading orthopaedic medical technology company, is investing in the growth of our community through an expanded Canadian head office in Waterdown. Stryker sees the significant benefits and the potential for synergies that our Orthopaedic Robotic Surgery Centre can offer. We look forward to continuing our partnership with Stryker as they build their roots in our City. Dr. Adili has begun engaging associates from engineering and health economics fields to start developing a robust research infrastructure for the new orthopaedic robot. He has also received correspondence from healthcare practitioners in Oakville and Toronto who expressed interest in visiting our Hospital to see the MAKO Rio Orthopaedic robot and potentially witness a procedure.
4. Expansion and Development of Innovative and Novel Procedures available in Canada	Hamilton is home to leading medical and innovative technology businesses, lending itself to the ground-breaking work we plan to undertake in orthopaedic robotics. Orthopedic robotic surgery was approved in Canada and the United States only in the last year so high-quality studies can still be done. The MAKO Rio surgical robotic technology increase accuracy in knee replacement surgeries by knowing precisely the right amount of bone to cut. While the technology is a significant investment, it will allow St. Joe's to push the boundaries in innovation and rethink how we approach patients with arthritic joints and conditions in the future. Dr. Adili and his team are currently reviewing the four completed surgeries to perfect procedures and facilitate research on the technology's performance so far. This is an important planning phase to ensure surgical procedures moving forward offer the best possible patient outcomes. Once Dr. Adili's review is complete, additional surgeries will be planned.
5. Research Productivity	At this stage, each procedure completed is geared towards enhancing orthopaedic research and improving the procedures, accuracy, and patient outcomes. Research studies are planned to measure the performance of the MAKO Rio System compared to minimally-invasive surgical methods to demonstrate the benefit of this robotic system for patients and the healthcare system.

	Research studies and reviews will be ongoing as surgical procedures increase and novel procedures are discovered. Research projects are planned, including studies for: • The modification and enhancement of the robotic technology to develop new and innovative surgical techniques, • The health cost effectiveness to approach government to fund orthopaedic robotic surgery, and • Patient outcomes for the accuracy of custom implant devices designed for individual patient anatomy. An important component of research productivity will be the training opportunities this will bring to our robotics program, and investigating different training methods available. Having already received interest expressed from surgeons across the province, this technology promises to garner a robust program for training and research. Currently the alternative for surgeons is to visit facilities in the United States, which can carry barriers to access. The novel research and training we have planned will serve as the economic engine to establish a sustainable research hub in Hamilton for the rapidly growing field of robotic surgery. No other site in the world is undertaking the research that we plan to complete.
6. Knowledge Translation	As the robot arrival was only announced late November, and initial research procedures have only just begun, at this point we are unable to report on academic publications and presentations. Dr. Adili and his team are confident this innovative technology will produce articles for publications, presentations, and academic opportunities with our academic relationships and will be engaged in significant knowledge translation.

On a long-term basis, each of these outcomes presented will also be used to demonstrate the multi-faceted nature of this vision's impact on Hamilton as a whole, including the opportunity it presents for strategic and business partnerships that will spur innovation and economic advancement.

OUR APPRECIATION

Our Hospital's legacy is one of innovation and, in partnership with the Hamilton Future Fund, we will continue to plan for a future that will enhance our City's legacy, build business partnerships and better support Hamiltonians. The acquisition of the MAKO Rio Robotic System (Phase 1 of our vision), made possible through the Hamilton Future Fund's support, is the foundational step that will allow St. Joseph's to establish an Orthopaedic Robotic Surgery Centre (Phase 2 of our vision), which includes partnerships with industry and building a research infrastructure for the advancement of our local economy.

Thank you again for The Hamilton Future Fund's dedication to healthcare and innovation in our community and for your contributions to our robotics program at St. Joseph's. It is thanks to your tremendous support that St. Joseph's is able to continue to offer the best possible care to our community and beyond, as well as support the economic development and reputation of Hamilton. We look forward to keeping you updated on our next successes with the orthopaedic robot technology, guided by Dr. Adili's leadership and dedicated surgical care and research teams.

