Sunnybrook

SAVING LIVES, ONE INNOVATION AT A TIME

to HAVE *and to* HEAL

How Sunnybrook got Billy to the church on time

also

PROSTATE CANCER: WHEN LESS RADIATION MEANS BETTER RESULTS

A BOLD NEW APPROACH TO TREATING OLDER CANCER PATIENTS

HELPING FAMILIES NAVIGATE THE COMPLEXITIES OF HEALTH CARE

ALS: OPENING THE GATE TO NEW TREATMENTS

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PHOTOGRAPH BY CHRISTOPHER LIANDO

Sunnybrook

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We are SUNNYBROOK

the INDIGENOUS PATIENT NAVIGATOR

Best possible outcomes

Leonard Benoit has spent his career as a nurse and community service worker learning the ins and outs of a complex health system. Now, in his latest role, he is using those skills to support First Nations, Inuit and Métis people through their cancer journey.

"Indigenous people in Ontario are disproportionately affected by cancer," Leonard says. "But stigma and discrimination, language barriers and factors related to past trauma and mistrust of the medical system can prevent people from coming to the hospital for testing and treatment."

Leonard, who is Qalipu Mi'kmaq from Burgeo, Newfoundland and Labrador, is one of 10 Indigenous patient navigators working across the province. He supports patients at Sunnybrook's Odette Cancer Centre and other hospitals in Toronto.

"I'm here for whatever people need," says Leonard. "I go to appointments and help patients understand their treatment options, connect people with programs and services in their community and with elders who can advise on spiritual matters."

He also advocates for inclusive practices that support the spiritual and cultural needs of Indigenous patients.

At Sunnybrook, for example, Leonard has been instrumental in the development of a smudging policy. Smudging is an important Indigenous spiritual and healing practice that involves the burning of sacred medicines like sage, cedar or tobacco.

"My goal is to create a culturally safe experience for my Indigenous brothers and sisters, and to help people through their journey," Leonard says. "I believe that will help to create the best possible outcomes for Indigenous people."

– Laurie Legere

the e-LEARNING DESIGNER

Designer with a purpose

On January 30, 2018, Igor Gemchuk got the wake-up call nobody wants. It came from a tight, unrelenting squeeze in his chest. Alarmed, he called 911 and an ambulance rushed him to Sunnybrook.

"The number of people who came to my aid – and quickly – was extraordinary," says Igor, who had now experienced first-hand the care his workplace offers to hundreds of thousands of people each year.

Igor works behind the scenes at Sunnybrook as an e-learning designer, making modules that help train the same staff who protected his life.

He collaborates with teams throughout the hospital, sifting through information to create easy-to-understand online workshops for staff on topics like patient health literacy and workplace violence.

"Frontline health-care professionals are inundated with so much information," says Igor, citing the numerous mandatory policies and processes that are part of health care. On top of that, they need to manage the physical, mental and emotional pressures of the job, he notes.

"Despite having that stress, they still manage to be so unbelievably caring."

After a run of antibiotics for myocarditis, an inflammation of the heart muscle, Igor was discharged with a healed heart and a new perspective.

"I always understood, theoretically, that my job was ultimately benefiting our patients," says Igor. "But now I understand it on a personal level. With each project, I think, 'How can I make the lives of our frontline staff as easy as possible, so they can stay as caring as they were with me?'"

– Katherine Nazimek

PHOTOGRAPH BY KEVIN VAN PAASSEN

PHOTOGRAPH BY KEVIN VAN PAASSEN (CATHY); DOUG NICHOLSON (AHMED)

Training leaders

Cathy Lemieux remembers a time when the acronym CPR didn't conjure up images of chest compressions and rescue breaths.

It was the mid-1970s, and Cathy was a nursing educator at Sunnybrook. CPR, or cardiopulmonary resuscitation, was relatively new and not widely practiced as a life-saving treatment, apart from appearing on a handful of medical television shows.

That all changed when hospital administration sent Cathy and a nursing education colleague to the United States to take an intensive CPR course.

Upon their return, they proceeded to train hundreds of staff at Sunnybrook. That experience sparked Cathy's career-defining interest in teaching how to successfully lead and work in teams.

Flash forward to the present, and Cathy's enthusiasm for staff development hasn't wavered. Over her 45-plus years at Sunnybrook, she has taken a prominent role in fostering leadership skills education at all levels and helped to create several staff training programs.

"The best part is seeing the 'ah-ha' moment in someone's face when they get it, whatever it is I'm teaching," says Cathy, organizational development associate at Sunnybrook. "Connecting with the learner is a powerful moment and really inspirational."

Cathy's current passion is facilitating Sunnybrook's Developing Nurse Leaders Program, which she developed with a colleague. The program prepares nursing staff to confidently take on leadership responsibilities when assigned to a team leader role. Cathy works with the nurses through a series of workshops, presentations, simulations, job shadowing and coaching.

