ProMedica Toledo Hospital Comprehensive Stroke Center

2018–2019 Outcomes Report
For Generations to Come

The Generations Tower offers improved access for patients while providing the latest technology and processes to ensure a safe, high quality environment for patient care and healing. ProMedica’s vision – to build healthier communities one life at a time, through safe, high-quality services and exceptional experiences – is driving us in transforming Toledo and our regions for decades to come.

In June 2019, ProMedica Toledo Hospital celebrated the opening of Generations Tower, a culmination of years of construction and a defining moment in the hospital’s more than 140-year history of caring for communities in northwest Ohio and southeast Michigan. With 13 stories and 309 private rooms, the tower allows for various improvements in the patient experience, including convenient parking, improved food service, and hotel-like amenities. For providers, the new space allows for better care team collaboration and innovation.

The Future of Neurosciences in Our Region

Patients with neurological conditions now have increased access to high-quality outpatient care close to home. ProMedica and the University of Toledo College of Medicine and Life Sciences teamed up in 2018 to bring together the best in clinical practice and academia in a state-of-the-art neurosciences center on the campus of ProMedica Toledo Hospital.

The three-story, 122,000 square-foot building offers a convenient location for services that include neurology and neurosurgery outpatient clinics, imaging, neurophysiology, neuro rehabilitation therapy, and an audiology clinic.

Quality Initiative

In 2016, the ProMedica Stroke Network began a comprehensive quality data initiative. This initiative includes tracking all facets of care for cerebrovascular disease patients from EMS triage, treatment time efficiencies, complications, and outcomes. The data is collected prospectively and reviewed routinely. Any case or trend that deviates from standards set forth by the Joint Commission are reviewed and process improvement initiatives are put into place as a plan of correction. Quality data is an important part of our stroke network as it allows our team to continue to provide high quality stroke care both safely and efficiently.
Dear Colleagues,

We are glad to share the 2018 – 2019 ProMedica Toledo Hospital Comprehensive Stroke Program outcomes report with you. Our program was the first in northwest Ohio to receive the Comprehensive Stroke Program designation from The Joint Commission in 2015. Since then, we have experienced significant growth in volumes, especially in patients with a high level of acuity. Our team of vascular and interventional neurologists, neurological surgeons, neurocritical care physicians, vascular surgeons, emergency medicine physicians and advanced practice providers also grew and became more collaborative. This allows us to create an optimal environment for life changing care, world class education for students and residents from The University of Toledo College of Medicine and Life Sciences, medical innovation and cutting-edge stroke research.

We are grateful for the compassionate team of physicians, advanced practice providers, nurses, radiation technologists, emergency medical technicians, pharmacists, therapists, social workers, stroke coordinators and other caregivers who stand ready to be there for our patients and their families when they need us the most. This team’s passion and dedication produce outstanding patient outcomes.

Collecting and analyzing clinical trends and outcomes in healthcare are essential to process improvement. Each dataset and graph in this booklet was reviewed extensively by our team to create new opportunities for improved process maps, diagnostic tools and treatments. Our major clinical highlights and achievements in the last two years include:

**Pre-hospital Stroke Triage**
We collaborated with Lucas County EMS leadership to establish a thorough pre-hospital stroke triage process in 2015. We presented our data which showed significantly faster treatment times and better outcomes in national and international conferences and we published several abstracts and manuscripts. This same process became part of the American Heart Association guidelines in 2016. We are now working with surrounding communities in northwest Ohio and southeast Michigan to incorporate this stroke severity-based triage process which we believe is cost effective, scalable and results in improved outcomes.

**ProMedica Telestroke Program**
Patients outside of Toledo now have access to acute stroke care via telehealth communications technology, with the goal of keeping patients in their local community hospitals if they do not need a higher level of care.

**Neurointerventional Fellowship**
In 2018, we started training our first neurointerventional fellow. This is a two-year fellowship provided by the Department of Neurology at The University of Toledo College of Medicine and Life Sciences. Fellows interact with other learners on the stroke service: UT-COMLS medical students, neurology residents and vascular neurology fellows. Our program became a teaching service in 2017.