APPENDIX: MEDIA RELEASES, PRESS COVERAGE & FOUNDATION COMMUNICATION

1. "First MAKO Rio surgery robot comes to Hamilton", by David Jones. December 4, 2018. Shared on St. Joseph's Healthcare Hamilton and Design Engineering. https://www.stjoes.ca/our-stories/news?resourceID=33&articleView=individual&articleID=1973

2. "A Robot is now performing knee replacements at St. Joseph's Hospital", by CHCH. November 22, 2018. Shared on https://www.chch.com/robot-now-performing-knee-replacements-st-josephs-hospital/

3. "First-ever MAKO Rio Surgery Robot in Canada comes to Hamilton, for knee replacement surgery and research", by Jeff Mahoney, November 22, 2018. Shared on the Hamilton SPEC. https://www.thespec.com/news-story/9044970-first-ever-mako-rio-surgery-robot-in-canada-comes-to-hamilton-for-knee-replacement-surgery-and-research/

4. "Canada's First Orthopaedic Surgical Robot Arrives at St. Joseph's Healthcare Hamilton", by St. Joseph's Healthcare Foundation. November 22, 2018. Shared on https://www.stjoesfoundation.ca/canadas-first-orthopaedic-surgical-robot-arrives-at-st-josephs-healthcare-hamilton/

5. "First-ever MAKO Rio Surgery Robot in Canada Comes to Hamilton, for Knee Replacement Surgery and Research", by Jeff Mahoney, November 22, 2018. Shared on McMaster University https://surgery.mcmaster.ca/news-events/news/news-item/2018/11/23/st.-joseph%27s-unveils-canada%27s-first-orthopaedic-surgical-robot

6. A Wave on Impact. St. Joseph's Healthcare Foundation 2017-2018 Donor Report. https://www.stjoesfoundation.ca/your-impact/publications/

7. MyStJoe's CONNECT, December 2018 Hospital Newsletter https://myemail.constantcontact.com/MyStJoes-CONNECT--What-a-difference-a-year-makes.html?soid=1125408332318&aid=IFfJWzomqO4

8. MyStJoe's CONNECT, March 2019 Hospital Newsletter. http://support.stjoesfoundation.ca/site/MessageViewer?dlv_id=0&em_id=2502.0

9. "First robotic knee replacement in Canada done in Hamilton". CHCH News. February 20, 2019. Shared on https://www.chch.com/first-robotic-knee-replacement-in-canada-done-in-hamilton/

10. "Knee replacement surgery performed with a robot for the first time in Canada". CBC News. February 22, 2019. Shared on https://www.cbc.ca/news/canada/hamilton/robot-knee-replacement-1.5029788

11. "Need a knee replacement? St. Joseph's Healthcare has a robot that does that". The Hamilton Spectator. February 22, 2019. Shared on https://www.thespec.com/news-story/9188851-need-a-knee-replacement-st-joseph-s-healthcare-has-a-robot-that-does-that/

CANADA'S FIRST ORTHOPAEDIC SURGICAL ROBOT ARRIVES AT ST. JOSEPH'S HEALTHCARE HAMILTON

St. Joseph's Healthcare Foundation
November 22, 2018
Categories: News, Press Releases

Thursday, November 22, 2018 – HAMILTON, ON – Today, St. Joseph's Healthcare Hamilton announced it is home to Canada's first orthopaedic surgical robot, the MAKO Rio Surgical Robotic System. The purchase of the robot – which until now has only been available outside of Canada – will be used with knee replacement surgery patients and will expand to include research into hip replacement and other orthopaedic surgical needs. It is the first step toward the creation of an Orthopaedic Robotic Surgery Centre at St. Joe's.

"For decades, St. Joe's has been a leader in the field of robotic surgery," said Ms. Winnie Doyle, Interim President of St. Joseph's Healthcare Hamilton. "We are home to Canada's first robotic surgery, the world's first tele-surgery, and we are internationally recognized for our leadership in urologic and chest robotic surgery through the Boris Family Centre for Robotic Surgery. With the addition of the orthopaedic robot a whole new frontier of robotic research will benefit patients in Hamilton, across Canada, and beyond."

In Canada, arthritis is the second most common chronic illness. And in Hamilton, 1 in 5 Hamiltonians are affected by this debilitating condition. More than 1,800 arthritis patients from across the region visit St. Joe's each year for orthopaedic surgery with 600 patients undergoing hip or knee surgeries annually. There are many other patients that rely on St. Joe's Fracture and Orthopaedic Clinic from across the city and region.