"I think back to those intimate, or challenging, moments when I was at patients' bedsides," she says. "[Those moments] help me identify with frontline staff. And I'm motivated knowing it's a never-ending journey to being a good educator."

When asked her advice for learners and teachers, Cathy says we should remind ourselves that we all take on both those roles at some point in our lives.

"I'm still learning each day," she says.

– Marie Sanderson

the NURSING LEADERSHIP TRAINER

the INFORMATION DESK CLERK

First contact

There's only one chance to make a good first impression. And first impressions are what Ahmed El-Gaali does best.

As an information desk clerk, Ahmed works the switchboard and front desk across three Sunnybrook locations. He is the first point of contact for many of the hospital's patients and visitors.

Colleagues view him as the kind of person who is always positive and happy. Talk to him on the phone, and you can hear the smile in his voice.

"Customer service is about understanding people, gauging how they may be feeling and empathizing," Ahmed says. "Understanding how a person feels helps you determine how to interact with them."

Calling or walking into a hospital can be a stressful experience, and Ahmed has learned how best to respond to a wide range of emotions.

"If someone is sad, be comforting," he says. "If they're [upset], try to understand why. Think, 'Is there anything that can be done to make their experience better?'"

Ahmed was born and raised in Abu Dhabi to expatriate parents from the Sudan, and he moved to Toronto at the age of 12. He has a degree in international development studies from York University, and he's working toward completing a certificate in e-business management from the University of Toronto.

He's also a huge music fan. Ahmed remembers standing on a stage with a choir of his peers when he first moved to Toronto, belting out the lyrics to "This Little Light of Mine." It was in that moment that he discovered his love for music and understood the joy it brings to others.

"With music, you touch people in a way that makes them feel better after hearing it," says Ahmed. "And that's the same with customer service. When I finish speaking with someone on the phone or in person, I want them to feel better."

It's a positive attitude that serves him well as one of the faces, and voices, of Sunnybrook.

"When I see people happy, I'm happy," he adds. "Everybody has a light. Let it shine."

– Shelley White

Labour of love

Adrian Hascal spends much of his day navigating the complexities of labour relations at Sunnybrook. His guide dog, Ronaldo, helps him navigate the busy halls.

Since the age of 10, Adrian has lived with retinitis pigmentosa, a rare, degenerative eye disorder that involves a breakdown and loss of cells in the retina.

The disease has caused him to lose almost all vision, so last spring Adrian decided that it was time to have a guide dog by his side. Ronaldo, a black Labrador retriever, has proven to be a perfect match.

"We bonded almost immediately and our relationship is very special," Adrian says. "We are inseparable and very in tune with each other's needs."

As manager of labour and employee relations, Adrian is part of Sunnybrook's human resources team.

"I always felt I had a talent in persuasion and negotiation skills," Adrian says. "For me, getting to a negotiated settlement or resolving a dispute where the common interests of all parties are met is rewarding."

Originally from Romania, Adrian relocated to Israel at the age of five with his family, then moved to Greece before settling in Canada.

He says his interest in human resources started at York University, where he studied labour relations and psychology.

Adrian began working at Sunnybrook 19 years ago. He started his career as a labour relations assistant and then moved up the ladder within the department to his present role. In 2012, he completed his education and obtained a master's degree in law, specializing in alternative dispute resolution.

"I love the people and the culture [at Sunnybrook], and the fact that it is internationally renowned," he says.

Keeping up to date in labour and employment law is a requirement of the job, Adrian says. But beyond acquiring knowledge, the role is all about "utilizing a high degree of emotional intelligence" and "applying common sense when all else fails."

– Sally Fur

Next gen champion

For almost 10 years, Tracy Howze-Innes has been helping nursing students begin their careers.

As a teaching institution, Sunnybrook offers local university- and college-trained nursing students the opportunity to apply what they've learned by caring for real patients.

Tracy is Sunnybrook's nursing education coordinator, organizing up to 1,800 nursing placements within a hectic three-week window at the beginning of three semesters each year. It's an act of strategic networking – matching what students are looking for with the needs and capacity of each patient care unit. She collaborates with nurses and unit leadership to make it all happen.

"I enjoy meeting the students," Tracy says. "Some are nervous. Some are ready to change the world." Tracy says she's worked with nurses who came into Sunnybrook as students, were hired on as staff and now are heading off to continue their education through a master's or post-degree program.

"They are 100 per cent engaged in Sunnybrook," she says. "For so many young students, their careers started here, and I often think that it was worthwhile that they had a strong impression of us at the start."

Tracy looks for ways to enhance the student experience. She and her colleagues have helped implement initiatives such as extending shuttle bus services for students and introducing a first-of-its-kind Sunnybrook "pocket guide."

Tracy and her colleagues were recognized in 2018 by the Council of Ontario University Programs in Nursing (COUPN). For providing nursing students with "excellent evidence-based practice experience in a caring and supportive environment," Sunnybrook received the prestigious Agency Recognition Award.

"I work to facilitate rewarding moments – to encourage and motivate our nursing students," Tracy says. "And I do it among colleagues who, like me, have a passion for what they do."