**National Recognition**
Our program earned several awards from the Get With The Guidelines® stroke initiative and was one of 46 hospitals out of 4,313 hospitals in the country with better than average rates of 30 days mortality after stroke for Medicare patients.

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**Message from the Directors**

Mouhammad A. Jumaa, MD
Medical Director
ProMedica Stroke Network
Assistant Professor, Vascular and Interventional Neurology
The University of Toledo College of Medicine and Life Sciences

Syed F. Zaidi, MD
Medical Director
ProMedica Teleneurology and Neurointerventional Services
Associate Professor, Vascular and Interventional Neurology
The University of Toledo College of Medicine and Life Sciences
With our unwavering commitment to upholding evidence-based best practices in stroke care, our hospitals earned Get With The Guidelines® recognitions from the American Heart Association/American Stroke Association (AHA). The AHA recognition included a Gold Plus award for ProMedica Toledo Hospital. Also, for the fifth year in a row, Healthgrades named ProMedica Toledo Hospital among the top 5% in the nation for the treatment of stroke.
As the area’s first Joint Commission Certified Comprehensive Stroke Center, ProMedica Toledo Hospital serves as the hub for the ProMedica Stroke Network, which includes support for 12 regional ProMedica sites and 18 area hospitals in total across northwest Ohio and southeast Michigan. Our stroke network helps ensure that our community members have access to safe, evidence-based, high-quality stroke care. The network is comprised of these elements:

• **Interventional vascular neurologists and cerebrovascular neurosurgeons** lead the stroke center and network. These highly trained and specialized physicians treat stroke and other cerebrovascular diseases.

• **Collaborative, multidisciplinary care teams** form the foundation of the stroke network. Our highly specialized teams include ProMedica Access, ProMedica Transportation Network, emergency room physicians and staff, neurovascular interventionalists, neurosurgeons, vascular surgery physicians, neurologists, neuro-intensivevists, critical care physicians and physiatrists.

• **State-of-the-art, 48-bed stroke and 16-bed neuro intensive care units** featuring a new neuro-interventional lab, 24-hour MRI service, and portable CT scanner. With the opening of the Generations Tower in 2019, our stroke patients and families have access to private updated rooms with nursing staff specifically trained in caring for people with complex neurologic conditions.

• **New, expanded neurointerventional suite.** Our highly trained neurointerventionalists can now complete technically difficult procedures in a state-of-the-art angiography suite specifically designed to reduce radiation exposure, provide more precise imaging and the added advantage of a 3D dimensional navigation system.

• **Telestroke network** uses telemedicine to provide rural and suburban hospitals with immediate access to interventional stroke neurologists at ProMedica Toledo Hospital. Via a webcam, these specially trained physicians diagnose a stroke and collaborate with local emergency room staff to assist with providing life changing stroke assessments and interventions that can prevent permanent disability. Currently, this program covers 18 hospitals in northwest Ohio and southeast Michigan, and continues to grow and serve our rural communities.

• **RACE (Rapid Arterial Occlusion Evaluation)** provides an evidence-based protocol for first responders to use to recognize stroke emergencies. When a RACE alert is identified, the patient is taken immediately to an accredited stroke center with neurointerventional capability.

• **Stroke clinic** at the Neurosciences Center is staffed by specially trained neurovascular and neurointerventional physicians who can assess new patients with findings of neurovascular disease as well as provide routine follow-up stroke care, risk factor assessment, second opinion consultations, and treatment for patients with findings of cerebrovascular disease. This facility also offers MRI capability, laboratory services, neuro specific rehab, and has a certified social worker to assist our cerebrovascular patients.

• **Neurological rehab**, provided by physical, occupational and speech therapists, addresses the physical, emotional and psychological needs of each stroke survivor.

• **Stroke research.** As a Comprehensive Stroke program, we continue to strive to find ways to expand care and provide up-to-date treatment options for our stroke patients. Our team has participated in numerous clinical trials and studies, and regularly publishes papers.

• **Monthly stroke support group** creates an opportunity for stroke survivors, caregivers and families to share their experiences with one another, receive guidance from clinical stroke specialists, and connect with community resources.