"Arthritis is very common, and care and treatment for arthritis has not progressed as far as in some other fields of medicine," explained Dr. Anthony Adili, Orthopaedic Surgeon and Chief of Surgery at St. Joe's. "With the research that is on the horizon with the orthopaedic robotic system, we anticipate uncovering new approaches to arthritis and other orthopaedic surgical treatments. We believe we now have new opportunities for operating on the knee, and that we will see even more positive, long-term benefits for patients."

The purchase of this leading-edge technology is the result of a truly made-in-Hamilton story. The catalyst to the project was a $1 million donation from a proud Hamilton couple. An investment through the City of Hamilton's Hamilton Future Fund, support from Stryker, the orthopaedic robotic technology owner with its Canadian headquarters in Hamilton, and donations from other grateful St. Joe's patients and community members, collectively brought the latest surgical technology and the promise of transformational research findings to Canada.

"It is an honour to witness so many people and organizations provide support in order to bring Canada's first orthopaedic robot to St. Joe's Hamilton and to know that because of philanthropy our Hospital will continue to lead the way with innovative robotic research," shared Ms. Sera Filice-Armenio, President and CEO, St. Joseph's Healthcare Foundation. "Members of the community, municipal government, industry partners and St. Joe's have all come together so patients – present and future – will benefit."

A robot is now performing knee replacements at St. Joseph's hospital

Posted: November 22, 2018 10:13:48 PM
Category: **Hamilton**, **Health & Lifestyle**
CHCH News
Tags: hamilton, hospital, knee surgery, st. joseph's healthcare

A new technology that has never been used in Canada before is expected to be the cutting edge at St. Joseph's hospital in Hamilton.

Canada's first orthopaedic surgical robot, is a $2 million robot that will be performing knee replacements.

Working off a 3D image of a patients knee, surgeons plan the perfect place to insert the knee implant. This framework is then programmed into this robotic arm so that it knows the precise amount of bone that needs to be cut.

"I push the robotic arm but the robotic arm will only let me push it where it needs to cut the bone. If I try to push it beyond that it will push me back and if I push it even more it will stop." Dr. Anthony Adili.

Making the cuts more accurately than if it were done by a surgeon.

The $1,800,000 robot was purchased with donated money. St. Joe's says the new technology will first be used on a few hundred knee replacements patients to gather research, then the research of the new device will expand to hip replacements. The study is needed to know if the benefit of the new robot outweighs the cost of operating it.

St. Josephs healthcare says one in five Hamiltonians are affected by arthritis and the hospital performs about 600 knee and hip replacements every year.

The hospital is already using robots for operations of the lung, prostate, kidney, mouth and throat.

First Mako Rio surgery robot comes to Hamilton, Ontario

Starting in January 2019, Rio will focus on partial and full knee replacements with the potential to expand to total hip arthroplasty.

December 4, 2018
Devin Jones

Hamilton, Ontario, has recently acquired Canada's first robot cleared to perform knee and eventually hip replacements at St. Joseph's Healthcare. St. Joseph's is an academic and research-based medical affiliate of the St. Joseph's Health System (SJHS), associated with McMaster University and Mohawk College.

Representing the first step towards St Joseph's goal of opening an Orthopaedic Robotic Surgery Centre, the Mako Rio Surgical Robotic System utilizes 3D imaging technology and miniaturized surgical instruments placed throughout the area of operation. Rio generates a 3D model of the surgery based on the results of a previous CT scan, and as surgeons use the robotic arm to resurface the knee for placement of the implants, Rio will provide real-time inter-operative visual, tactile and auditory feedback. This enables a high level of precision and optimal positioning of the implants during surgery.

"I've known about the technology for about two years now," said Dr. Anthony Adili, an orthopedic surgeon and chief of surgery at St. Joseph's Healthcare Hamilton. "We wanted to do our due diligence and understand the role of this technology in our centre before we decided to implement it."

According to Dr. Adili, money for Rio was raised over the period of a year and a half and was delivered in late October. The first procedures will be performed in January 2019. Until that time, Rio will be used for research purposes, gathering information for an evidence-based approach on how to use the system accurately. Dr. Adili spent time in the United States learning and training on the Rio. Come January he'll have a surgeon from the U.S on hand, whose prior experience with the device will provide a valuable knowledge base for the first few surgeries.