– Natalie Chung-Sayers

PHOTOGRAPHS BY DOUG NICHOLSON

HELP FOR **PARENTS** OF PREEMIES

Daphne Schibler experienced her first panic attack driving home after spending the day with her premature daughter in Sunnybrook's Neonatal Intensive Care Unit (NICU).

Violet had been born at 24 weeks, weighing under one pound, and she spent 133 days in Sunnybrook's NICU.

"[The panic attack] was scary and forced me to acknowledge what a toll it was taking on me," says Daphne, who booked an appointment with her family doctor immediately. "I felt like a worker bee in the NICU. I wanted to show I could pump all the milk Violet needed. I wanted to prove I was a good mom."

When she was approached by hospital staff about a study called Coached, Coordinated, Enhanced Neonatal Transition, Daphne jumped at the opportunity. This neonatal follow-up model offers mindfulness-based support and coping resources for parents during the first year of their child's life.

As part of the study, Daphne began attending Acceptance and Commitment Therapy coaching sessions at the hospital. It's an approach that encourages families to focus on what's important to them and to remember that while the experience of having a baby in the NICU can be very stressful, it's temporary.

"You can live a life that is meaningful, even if there is pain and trauma," says Kate Robson, project manager for Sunnybrook's Neonatal Follow-Up Clinic. Kate has two children who were formerly in the NICU.

"The reality of the NICU can obscure what's actually important to families, so we're encouraging them to do things that hold meaning for them, whether it's going for a walk outside or visiting a local coffee shop," she says.

The coaching sessions helped Daphne better handle the stress of having a premature infant still in hospital. She has since returned to the gym to reconnect with her passion for powerlifting.

"I realized I didn't need to carry the pain of having a baby in the NICU with me at all times," she says. "I didn't need to live in fear; I was going to be okay."

Marie Sanderson

Daphne Schibler and her daughter Violet enjoy some playtime at home.

PHOTOGRAPHS BY KEVIN VAN PAASSEN

GOING GREEN

Sunnybrook is even greener than usual this spring, thanks to a pioneering program designed to nurture and protect its unique tree canopy.

In partnership with the University of Toronto's Faculty of Forestry, Sunnybrook has embarked on an ambitious forest management plan.

Last summer, graduate students Joanna Yu and Peter Kuitenbrouwer began by assessing the woodlots and cataloguing the trees on Sunnybrook's Bayview site.

Their inventory resulted in an impressive tally: more than 1,200 individual trees from 72 species, including two endangered butternuts. The team also checked the health of thousands of other trees in the hospital's woodlots.

"With 42 hectares of beautiful landscape, Sunnybrook's Bayview site is a natural healing environment and legacy property unique among hospitals in Canada," says Kuitenbrouwer.

"It was a great summer job," he adds, remembering crisp early mornings criss-crossing the hospital grounds in steel-toed boots.

Together with a team of forest conservation students, Kuitenbrouwer returned to plant 110 trees in early November, placing them according to each sapling's specific needs. This effort contributed to Sunnybrook's 2017 goal of planting 500 trees over five years.

Kuitenbrouwer and Yu are not the first researchers to take on the task of inventorying Sunnybrook's ample woodlands.

Eighty years ago, botanist R.B. Thomson made the first major attempt to document the forest of maple, oak, elm, beech, hemlock, white pine, hickory, birch and catalpa that covers the area. He found 40 species of trees, a figure that has almost doubled in the intervening years.

One tree that made both Thomson's list and last year's survey is a 250-year-old sugar maple that's older than Canada. Nearly a metre and a half wide, the massive maple is dwarfed only by another giant – a 34-metre pin oak that's taller than the hospital's main wing.

The benefits of such trees are more than aesthetic. Research suggests a link between healthy forests and healthy people: regular walks through greenery can strengthen immunity, lower blood pressure and reduce stress.

Considering these potential benefits, it's encouraging to see the saplings taking root and spreading their branches wide.

Sally Fur

University of Toronto graduate students Peter Kuitenbrouwer (left) and Joanna Yu measure trees on Sunnybrook's Bayview site.