• **Community outreach efforts** build awareness about stroke risk factors and warning signs. Last year, more than 17,100 community members attended more than 30 Stroke Network sponsored events. These included:
  - Stroke Miracle Mile on the route of the American Heart Association/American Stroke Association Heart Walk.
  - Annual Cerebral Aneurysm Event held each September, recognizing our cerebral aneurysm survivors and caregivers.
  - Collaborating with ProMedica Cancer Institute, ProMedica Mary Ellen Falzone Diabetes Center and ProMedica Physicians Cardiology by providing stroke risk assessments and education at local minority barbershops.
  - Promoting and participating in system wide community stroke events including “Spotlight on Stroke” at ProMedica Bay Park and Flower Hospitals’ “Stroke Hero Night.”
  - Health fair participation at hospitals, assisted living and senior centers, popular women’s health events, and other community settings.
Empowering Our Stroke Team

ProMedica recently adopted the RAPID imaging platform, a clinically proven, data-driven solution from RapidAI, the worldwide leader in advanced imaging for stroke. Powered by artificial intelligence, the RAPID platform is empowering our stroke teams to make faster, more accurate diagnostic and treatment decisions for stroke patients and deliver the best stroke care outcomes.

The RAPID platform processes non-contrast CT, CT angiography, CT perfusion, and MRI diffusion and perfusion studies in a matter of minutes, delivering high-quality images and analysis to our stroke team members via PACS, email and the RAPID Mobile App.

ProMedica has installed the following RAPID products:

• RAPID CTA – helps stroke teams to quickly identify and assess large vessel occlusion (LVO) cases.
• RAPID CTP – enables faster clinical decisions by helping physicians quickly assess salvageable brain tissue and identify patients who are likely to benefit from interventional thrombectomy.
• RAPID MRI – helps physicians assess salvageable brain tissue through the delivery of quantified and color-coded MR diffusion and perfusion maps that identify brain regions with reduced ADC and prolonged Tmax.
• RAPID Mobile App – notifies physicians of stroke cases and provides anytime, anywhere access to critical patient images and RAPID results. In-app communication features allow stroke teams to quickly align on patient status.

To date, the RAPID platform has been installed in over 1,500 hospitals in more than 50 countries and has been validated in 14 major clinical stroke trials. In addition to achieving the best clinical outcomes and largest treatment effects ever obtained, the results of these trials led to new American Heart Association and American Stroke Association treatment guidelines and have dramatically altered the management of acute stroke around the world.

Giving Back

For half of his life, 36 years to be exact, Mike Salwiesz shared the teachings of the Catholic Church with grade school children at a parish in Toledo. He knows the sacraments, the Bible, the traditions of the church and more. Mike was, in his own words, spiritually healthy.

So, on December 26, 2015, when an ischemic stroke threatened to shorten his life, Mike describes a feeling of sudden calmness after his emergency medical procedures. “Someone gently touched me on the shoulder,” says Mike. “But when I turned, no one was there. I believe it was Jesus, at my side, giving me strength.” This wouldn’t be the last message Mike was sent that day.

At ProMedica Toledo Hospital’s Comprehensive Stroke Center, Mike received the clot dissolving stroke medicine called tissue plasminogen activator, or tPA. He also underwent a surgical thrombectomy, to remove a blood clot from inside his arteries. He would suffer no damage or functional impairment.

At the end of surgery, Mike’s doctor reached out to hold his hand. Knowing Mike was a religious man, though not of the same faith as the doctor, the doctor said, “Mike, you are going to be all right. Your Jesus wants something more from you.”

The next day, Father Jim Auth, Chaplain at ProMedica Toledo Hospital, came to give Mike a blessing. He said, “Mike, the old man upstairs is not through with you.” Mike believes two men, from two different faiths, gave him the same message. There was something more for Mike to do.