"The real benefit is the accuracy of this machine. Now we can plan the entire surgery before we make a cut," says Dr. Andili. "It allows us to take a step back and think of different ways to approach the surgery. For example, instead of cutting away part of the bone to match the implant, we can match the implant to the patient's physical structure. It completely flips the surgery on its head."

Founded in 2004, Mako Surgical Corp. was acquired by Stryker in 2013 for $1.65 billion. As a Fortune 500 medical technologies firm based out of Michigan, Stryker is known for their medical implants used in joint replacements and trauma surgeries.

According to Stryker's clinical evidence summary—available on their website—the surgical aspect of Rio is comprised of three primary steps: "Enhanced planning, dynamic joint balancing, and robotic-arm assisted bone preparation." Currently, the Rio works within partial and total knee arthroplasty (reconstruction or replacement) and Total Hip Arthroplasty (THA).

The Mako system is designed to minimize the margin of error associated with component placement and to enhance the accuracy and reproducibility of the aforementioned surgeries. According to a paper cited within the literature, titled *Improved accuracy of component positioning with robotic-assisted unicompartmental knee arthroplasty: data from a prospective, randomized controlled study*, The Mako system showed a marked improvement in the placement of implant components versus a traditional manual method.

Additionally, when it comes to hip arthroplasty's robotic-arm assisted THAs were five times more accurate in cup inclination (orientation of the socket to the coronal plane) and 3.4 times more accurate in cup anteversion (a specific technique used in hip replacements).

Prior to acquiring Rio, St. Joseph's Healthcare was known for its centre of excellence in robotics. Since 2012, St. Joseph's has worked with the Da Vinci robot which assists in head/neck and kidney surgeries. Performing invasive surgical procedures through tiny incisions, the device's arm has a wrist that fully rotates 360 degrees, minimizing tissue damage and cutting down on surgery time. Since March 2012, well over 200 robotic surgeries have been performance.

First-ever MAKO Rio surgery robot in Canada comes to Hamilton, for knee replacement surgery and research

Posted: November 22, 2018
Hamilton SPEC, McMaster University
by Jeff Mahoney.

Their bedside manner might be a bit, well, mechanical but, on the plus side, no massive med school debt.

Robots. There'll come a day soon, presumably, when we'll be asking of the surgeons who do our knee replacements and other complex operations not what universities they trained at but what factory they were built in.

Robot surgery is not just coming, it's here and it takes a big step forward in Hamilton on Thursday with St. Joseph's Healthcare Hamilton unveiling Canada's first orthopaedic surgical robot, the MAKO Rio Surgical Robotic System, which will be used to perform knee and, in time, hip replacements.

"I'm very excited about it; it's the first one ever in the country," says Dr. Anthony Adili, of the MAKO Rio, previously available only outside of Canada (chiefly in the United States), and acquired by St. Joe's as a first step toward creating a planned Orthopaedic Robotic Surgery Centre in Hamilton.

Everyone involved in the project is excited about it, but no one has more cause to be than Dr. Adili, orthopaedic surgeon and chief of surgery at St. Joseph's Healthcare Hamilton.

Right now, he is the only surgeon trained to use the robot, and soon he should be guiding it in actual knee replacement surgeries, but only ones (for now) being done for research purposes.

"The first procedures are scheduled to be done in January," says Dr. Adili. "We have to generate research so that (determinations about the role of the robot in surgery and health care) can be evidence-based.

"We will be trying to assess the economics. Is it cost-effective (to use a robot rather than conventional surgery)? We will develop a body of evidence."

The way it works, he explains, is that 3-D cameras and miniaturized surgical instruments are placed in the patient's body by the robot; the robot can plan a 3-D model of the surgery by marrying the anatomy to the image from the CT.

"We can decide where exactly we want the implant and lock it in."

The human surgeon presides over all this, from a console, manipulating the robot's arms with a joystick, says Dr. Adili. "The robot does all the actual cutting."

The benefits of robotic surgery include smaller incisions and less small tissue cutting.

"The robot can be so much more accurate and pinpoint and that's what's exciting."