PHOTOGRAPHS BY KEVIN VAN PAASSEN

BY THE NUMBERS

SUNNYBROOK'S PATIENT TRANSPORT PORTERS

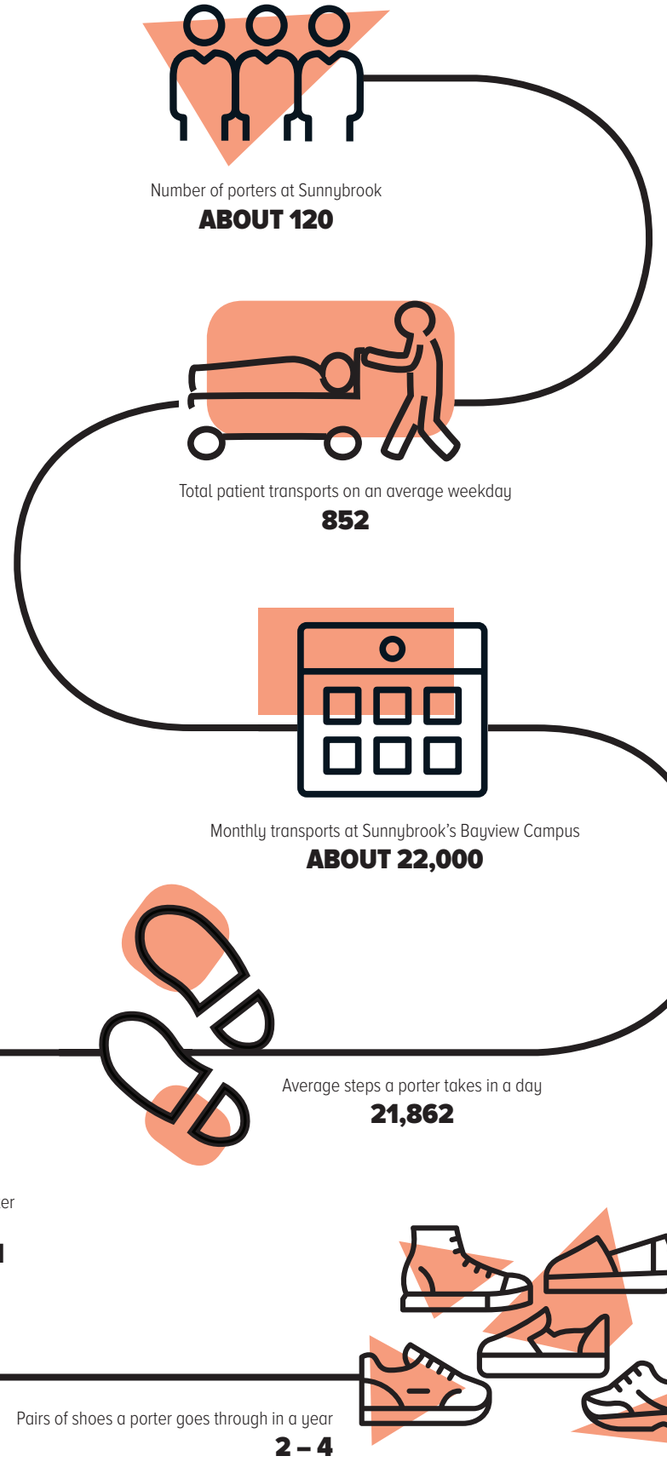
Whether bringing a new patient up to the operating room or ensuring a post-surgery patient gets to their follow-up appointment, Sunnybrook porters work hard to get patients to the right place at the right time.

It's a role that requires more than a sense of direction and a good pair of shoes.

Transport staff often provide a sympathetic ear and a large measure of comfort for patients. They can be a source of reassurance in an unfamiliar environment.

Even if patients are anxious about the destination, patient transport porters are there to make the journey as pleasant as possible.

Monica Matys



A PORTAL TO QUICKER, EASIER SERVICE

It just got easier to navigate Sunnybrook's array of hospital services, from renewing parking permits to helping patients watch cable TV from their bedside.

Sunnybrook is one of the first hospitals in Canada to offer a customized, easy-access online portal with the launch of MySunnybrook.

"This digital hub simplifies and centralizes hospital services for patients and their loved ones," says Sivan Keren Young, director of digital and visual communications at Sunnybrook.

Now anyone can stay connected to personalized services from a desktop or mobile device.

With a few simple clicks, it's easy to renew parking permits, pay hospital invoices, order cable television packages in patient rooms and even pick items for delivery from Sunnybrook's gift shop.

These services can all be accessed by visiting mysunnybrook.ca, and plans are in the works to add digital prescription refills and hourly parking payments later this year.

"We wanted to use technology to bring services directly to people, because being in the hospital can be difficult and overwhelming," says Keren Young. "We hope the convenience of MySunnybrook will have a positive impact on all our patients and their families."

Sybil Millar

PHOTOGRAPH BY KEVIN VAN PAASSEN

PHOTOGRAPH BY DOUG NICHOLSON

COMPLEX CARE CLOSER TO HOME

In recent years, patients with blood disorders and cancers of the blood have experienced long wait times and often had to travel outside the GTA for care. To address this challenge, the Ontario government worked with Sunnybrook to increase capacity for these patients.

Thanks to funding from the Ontario Ministry of Health, Sunnybrook opened its new 15-bed Complex Malignant Hematology Unit in December 2018.

Complex malignant hematology includes a variety of disorders and cancers of the blood, like acute leukemia. These conditions start in the bone marrow or in the cells of the immune system.

Significant renovations were needed to create the highly specialized in-patient environment these patients require. In addition, government support allowed Sunnybrook to create a new outpatient unit for day treatments for patients facing blood cancer. In this clinic, patients will receive chemotherapy and other transfusions. Two pharmacies were also renovated as part of this project.