Mike is a volunteer in the Spiritual Care Department of ProMedica Toledo Hospital. He is a Eucharistic Minister, visiting and bringing Holy Communion to patients and their families in the Neuro-Stroke Unit and in the Cardiac Unit.
Acute Ischemic Stroke 30-Day Mortality Rate | July 1, 2017 – June 30, 2018

<table>
<thead>
<tr>
<th>Hospitals in the United States</th>
<th>46 hospitals were better than national value.</th>
<th>2,424 hospitals were no different than national value.</th>
<th>76 hospitals were worse than national value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,767 hospitals did not have enough cases to reliably tell how well they were performing.</td>
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</table>

Out of 148 hospitals in Ohio

<table>
<thead>
<tr>
<th>Hospitals in Ohio</th>
<th>3 hospitals were better than national value.</th>
<th>94 hospitals were no different than national value.</th>
<th>0 hospitals were worse than national value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>51 hospitals in Ohio did not have enough cases to reliably tell how well they were performing.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Source: Publicly reported all-cause 30-days mortality for Medicare patients. www.medicare.gov/hospitalcompare

Hospital Readmission Rate | July 1, 2017 – June 30, 2018

<table>
<thead>
<tr>
<th>Hospitals in the United States</th>
<th>15.3%</th>
<th>Our average: 14.1%</th>
</tr>
</thead>
</table>

Source: Publicly reported all-cause 30 days readmission rate for Medicare patients. www.medicare.gov/hospitalcompare
Direct access to stroke experts through the ProMedica telestroke service increased the number of patients treated with IV tPA and mechanical thrombectomy, decreased the time from door to needle for IV tPA and enabled more than 50% of patients to stay in their local community hospitals. Recently, two hospitals – Lima Memorial Hospital, Lima, Ohio, and ProMedica Memorial Hospital, Fremont, Ohio – became Primary Stroke Centers in 2019.
For patients who experience an ischemic stroke, it is crucial to break up the clot that is blocking the flow of blood to the brain as soon as possible. The gold standard treatment is to provide clot-busting medicine (tPA) via an IV within the first three hours following the onset of symptoms. Number of patients treated with IV tPA in our emergency department continued to rise. All patients are evaluated by emergency department staff and a dedicated neuro intensive care unit “stroke nurse.” Most stroke patients are also seen by neurology residents since Toledo Hospital became the main training site for UT-COMLS students and trainees in 2017.

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Rate of Symptomatic Intracranial Hemorrhage in Patients Who Received IV tPA at ProMedica Toledo Hospital Emergency Department 2018-2019

2018: 2.1% (patient also underwent mechanical thrombectomy)
2019: 0%

Note: The National Institute of Neurological Disorders and Stroke Trial had a 6.4% incidence of symptomatic intracranial hemorrhage rate. This is the rate of bleeding in patients who received IV tPA and whose symptoms then worsened. It is defined by a worsening of the National Institutes of Health Stroke Scale (NIHSS) by 4 points. The NIHSS is a clinical stroke assessment tool to evaluate and document neurological status in stroke patients. The rate of symptomatic intracranial hemorrhage at ProMedica Toledo Hospital continues to be significantly lower than national standards due to intensive protocols and processes set in place in the neuro intensive care unit.
## RACE (Rapid Arterial Occlusion Evaluation) | 2015 – 2019

<table>
<thead>
<tr>
<th>Time (in minutes)</th>
<th>2015 (n=60)</th>
<th>2016 (n=73)</th>
<th>2017 (n=99)</th>
<th>2018 (n=89)</th>
<th>2019 (n=77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median EMS Dispatched to Arrival*</td>
<td>31</td>
<td>28.5</td>
<td>30</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td>Median Door to CT Scan</td>
<td>7</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Median Door to IV tPA</td>
<td>42</td>
<td>29</td>
<td>28</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Median Door to Groin Puncture</td>
<td>73</td>
<td>68</td>
<td>50</td>
<td>66</td>
<td>72</td>
</tr>
<tr>
<td>Median Door to Recanalization</td>
<td>94</td>
<td>97.5</td>
<td>85</td>
<td>94</td>
<td>89</td>
</tr>
<tr>
<td>Median EMS Dispatch to IV tPA</td>
<td>59</td>
<td>56</td>
<td>58</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>Median EMS Dispatch to Groin Puncture</td>
<td>104</td>
<td>94</td>
<td>90</td>
<td>99</td>
<td>104</td>
</tr>
</tbody>
</table>

*Mobile Stroke Unit patients excluded from EMS dispatch times.