Another advantage is that the robot is highly mobile and can be linked to the human surgeon from afar.

All of this, of course, is not cheap, and one of the biggest challenges in getting the robot here was raising the money. Every surgery comes with variable costs as some parts of the instruments must be replaced, each time.

The MAKO Rio acquisition, in the $2-million range, was made possible by investments through the City of Hamilton's Hamilton Future Fund; support from Stryker, the orthopaedic robotic technology owner with its Canadian headquarters in Hamilton; and donations from other grateful St. Joe's patients and community members. But the original impetus and catalyst behind the effort was a $1-million donation by a Hamilton couple.

While the initial outlays and ongoing upkeep and maintenance might run high, says Dr. Adili, robotic surgery could prove more cost efficient than conventional surgery in the long run if measured by patient outcome — fewer replacements and repeat visits.

"Interestingly," says Dr. Adili, "I started my career as an electrical engineer. I always felt we could do better (using technology to improve surgical procedures)."

Now, this city has a chance to prove him right. And he couldn't be happier for the opportunity, to be the first, and the first, he hopes, of many.

First robotic knee replacement in Canada done in Hamilton

Posted: February 20, 2019 09:22:36 PM
Category: **Hamilton**
Tags: hamilton, knee, robot, st joseph's hospital, surgery

The first knee replacement surgery performed by a robot in Canada has been done right here in Hamilton at St. Joseph's hospital.

Peter Sporta had partial knee replacement surgery six weeks ago. He is still recovering, but already looking forward to getting back on the tennis courts. Doctors say Sporta had a condition where part of his knee was damaged but the rest of his knee was in good shape.

Dr. Anthony Adili is the chief orthopaedic surgeon at St. Joseph's healthcare Hamilton. Without the robot, Sporta would likely have had his entire knee replaced.

"With this technology we're able to say we can do a partial replacement and leave the good parts of the knee alone."

Dr. Adili says partial knee replacement surgery is difficult to do but the robotic technology removes the margin of error by knowing precisely the right amount of bone to cut.

One in five patients report being unhappy with their knee replacement surgery, the idea with the robot is for that number to improve.

"We're leaving the patients normal anatomy and we're not really interacting or changing the normal bio mechanics of the knee so it should feel like a more normal knee."

Dr. Adili says the second most chronic condition in Canada is arthritis and with an aging population that number will continue to rise.

The robotic technology is expensive but, Dr. Adili says it's allowing them to push boundaries in innovation and rethink how they will approach patients with arthritic joints and conditions in the future.

Canada's epicentre of orthopaedic robotic research

Brenda & Terry Yates

Hamiltonians Terry and Brenda Yates are well-known for their commitment to supporting innovation. Whether in the arts, education, healthcare or nature conservancy, the Yates' are hometown-proud and passionate about helping to build a stronger future for all of us.

And a stronger, healthier future is exactly what their recent $1 million gift to St. Joe's is enabling.

The Yates' generous gift to support St. Joe's purchase of Canada's first orthopaedic robot is doing more than bringing the latest surgical technology and the promise of transformational research findings to our City. Their generosity went on to inspire a $675,000 investment from the Hamilton Future Fund, City of Hamilton, as well as donations from grateful St. Joe's patients and community members, to the project too.

Now, entirely as a result of philanthropy, St. Joe's is set to become the Canadian epicentre of orthopaedic robotic research.

In Canada, arthritis is the second most common chronic illness with 1 in 5 Hamiltonians affected by this debilitating condition. Over 1,800 arthritis patients from across the region visit St. Joe's each year for orthopaedic surgery and many others are patients in the Fracture Clinic.

> "A stronger, healthier future is exactly what their recent $1 million gift to St. Joe's is enabling."

The MAKO Rio Surgical Robotic System

1 in 5
Hamiltonians
are affected by arthritis

"There is no cure, and care and treatment for arthritis have not progressed as far as in some other fields," explained Dr. Anthony Adili, Orthopaedic Surgeon and Chief of Surgery at St. Joseph's Healthcare Hamilton. "But with the research that is on the horizon – research we will do with the orthopaedic robotic system – we anticipate uncovering new approaches to arthritis and other orthopaedic surgical treatments in the not-too-distant future."