"Sunnybrook is known for its specialized care in many areas, and we are so pleased that we can now open our doors even wider to welcome patients with acute hematological malignancies," says Dr. Andy Smith, president and CEO of Sunnybrook. "Now these patients can receive state-of-the-art care in a more timely manner and closer to home."

Laura Bristow

A room in the new Complex Malignant Hematology Unit.

SUNNYBROOK'S NEW HELIPAD

When a patient's life hangs in the balance, every second counts. Sunnybrook's new rooftop helicopter pad, now under construction, will ensure life-saving treatment can start that much faster.

Sunnybrook's Tory Trauma Program, the largest in Canada, treats ***more than 2,000 patients*** *annually from across Ontario who need rapid, life-saving care following a car crash, fall or other catastrophic injury.*

Laura Bristow

- One in 10 Sunnybrook trauma patients arrive by air ambulance. A team of eight or more highly trained staff then diagnose the patient and begin treatment as quickly as possible.
- Air ambulances also transport high-risk mothers and very premature babies in need of urgent care.
- The new 75-by-75-foot helipad will sit on the roof of the main wing of the hospital. A covered tunnel will protect patients arriving in poor weather, leading to a pair of dedicated elevators for quick access to the treatment areas.
- The project was made possible thanks to the generosity of donors, including the Gelato Cup and the Rudolph P. Bratty Family Foundation. Construction is expected to be completed by the fall of 2019.

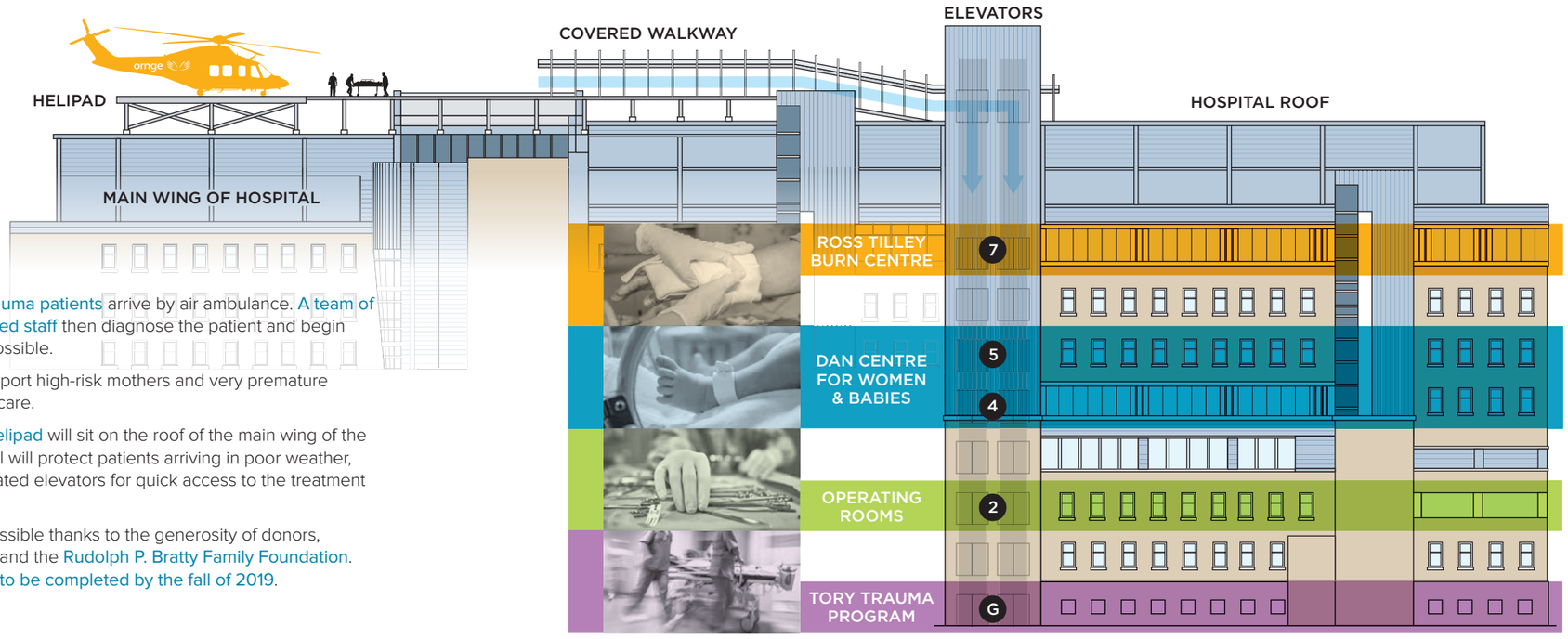


Illustration not to scale.

ILLUSTRATION BY TREVOR JOHNSTON

PHOTOGRAPH BY KEVIN VAN PAASSEN

Opening the gateway to the brain

Amyotrophic lateral sclerosis, or ALS, is a devastating disease with a grim prognosis. By opening the blood-brain barrier with focused ultrasound, Sunnybrook researchers have made important progress toward new treatments and new hope

By Diane Peters

In early 2014, Hanna Hadden noticed that something was wrong with her fingers.