## Intervention

<table>
<thead>
<tr>
<th>Intervention</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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</thead>
<tbody>
<tr>
<td>tPA Only</td>
<td>8.3%</td>
<td>12.3%</td>
<td>10.1%</td>
<td>14.6%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Thrombectomy Only</td>
<td>11.7%</td>
<td>15.1%</td>
<td>12.1%</td>
<td>16.9%</td>
<td>13.0%</td>
</tr>
<tr>
<td>IV tPA + Thrombectomy</td>
<td>6.7%</td>
<td>12.3%</td>
<td>15.2%</td>
<td>4.5%</td>
<td>22.1%</td>
</tr>
<tr>
<td>tPA and/or Thrombectomy</td>
<td>26.7%</td>
<td>39.7%</td>
<td>37.4%</td>
<td>36.0%</td>
<td>44.2%</td>
</tr>
<tr>
<td>All Thrombectomy Patients</td>
<td>18.3%</td>
<td>27.4%</td>
<td>27.3%</td>
<td>21.3%</td>
<td>35.1%</td>
</tr>
</tbody>
</table>

Lucas County EMS paramedics were educated and trained to use this protocol to recognize stroke emergencies. First responders evaluate a patient’s level of severity. When a RACE alert is identified, the patient is taken immediately to an accredited stroke center with neuro interventional capability. Initial mandatory 4-hour class was provided to all EMS personnel in 2015; a refresher course was provided in 2019. Of note: The accuracy of pre-hospital assessment has improved in the last year.
In 2018, the American Heart Association expanded the time window for mechanical thrombectomy from 6 to 24 hours from last known well. The Society of Vascular Neurology recommends door to groin puncture less than 90 minutes and a puncture to recanalization time of 60 minutes. The ProMedica Stroke Network has consistently exceeded these time metrics.

### Baseline Characteristics of Ischemic Stroke Patients Undergoing Mechanical Thrombectomy | 2013 – 2017

<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Average Age</td>
<td>68.4</td>
<td>69.1</td>
<td>70.6</td>
<td>71.5</td>
<td>73</td>
<td>71</td>
<td>68.2</td>
</tr>
<tr>
<td>National Institute of Health Stroke Scale</td>
<td>17.2</td>
<td>19.5</td>
<td>17</td>
<td>17.1</td>
<td>16.9</td>
<td>17.4</td>
<td>17.3</td>
</tr>
<tr>
<td>Median Onset to Arrival (minutes)</td>
<td>119.5</td>
<td>223</td>
<td>200.5</td>
<td>269</td>
<td>171</td>
<td>217</td>
<td>220</td>
</tr>
<tr>
<td>Percentage of Patients Treated Within Six Hours of Onset of Symptoms</td>
<td>75%</td>
<td>64%</td>
<td>72%</td>
<td>58%</td>
<td>69.9%</td>
<td>59.3%</td>
<td>58.4%</td>
</tr>
<tr>
<td>Percentage of Patients Treated Between Six and 24 Hours of Onset of Symptoms</td>
<td>25%</td>
<td>33%</td>
<td>26%</td>
<td>41%</td>
<td>30.1%</td>
<td>29.1%</td>
<td>38.9%</td>
</tr>
</tbody>
</table>

Mechanical thrombectomy, a treatment for acute ischemic stroke, removes a blood clot from a blood vessel in the brain by using a stent retriever. An interventional vascular neurologist uses a catheter to maneuver the retriever to the blocked blood vessel. Then, the physician traps and removes the blood clot.

### Door-to-Groin Puncture and Door-to-Recanalization Times for Ischemic Stroke Patients Who Arrived at ProMedica Toledo Hospital Emergency Department and Underwent Mechanical Thrombectomy | 2013 – 2019

In 2018, the American Heart Association expanded the time window for mechanical thrombectomy from 6 to 24 hours from last known well. The Society of Vascular Neurology recommends door to groin puncture less than 90 minutes and a puncture to recanalization time of 60 minutes. The ProMedica Stroke Network has consistently exceeded these time metrics.
This graph illustrates the time efficiencies achieved for all ischemic stroke patients who underwent a mechanical thrombectomy. The Joint Commission recommends door-to-groin puncture times of less than 90 minutes and puncture times to recanalization (TICI 2b/3) of less than 60 minutes.