St. Joe's is acquiring Canada's first MAKO Rio Surgical Robotic System from Stryker, which has its Canadian headquarters in Hamilton. While the System will first be used to research patient benefits following knee replacement surgery, it will in time expand to include research into hip replacement and other orthopaedic surgical needs too.

"Brenda and I believe that an investment in science and artificial intelligence will lead to significant research findings and, in this case, previously unheard of surgical procedures," shared Terry Yates. "We've chosen to make this investment at St. Joe's because everyone who is able has a duty to participate in any way possible to improve our health care system and fund equipment and innovation that the government will not support."

For decades, St. Joe's has been making waves in the field of robotic surgery. Our Hospital was home to Canada's first robotic surgery, it's where the world's first tele-surgery was performed, and it is internationally recognized for its leadership in urologic and thoracic (chest) robotic surgery through the Boris Family Centre for Robotic Surgery.

Now, a whole new frontier of robotic research is on the horizon and it will continue to make waves for years to come.

Created in 2002 when Hamilton Hydro was sold, the **Hamilton Future Fund** provides funding to create and protect a permanent legacy for current and future generations of Hamiltonians to enjoy economic prosperity and improved quality of life.

HAMILTON FUTURE FUND
BUILDING A LEGACY

> "St. Joe's leadership in orthopaedic robotic surgery research is being made possible because of a truly **made-in-Hamilton story**. Members of the community, municipal government, industry partners, and a leader in healthcare innovation have all come together so St. Joe's patients – present and future – win."

Dr. Anthony Adili

foundation IMPACT

St. Joseph's Healthcare Hamilton FOUNDATION HOPE HEALING DISCOVERY

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Need a knee replacement? St. Joseph's Healthcare has a robot that does that

St. Joe's will do research to prove the technology works to avoid pitfalls plaguing robotic prostate cancer surgery.
News 01:18 PM by Joanna Frketich The Hamilton Spectator|

Dr. Anthony Adili performs the first robotic knee surgery in Canada on Peter Sporta, 66, of Oakville at St. Joseph's hospital in Hamilton on January 18, 2019. - Photo Courtesy of St. Joseph's Healthcare , The Hamilton Spectator

Canada's first knee replacements by a doctor-controlled robot have taken place at St. Joseph's Healthcare as part of a study to prove the effectiveness of the technology and avoid the ongoing funding pitfalls plaguing prostate cancer surgery.

The robot has been used in four knee operations since Jan 18 in a pilot study funded by hospital donors.

"It's very fledgling," said Dr. Anthony Adili, who did the surgeries. "We're just starting down a very exciting path ... At the end of the day I think patients will benefit immensely from this new technology."

St. Joseph's, which specializes in robotic surgery, is getting the proof it needs from the start to show the technology is worth the extra cost so it doesn't end up embroiled in the same dispute it faces with prostate cancer surgery.

"We're in a golden opportunity to do that kind of pivotal research to inform our decision-making," said Adili, chief of surgery at St. Joseph's. "The research is being done (elsewhere) but it's not high quality research so it's hard to make definitive decisions and definitely difficult to make policy decisions. We want to produce that high quality data."

The research is significant because a lack of evidence was behind a controversial recommendation in 2017 by the Ontario Health Technology Advisory Committee (OHTAC) against publicly funding robotic surgery to remove a cancer patient's prostate gland.

It was a stunning blow to St. Joseph's, where the vast majority of radical prostatectomies are done with the help of the da Vinci robot system.

Currently, the province pays the hospital the same price as the traditional operation and donors make up the extra cost of the robot. It's an increasing burden on the St. Joseph's Healthcare Foundation as the robot is rapidly becoming the surgery of choice with men from Kitchener to Niagara willing to travel and wait longer to get it.

A final decision on whether the province will eventually fund the robot for prostatectomies at an estimated cost of $800,000 — $3.4 million a year has been put off while St. Joseph's gathers evidence on how it saves the health care system in other ways, such as a faster recovery time, since it's no longer possible to do randomized trials.

"It's so ubiquitous and it's almost the standard of care," said Adili. "It's impossible to randomize someone to robotic prostatectomy versus an open prostatectomy. Nobody will go for it. We lost that opportunity."