The former teacher from Scarborough, Ont., was counting donations at her church. "I found I could not pick up coins," she says.

It took several appointments with medical specialists over the next year and a half to discover what was affecting her dexterity. Hanna was in the early stages of amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease.

"I was shocked at the diagnosis," Hanna recalls. "It's not something I ever expected."

ALS is a degenerative brain disease that causes gradual paralysis as the motor neurons stop communicating with muscles. As these nerve cells die, gradual paralysis sets in, affecting a person's ability to walk, talk, eat, swallow and eventually breathe. Diagnosis typically occurs between the ages of 40 and 70, with an average age of 55 at the time of diagnosis.

About 3,000 people in Canada are living with ALS and 80 per cent die within two to five years after getting diagnosed. There is no cure.

"ALS is one of the worst diseases on the planet," says neurologist Dr. Lorne Zinman, director of Sunnybrook's ALS clinic and an associate scientist in the Hurvitz Brain Sciences Research Program. "It's an awful neurological disease, and currently we can only mildly slow progression."

NEW, EXPERIMENTAL TREATMENTS

Hanna, now 70 years old, started receiving care at Sunnybrook in 2015.

From her earliest appointments, she'd ask Dr. Zinman about the possibility of experimental treatments and clinical trials.

During one appointment, Dr. Zinman told Hanna about a revolutionary trial testing focused ultrasound to open the blood-brain barrier in people with ALS.

OPENING THE BLOOD-BRAIN BARRIER

The blood-brain barrier is a network of closely spaced cells that protects the brain by keeping out toxins, viruses and bacteria in the bloodstream, but it also prevents drug therapies from reaching the brain.

"The blood vessels in this area are so small, they act like a physical barrier," says neuroscientist Dr. Nir Lipsman, director of the Harquail Centre for Neuromodulation at Sunnybrook and team member of this clinical trial. "We need to 'open the gates.'"

By targeting and opening the blood-brain barrier in specific regions of the brain, Sunnybrook researchers can deliver promising medications directly and try to treat diseases such as ALS.

TARGETING THE BRAIN'S MOTOR CENTRE

While Sunnybrook researchers have made huge strides using focused ultrasound, successfully opening the blood-brain barrier in patients with brain tumours and Alzheimer's disease, the idea of using focused ultrasound to treat ALS was a first.

Never before had anyone opened the blood-brain barrier over the motor cortex, the area of the brain responsible for controlling the body's voluntary movements.

"We had to prove the feasibility of opening this region of the brain, and that it was safe and reversible in patients with ALS," Dr. Zinman says.

His team would need to show that the blood-brain barrier would close again after temporarily being opened after the procedure.

In spring 2018, Sunnybrook began looking for volunteers with ALS to

undergo this non-invasive procedure to open the blood-brain barrier over the motor cortex. Phase 1 of the clinical trial involved a small group of patients to determine the procedure's efficacy and safety. Follow-up studies will add the delivery of a promising therapeutic for ALS.

VOLUNTEERING HER TIME

Hanna was one of the first to volunteer. She qualified for the trial because she was otherwise healthy and could tolerate being in a magnetic resonance imaging (MRI) machine for a prolonged period, which was a key part of the procedure. Also important was the fact that Hanna's ALS had not yet impaired her breathing, as it often does with people in later stages of the disease.

"Because of my condition, I didn't know what else I could do to help," Hanna says of her decision to take part in the clinical trial. "I was quite enthusiastic, because it sounded quite innovative."

Hanna's hands have been deeply affected by the disease. After breaking her ankle last spring and being in hospital and then rehab for weeks, she subsequently lost her ability to walk and now needs a wheelchair.

She has a personal support worker visit her home three times a day and needs two people to help her use her stair lift and get into cars. But despite these hurdles, Hanna was determined to participate in the clinical trial for the sake of furthering science.

"It may be the last good deed I can do to help other people with this disease," she says.

HOPE ON THE HORIZON

And so one early morning last August, with her head freshly shaved for the procedure, Hanna headed to Sunnybrook. Hanna says she didn't sleep the night before the big day, "Anytime you're excited about something, you don't sleep the night before anyway."

Three other patients from the ALS clinic had already gone through the process that summer. Sunnybrook has the largest ALS clinic in Canada, with approximately 250 new patients diagnosed each year. Dr. Zinman says many of these people are eager to contribute to medical research.

"PATIENTS WITH ALS ARE SO ALTRUISTIC AND COMMITTED TO FINDING TREATMENTS FOR THIS TERMINAL DISEASE."