The modified Rankin Scale (mRS) measures the degree of disability experienced by patients who have survived a stroke. The scale runs from 0 to 6. Patients with an mRS score of 0 – 2 have recovered to the level that they are able to carry out their daily activities, regaining their independence. Clinicians certified in using the mRS evaluate patients three months after their stroke during a clinic encounter or phone interview. Note: We began tracking baseline mRS in mid 2016. Also, the rate of symptomatic intracranial hemorrhage per ECASS III criteria was 1.2% in 2018 and 4.4% in 2019, significantly below the rates noted in national registries.
Recanalization is the restoration of blood flow to the brain during a stroke. Thrombolysis (TICI) score is a widely used scoring system to grade recanalization after mechanical thrombectomy. TICI scores range from 0 to 3 with 0 being no or minimal reperfusion and 3 being complete restoration of blood flow. A TICI score of 2B, 2C, or 3 suggests successful reperfusion which is directly correlated with good patient outcomes. Our goal is to have an 80% or higher successful reperfusion rate.

Recanalization Scores for Mechanical Thrombectomy | 2013 – 2019
Good Reperfusion is TICI 2b/2c/3

Before and After: Mechanical Thrombectomy

The angiograph on the left shows microcatheter in the blocked internal carotid artery. The angiographic run shows a blockage in the terminus of the ICA resulting in absence of blood flow into the middle and anterior cerebral arteries. The angiographic run on the right is after mechanical thrombectomy, showing complete restoration of blood flow into the cerebral hemisphere.
Robotic Device Helps Patients Learn to Walk Again

Two and a half years ago, Peggy Avers was up in the garage attic getting Christmas decorations when she fell through the ceiling, landing on the concrete floor 20 feet below.

“I broke T11 and L3, and they were crushed,” said Peggy. “There were a lot of things broken in my back. There was a chance that I would have no feeling in my legs and be paralyzed, but I did get a lot of feeling back.”

Peggy can use a walker for short distances, but it’s difficult. So she mostly uses a wheelchair to get around. She’s excited about a new therapy at the ProMedica and The University of Toledo College of Medicine and Life Sciences Neurosciences Center. It’s a piece of equipment called the Ekso GT, a robotic exoskeleton designed to help stroke and spinal cord injury patients learn how to walk again.

Physical therapists strap Peggy into the device, which is able to support her as she walks. The machine can detect in real time how much effort Peggy is able to give and how much motor support it needs to contribute. So if Peggy is doing 30 percent of the work, the Ekso GT will automatically do the other 70 percent to help her stay upright, and reteach her brain how to make those steps with the proper lift and gait.

“A very significant number of patients have fatigable gait, which means they start with 60 percent and then five minutes later they’re able to only contribute 20 percent. The real-time feedback and the ability of the device to readjust the function of the ordered parts is very essential in achieving the goals of rehabilitation,” said Mouhammad Jumaa, MD, ProMedica Physicians Neurology. “We also have one or two physical therapists working with you and they have the ability to control the device. So if they see that the patient is starting to fatigue very significantly and they need to adjust some of the angles or the measurements of the device, then they can do that.”

“When I use the walker I bend over a lot because I’m using the weight of my arms to hold me up more,” explained Peggy. “But now I’m trying to make my legs do more. It’s stretching me out, forcing me to stand up straighter, even with the walker. It feels more like walking, which I had forgotten.”

The device’s ability to help patients move has additional benefits, including a lower risk for blood clots, lower readmission rates and psychological benefits. Peggy has noticed improvement since starting her therapy with the Ekso GT and is hopeful it will continue to help her regain her independence.

“With a spinal injury, there isn’t any way to tell [what functions] are going to come back and what’s not. If you don’t use it, it’s not going to come back,” said Peggy. “My hope with this is that it’s going to do the best for whatever’s in there.”
Patients who experience an ischemic stroke often have carotid stenosis that requires surgical treatment to clean out the blocked artery in the neck and restore normal blood flow to the brain. The ProMedica Toledo Hospital Stroke Center collaborates with Jobst Vascular Institute – also on the campus of Toledo Hospital – to coordinate this care for patients.

