

MEDIVIS



Providence Swedish makes medical advancements with Mixed Reality

COMPANY PROFILE

OVERVIEW

Providence Swedish has been providing quality care and patient safety since 1910, operating in the Pacific Northwest with seven campuses and more than 10,000 employees.

INDUSTRY FOCUS

Medical Technology / Healthcare

COUNTRY/REGION

United States

SERVICES

- Cerebrovascular procedures
- Technologies deployed
- Medivis Surgical AR
- HoloLens 2
- Microsoft Teams

For 112 years Providence Swedish's focus has been improving the health and well-being of each person they serve. Since 1910 they have been recognized as one of the Seattle area's best hospitals with the best doctors, nurses, and overall care in a variety of specialty areas.

With seven campuses, Providence Swedish Neuroscience Institute serves thousands of patients yearly from around the world. The institute offers comprehensive, coordinated care for patients with brain blood vessel disorders such as brain aneurysms and stroke, brain tumors, and spine problems.

Technology continues to be the driving force behind Swedish's ability to transform and enhance patient care, with the latest innovation project focusing on the impact of mixed reality to neurosurgical planning workflows. Doctor Stephen Monteith of the Swedish Neuroscience Institute has now been leading the charge in coordination with partner Medivis who has been helping the institute adopt a new view of mixed reality using their proprietary Surgical AR software with HoloLens 2.



"Planning of complex brain surgeries using the Medivis HoloLens 2 system allows us to optimize surgical strategies to maximize patient outcomes and minimize risk."

— Stephen Monteith MD, Director of Cerebrovascular Neurosurgery, Providence Swedish Neuroscience Institute



"I can position the hologram in 3D space just like I would in the operating room, so I can plan out the optimal surgical corridor to address complex lesions in the brain like an aneurysm, brain tumor, or tangle of blood vessels. This view allows me to plan a surgical strategy with the least amount of disruption to healthy tissue for optimal patient results."

— Dr. Stephen Monteith, Director of Cerebrovascular Neurosurgery, Swedish Providence Neuroscience Institute

Re-envisioning neurosurgical procedures with mixed reality

The case for 3D visualization over 2D MRI and CT scans

What if you had an improved understanding of a patient's anatomy and pathology prior to undergoing an operation? To what degree could extended reality technologies like augmented or mixed reality impact the effectiveness and cost of highly complex surgical procedures?

That's the question Dr. Monteith wanted to explore when Microsoft MR partner, Medivis, demonstrated an alternative way to interpret 2D data like MRI or CT scans—a view that involves an interactive, 3D holographic version of a patient's brain with options to remove digital elements like a skull to effectively map out different surgical approaches to lesion removals.

Today's neurosurgeons are tasked with performing some of the most complex procedures involving the brain and spine. The option of rehearsing on a holographic twin of a patient with their exact anatomy and pathology to optimize craniotomies was something Dr. Monteith couldn't pass up. Intrigued by the possibilities of mixed reality use cases in healthcare settings, the neurosurgical director became a champion of the Medivis Surgical AR software at Providence Swedish where he and his colleagues ran the program on HoloLens 2. His goal was to quantify the impact of this specialized technology on patient care when used for the purpose of enhancing research and pre-operative surgical planning. But there was still one other requirement he needed to make sure his team could meet: collaboration.

Transforming remote collaboration to optimize patient outcomes

Where 3D visualization offers an unprecedented view of patient data, those insights would not be nearly as valuable if a surgeon were unable to share that experience with another colleague. Part of Providence Swedish's success as a medical research institute is rooted in the exchange of knowledge and expertise shared among leading physicians and neurosurgeons in training. This need to make collaboration integral to the surgical planning processes could not be secondary to adopting disruptive technologies—especially in Dr. Monteith's department that specializes in highly complex cerebrovascular and brain surgeries.

Acknowledging that flying in experts (or patients) to enable in-person consultations is an expensive investment, there was an opportunity to explore ways that Medivis could help Providence Swedish check all their boxes. Microsoft Teams was soon recommended as a secondary layer to the engagement. By wearing the HoloLens 2 with Medivis Surgical AR software, Dr. Monteith and his team could easily hop on a Teams hosted meeting with colleagues in different cities and walk through possible surgical approaches prior to complex operations. Dr. Monteith experienced what it was like to weigh in on patient cases virtually where collaboration was characterized not just by the Teams interface—it also involved interactive 3D simulations that brought patient anatomy and pathology to life for anyone participating on the same Teams meeting while also wearing a HoloLens 2 device. This helped Dr. Monteith break down traditional barriers like access and cost to help his peers make highly informed decisions about patient procedures prior to an operation. It also made the case of mixed reality all the more real for him and his department.