DR. LORNE ZINMAN,
DIRECTOR,
ALS CLINIC
AT SUNNYBROOK

How focused ultrasound (FUS) opens the blood-brain barrier

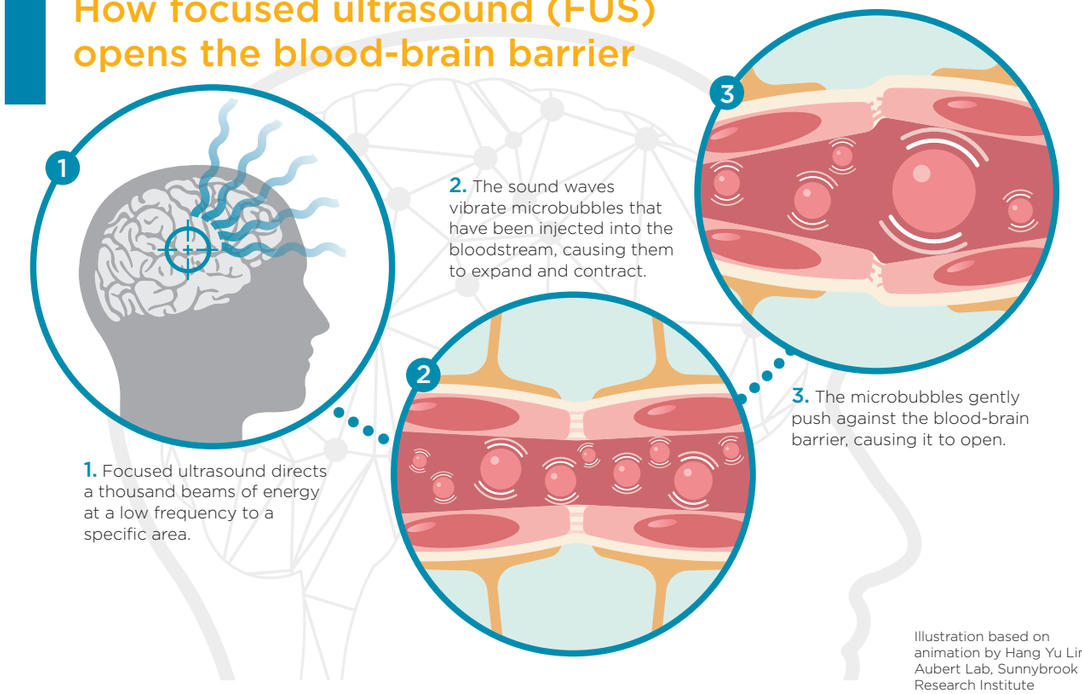


Illustration based on animation by Hang Yu Lin, Aubert Lab, Sunnybrook Research Institute

ILLUSTRATION BY TREVOR JOHNSTON

Dr. Agessandro Abrahao (left) and Dr. Lorne Zinman.

PHOTOGRAPH BY KEVIN VAN PAASSEN

"Patients with ALS are so altruistic and committed to finding treatments for this terminal disease," he says. "They understand that although the research study may be in its earliest stages and may not benefit them individually, they accept the potential risks to help others."

Hanna soon found herself being fitted with a special helmet lined with a thousand tiny ultrasound transducers, which convert electrical energy into sound energy. Then, she was placed into an MRI machine, so researchers could map out the motor cortex for precise targeting by the ultrasound waves.

That's when doctors turned on the focused ultrasound inside the helmet. Thousands of low-frequency ultrasound waves converged on key points, hitting right near the blood-brain barrier of the motor cortex. "The frequency is so low, it's harmless to the brain," Dr. Lipsman says.

Tiny microbubbles are injected intravenously, and the ultrasound waves cause them to vibrate at the targeted brain regions. As they expand and contract, the microbubbles gently push against the sides of the tiny blood vessels around the motor cortex, eventually creating a small opening in the blood-brain barrier. Intravenous contrast is then injected to observe the blood-brain barrier opening on MRI.

After this four-hour procedure, Hanna stayed overnight in hospital to be closely monitored and had an MRI the next morning to determine if the blood-brain barrier had closed again. It had.

"The blood-brain barrier has an important function which needs to be restored. We want this therapeutic window to be opened only temporarily and then repair itself over a few hours," says neurologist Dr. Agessandro Abrahao, a fellow at Sunnybrook with the ALS clinic who's part of the research team.

"It's been incredibly exciting for me to be involved in this world-class research. We are so pleased that this non-invasive procedure has been safe and well tolerated by all the trial participants," Dr. Abrahao says.

MOVING FORWARD

The team at Sunnybrook is now moving ahead with plans to start Phase 2 of the trial. This study will include the use of a therapeutic agent and Drs. Abrahao, Zinman and Lipsman hope to begin in the fall.

Over time, researchers will likely develop therapies for ALS designed for this type of direct-to-the-brain use. Antibodies, gene or viral therapy, for instance, might be ideal.

Antibodies directed to specific targets can be used to decrease toxic proteins or reduce harmful inflammation. Gene therapy can involve replacing a mutated gene that causes disease with a healthy copy of the gene, or knocking out a mutated gene that is functioning improperly. Viral therapy can involve reprogramming viruses in the lab into therapeutic agents that can be used to kill harmful cells.