The highly experienced Jobst vascular surgeons perform two types of procedures to restore blood flow – carotid endarterectomy and carotid stenting. Each year, they perform more than 100 of these procedures.

### Carotid Artery Surgery Outcomes

**Total Number of Carotid Endarterectomies (CEA) and Carotid Artery Stenting (CAS) Performed by Jobst Vascular Surgeons at ProMedica Toledo Hospital | 2015 – 2019**

<table>
<thead>
<tr>
<th>Year</th>
<th>CEA Elective</th>
<th>CEA Emergent</th>
<th>CAS Elective</th>
<th>CAS Emergent</th>
<th>CEA Combined with Other Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>94</td>
<td>11</td>
<td>33</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2016</td>
<td>128</td>
<td>3</td>
<td>35</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>2017</td>
<td>125</td>
<td>11</td>
<td>24</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>2018</td>
<td>155</td>
<td>7</td>
<td>24</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>2019</td>
<td>146</td>
<td>16</td>
<td>21</td>
<td>24</td>
<td>6</td>
</tr>
</tbody>
</table>
## Complication Rates for Post Carotid Artery Surgery | 2015 – 2019

<table>
<thead>
<tr>
<th></th>
<th>Death Prior to Discharge</th>
<th>Post-op Stroke</th>
<th>Post-op MI</th>
<th>Aggregate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2015 CEA/CAS</strong>&lt;br&gt;(n=136)</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>2016 CEA/CAS</strong>&lt;br&gt;(n=175)</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>2017 CEA/CAS</strong>&lt;br&gt;(n=182)</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>2018 CEA/CAS</strong>&lt;br&gt;(n=208)</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>2019 CEA/CAS</strong>&lt;br&gt;(n=207)</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

The Joint Commission sets the standard for an aggregate complication rate of less than 6% for carotid endarterectomy (CEA) and carotid stenting (CAS). For the past five years, Jobst Vascular Institute rates have been lower than the standard.
In 2017, we established a brain aneurysm clinic at ProMedica Toledo Hospital. Based on a patient-centered and multidisciplinary approach, the clinic provides patients with access to both a cerebrovascular neurosurgeon and an interventional vascular neurologist during the same clinic encounter. This offers an opportunity for patients and their families to talk with both doctors about the jointly developed plan to manage the patient’s brain aneurysm. We offer a wide range of treatment options including surgical clipping, endovascular coiling, flow diversion and observation with follow-up imaging.

In 2019, we became the first regional center in northern Ohio and Michigan to offer a new cutting edge treatment for brain aneurysms called the Woven EndoBridge (WEB) Aneurysm Embolization System. The device offers patients with complex brain aneurysms a treatment that is less risky and less difficult than previous endovascular therapy.

Emergent aneurysm treatments include patients treated after subarachnoid hemorrhage and unruptured symptomatic intracranial aneurysms.

Since 2018, 76 elective embolizations with 0% mortality, 3.9% minor neurological complications returning to baseline at 30d and 1.3% disability rate at 30 days.
The Journey

“I felt dizzy,” recalls Connie Smarscz. “Suddenly, I had a severe headache, felt nauseous and started to vomit.” At age 54, Connie experienced a subarachnoid hemorrhage, a life-threatening type of stroke caused by bleeding in the space surrounding the brain. “The last thing I can remember,” Connie says, “was my face hitting the floor.”

Connie’s stroke was the result of a ruptured brain aneurysm. Classified as large, the 11-millimeter aneurysm was about the size of a large pencil eraser. Connie was transferred to ProMedica Toledo Hospital, a comprehensive stroke center, recognized for their ability to quickly and effectively treat all subarachnoid hemorrhage patients. Doctors would need to prevent rebleeding, restore normal blood flow, and prevent any narrowing of the arteries.

“My life changed that day. Suddenly, I was on this long journey, not knowing for sure when or where it was going to end,” says Connie. “More things kept happening, but my family kept reassuring me that everything would be okay.”

While in the Neuro ICU, Connie required treatment for a vasospasm and hydrocephalus. EVD placement was required and caused a small hemorrhage in the frontal lobe which subsequently caused some temporary personality changes in Connie. In addition, her treatment was complicated by something called cerebral salt wasting, a rare endocrine condition that can happen when trauma or tumors impact the brain. A nephrologist was called in to manage this aspect of her care.