"A colleague of mine was planning a surgery and I was able to sit in my office while on Microsoft Teams and see into his operating room as if I were there in person. I'm not talking about just seeing his office over video—I'm talking about witnessing in 3D his entire surgical plan for one patient prior to the operation. We could determine whether it was an appropriate surgical approach that would yield the highest results—both in removing the lesion and minimizing risk to the patient.

— Dr. Stephen Monteith, Director of Cerebrovascular Neurosurgery, Swedish Providence Institute

Optimizing surgical strategy and planning on HoloLens 2

Together with Medivis, Providence Swedish Neuroscience Institute has now utilized the FDA-approved Surgical AR software with HoloLens 2 to support surgical planning prior to operations for over 78 patients. The overall goal is to use 3D data visualization with remote assistance to transform patient care, improve surgical outcomes, enable greater education amongst neurosurgeons, and shorten the time it takes to perform procedures.

Accelerated time to care

When one patient suffered from a ruptured arteriovenous malformation (AVM) in Anchorage, Alaska, they were quickly rushed to a nearby Native Medical Center for an emergency decompression procedure. Unfortunately, the hospital did not have the resources required to carry out the definitive surgery. The patient was consequently flown down to Providence Swedish in Seattle for immediate, definitive surgery. While in flight, patient data was digitally sent and loaded into Surgical AR on HoloLens 2. And by the time the patient arrived at the hospital, Dr. Monteith and his team had already aligned on an emergent surgical strategy to remove the AVM. This accelerated access to patient data combined with an extensive view of the patient's pathology was what enabled the team to quickly and effectively execute the procedure, saving the patient's life as a result.

Optimized surgical strategy

In the case of another patient who suffered from a highly complicated AVM, Dr. Monteith was faced with a dilemma. The risk involved in the surgical removal of this large AVM was high—the patient could suffer significant neurological deficit from surgery. Dr. Monteith wanted to ensure he was able to land on the right strategy before operating to quickly and efficiently perform the procedure while minimizing blood loss. To increase the success rates of the procedure, he chose to wait until he had access to the HoloLens 2 device which granted him the ability to create a holographic twin of the patient's brain and simulate multiple approaches to understand potential benefits or pitfalls. In the end, Dr. Monteith successfully shortened the length of the procedure by a few hours because he was able to identify the best entry point to remove the lesion. That patient went on to make an excellent recovery after his AVM removal.

Enhanced training experiences

As part of Providence Swedish's mission to train the next generation of neurosurgeons from around the world, Neurosurgery Fellows are given the opportunity to train alongside specialized neurosurgeons after they have finished their traditional residency training. They're given access to real patient data and asked to propose a surgical approach that is then critiqued by experienced neurosurgeons for learning purposes. Empowered by HoloLens 2, Dr. Monteith and others can now facilitate lifelike surgical rehearsals where Fellows are invited to carry out procedures on a holographic patients. This hands-on, immersive experience has become a safe and effective way for Fellows to learn through a mix of trial and error. As challenging and unanticipated situations arise hours into a virtual rehearsal, Fellows must conduct quick problem-solving which can help them gain critical, potentially life-saving skillsets.



“Medivis is the industry leader in neurosurgical augmented reality. Our collaboration with Microsoft and Medivis will continue to benefit our patients as we advance this technology together”

— Dr. Stephen Monteith, Director of Cerebrovascular Neurosurgery,
Swedish Providence Neuroscience Institute

Redefine personalized care with Medivis Surgical AR

In the eyes of Dr. Monteith, who is introducing Surgical AR with HoloLens 2 to other adjacent departments at Providence Swedish, mixed reality is creating a world of endless possibility in the healthcare industry. Institutions like Providence Swedish are, for the first time in the history of medicine, taking patient data that would otherwise be trapped on a traditional monitor and bringing it into full focus using 3D visualization to create an exact holographic replica of patient anatomy and pathology. This opens a door to a host of new opportunities from a pre-operative proctoring perspective to teaching neurosurgical trainees on highly complex procedures to running simulations and testing the effectiveness of certain surgical approaches, and more.



78 surgeries planned

Prior to operating, Dr. Monteith and his team have used Surgical AR with HoloLens 2 to determine minimally invasive cranial and spinal surgical approaches for 78 cases to date.

More than 100 surgical rehearsals completed

Surgical AR has delivered immersive, lifelike learning experiences to support the Providence Swedish Neuroscience Institute Fellowship program.

MEDIVIS

Medivis is a medical technology company with corporate origins in New York. For the past six years Medivis has been advancing medical imaging and surgical navigation by Mixed Reality and Artificial Intelligence.

[Learn more](#)

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