Orthopedic robotic surgery was approved in Canada and the United States only in the last year so high-quality studies can still be done. It's the same for robotic thoracic cancer surgery with St. Joseph's already running a multicentre trial.

"We don't know who it's going to benefit so we can do these randomized trials and develop that data that will help drive decision-making," said Adili.

The biggest roadblock is that St. Joseph's is the only centre in Canada doing robotic orthopedic surgery, making a multi-site trial of thousands of patients impossible to do here. With a price tag of $2 million a robot, it will be hard to find other centres with the appetite to join in.

"We're going to have to partner with centres in the United States and convince them to contribute data," said Adili. "The problem is they are buying robots like crazy because it is driving their business. They are going to be less inclined to want to randomize one versus the other. Some of our progress will be hampered until we get more units in Canada because Canadians have a very different mindset and will participate in trials."

In the meantime, St. Joseph's has started the pilot study that it hopes will provide enough evidence to get grants for the eventual large trial.

It's important because Adili says one in five patients are currently unhappy with the outcome of their knee replacement and the robot's precision could drop that number substantially. In addition, it makes partial knee replacements much easier, so surgeons will be more likely to do them.

"By replacing just the bad part of the knee, I'm leaving more of the patient's normal anatomy behind," said Adili. "It should feel like a more normal knee, recovery should be quicker and they should have better functionality. A total knee, although it is a successful procedure, it still does not match the mechanics of a normal knee."

With the popularity of the robot for prostate cancer, Adili doesn't expect any difficulty in recruiting patients.

The first was 66-year-old Peter Sporta from Oakville, who waited an extra two months to get a robotic partial knee replacement on Jan. 18.

"I wasn't scared at all" Sporta said about being the first patient. "I couldn't wait."

Sporta was in the hospital for one night and walking the next day.

"Within three days I threw away my crunches and my cane," he said. "For sure I would recommend this."

Knee replacement surgery performed with a robot for the first time in Canada

Doctors at St. Joseph's Hospital in Hamilton have performed the first robotic knee replacement surgery in the country.

Doctors at St. Joseph's Healthcare Hamilton first to use new procedure.

After years of hobbling in pain, Peter Sporta is walking like a new man — and he has a robot to thank for it.

Doctors at St. Joseph's Hospital in Hamilton performed the first robotic knee replacement surgery in the country in January, with Sporta as the patient.

He says hearing a robot would be involved in his partial knee replacement was a bit of a shock at first, but he quickly warmed up to the idea."Of course I was kind of skeptical at first," the Oakville, Ont. man said. "I had never heard of it. "But I was walking within three days at home … I feel privileged to have had it done."

Dr. Anthony Adili is the chief orthopedic surgeon at St. Joseph's Healthcare Hamilton. He says the biggest upside to incorporating a robot in surgeries like this one is it allows doctors to be more precise."The big advantage is you're able to pre-plan the patient's surgery on a 3D model in the OR," he said. With the procedure mapped out on that model, Adili was able to make sure he was only replacing the arthritic parts of Sporta's knee that absolutely had to go, leaving the healthy parts untouched.

Though more clinical research is needed to see how the procedure impacts recovery, Adili says the belief is it helps speed healing and future health outcomes."We feel because I don't have to do as big an exposure, you're not disrupting as much soft tissue or bone anatomy," he said.

Robotic knee and hip replacement surgery first surfaced in U.S. in the mid-2000s. While very niche at the time, it is slowly becoming more mainstream, with the procedure now happening in parts of Europe, as well.

More than sixty thousand Canadians a year get knee replacement surgery, and Adili says this technology allows doctors to consider more people for partial knee replacement, which is less invasive and generally heals faster.

That's been the case for Sporta so far. The inside of his left knee was arthritic, but the outside was fine. A few weeks removed from the surgery, he says he's feeling great — save for some trouble sleeping at night because of pain.There's also a strange numbness that comes with a knee replacement. Sporta calls it like "walking around with a potato in your knee."Adili says that's normal, and comes from removing human tissue that provides feedback to the brain, and replacing it with man-made materials."It's like a black hole in your brain," he said.

But for Sporta, that numbness is entirely preferable to the years of pain he was enduring. Now, he's eyeing a return to the types of physical activity he loves, from tennis to swimming. "I can't believe I'm walking around normally again," he said."You take it for granted.

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