Based on the size, shape and location of Connie’s aneurysm, Syed Zaidi, MD, a ProMedica neuroendovascular surgeon, opted to do a coil embolization. About 8 weeks later, Kevin Reinard, MD, a ProMedica neurosurgeon, would perform a surgical clipping on an unruptured aneurysm that was discovered on a CT angiogram. Both surgeries were successful, but recovery was challenging.

“Dr. Zaidi and Dr. Reinard were supportive and very kind. I had such good care from them and the entire staff,” says Connie. “Because of what I went through, I have made some changes in my life. I have quit smoking, and I don’t take anything for granted,” Connie says. “I wouldn’t have made it through this experience without my family and co-workers.”

Clinical Outcomes of Patients with Subarachnoid Hemorrhage | 2016 – 2019

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019 (Through Q3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aneurysmal SAH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Procedures</td>
<td>23*</td>
<td>21*</td>
<td>30</td>
<td>14</td>
</tr>
<tr>
<td>3-month mRS 0 – 2</td>
<td>56.2%</td>
<td>61.9%</td>
<td>56.7%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Deceased at 3 months</td>
<td>30.4%</td>
<td>23.8%</td>
<td>23.3%</td>
<td>35.7%</td>
</tr>
</tbody>
</table>

*One patient lost to follow up.
Thanks to research, neurosciences is one of the fastest growing specialities in medicine. Our physicians play a role in that research by serving as site primary investigators for national studies and co-authors in articles presented in leading neurosciences publications.

**Ongoing Clinical Trials**

**OPHELIA:** Outcomes and Practice Patterns for Hemispheric Infarcts with Malignant Edema (OPHELIA): a Multicenter, Prospective Registry – The University of Toledo; February 2017 – Present; PI: Dr. Mouhammad Jumaa

**ARAMIS:** Management of Acute Stroke Patients on Treatment with New Oral Anticoagulants: Addressing Real-world Anticoagulant Management Issues in Stroke (ARAMIS) Registry – Duke University; December 2015 – December 2019; PI: Dr. Mouhammad Jumaa

**RESTORE:** A Phase 2a, Randomized, Double-Blind, Placebo-Controlled 21-Day Treatment Study, Including an fMRI Sub-Study, to Evaluate the Effect of HT-3951 on Upper Extremity Motor Function Following Ischemic Stroke – Dart NeuroScience, LLC; April 2017– December 2017; PI: Dr. Syed Zaidi

**CHARM:** Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Multicenter, Phase 3 Study to Evaluate the Efficacy and Safety of Intravenous BIIB093 (Glibenclamide) for Severe Cerebral Edema following Large Hemispheric Infarction CHARM Study: Glibenclamide for large hemispheric infarction analyzing mRS and mortality – Biogen; March 2019 – Present; PI: Dr. Syed Zaidi

**TIMELESS:** A Phase III, Prospective, Double-Blind, Randomized, Placebo-Controlled Trial of Thrombolysis in Imaging-Eligible, Late-Window Patients to Assess the Efficacy and Safety of Tentecteplase (TIMELESS) – Genentech; January 2020 – Present; PI: Dr. Mouhammad Jumaa

**Publications**


ProMedica Toledo Hospital is a member of Toledo, Ohio-based ProMedica, a mission-based, not-for-profit healthcare organization serving northwest Ohio and southeast Michigan. The 13-hospital system has more than 55,000 employees, 2,600 physicians and advanced practice providers with privileges, more than 960 healthcare providers employed by ProMedica Physicians, as well as 400+ senior care facilities. Additionally it offers a health plan, Paramount Health Care – a trusted part of the metro Toledo, Ohio market for more than 30 years. Driven by its Mission to improve your health and well-being, ProMedica offers a full range of diagnostic, medical and surgical specialties in areas such as emergency medicine and trauma, behavioral health, heart and vascular, oncology, orthopaedics, neurology, and women's and children's services. The health system has been nationally recognized for its advocacy programs and efforts to raise awareness about hunger as a health issue.

For more information about ProMedica, please visit promedica.org/aboutus.