It is believed that these kinds of therapies could potentially improve, or even reverse, the damage caused by ALS, resulting in better motor function and a longer life span for people with the disease.

Being able to open up the blood-brain barrier around the motor cortex could also eventually lead to more effective treatments for other neurological diseases that impact movement, such as Parkinson's disease and Huntington's disease.

Once the process for opening the blood-brain barrier is refined and effective drugs are developed, Dr. Lipsman says it will be possible that focused ultrasound could be used in any hospital for ALS treatment.

"There are upfront costs for equipment," he says. But because opening the blood-brain barrier helps medication get to the brain more effectively, hospitals could cut down on the dosage they need to administer.

"And if you can slow ALS progression and reduce disability in these patients, there is the potential to not only develop a much needed therapy, but [also] save our health-care system significant expense," Dr. Lipsman adds.

And while it's uncomfortable to lie in an MRI machine, this can be a painless and side-effect-free procedure for patients like Hanna.

To help others one day receive a truly effective treatment for this devastating disease, Hanna says undergoing the procedure as one of the first study participants was worth it.

"I would do it again," she says.

DOWN THE AISLE *and* ON THE MEND

Nerve injuries to the shoulders and arms can be severe and complicated, impairing a person's quality of life. Sunnybrook's new Complex Combined Upper Extremity Clinic takes a team approach to provide patients like Billy Kurniawan with a leading model of care

BY JOEL SCHLESINGER

Billy Kurniawan awoke last May not knowing how he ended up at Sunnybrook.

Told that he been unconscious for a number of days, he had no memory of the motorcycle crash that had brought him to Canada's busiest trauma centre.

What the 39-year-old could recall, however, was that he was to be married to his fiancée, Raysha, in two months.

Billy soon realized he faced a challenging recovery from a long list of injuries. Because of his neck injury, he needed to wear a halo brace – a medical device that clamps around the head and attaches to the shoulders to stabilize the spine.

"But the real major [injury] was to my brachial plexus – a root of the nerves that attach to the spinal cord," he explains. "Basically, the nerves that control my arm, hand and fingers were detached from my spinal cord."

The injury, called a root avulsion, meant Billy had lost much of the sensation and use of his left arm. Suddenly everything in his life now seemed up in the air: the wedding, his job and whether he'd ever be able to use his arm again.

What was certain, however, was that Billy needed specialized care, and Sunnybrook was the right place. A year before his crash, Sunnybrook's Complex Combined Upper Extremity Clinic opened with a mandate to treat serious nerve injuries like his.

"I am one of those lucky people – to be at Sunnybrook," he says. "I am thankful to be alive and still able to walk."

Billy is among several dozen Ontarians who have undergone treatment at the Complex Combined Upper Extremity Clinic since it opened in June 2017.

Plastic surgeon Dr. Paul Binhammer, one of the clinic's specialists, says the idea for a specialized unit evolved out of the realization that care for patients with serious nerve injuries to their arms and hands was not as good as it could be.

"I felt like these patients weren't being well served," says Dr. Binhammer, one of Canada's leading specialists for procedures to repair nerve injuries to the upper extremities.

Before Sunnybrook's innovative new clinic, patients might have had to see several specialists at different locations over a number of weeks.

"That often would prolong the recovery process because patients go back and forth between specialists as they tried to solve the problem," Dr. Binhammer says. "The clinic came about with the aim of having all the specialists for the patients in one place, so we can come up with solutions much more quickly."

Time is a big factor with these kinds of injuries, he explains. The longer patients wait for care, the longer their recovery will be. Also, as time passes, the damage is more likely to become permanent, as muscles atrophy and joints become progressively more rigid.

BELOW:
Dr. Paul Binhammer, plastic surgeon, Complex Combined Upper Extremity Clinic at Sunnybrook.

LEFT:
Raysha Rivany and Billy Kurniawan on their wedding day.

PHOTOGRAPHS BY CHRISTOPHER LIANDO (LEFT); KEVIN VAN PAASSEN (RIGHT)

The Complex Combined Upper Extremity Clinic aims to provide fast-tracked care. Patients first meet with the team, three specialists who include Dr. Binhammer, Toronto Western Hospital hand surgeon Dr. Heather Baltzer and physiatrist Dr. Larry Robinson. (Physiatrists are nerve, muscle and bone experts who diagnose and treat illnesses or injuries that affect movement.)

The clinic is part of a growing trend in health care acknowledging the importance of multidisciplinary treatment for patients with multifaceted injuries, Dr. Robinson says, who serves as chief of St. John's Rehab at Sunnybrook.

"A big piece of doing that well is offering all the care in one place," he says. "Because the surgeons and others – [including] physiatrists like myself – can have that interdisciplinary discussion, we're bringing multiple viewpoints to the table, which allows us to reach a thoughtful recommendation much faster."

Often Dr. Robinson's role comes first in the care plan. He helps discover the extent of a patient's injury by testing nerve function using electromyography, or EMG for short.

"In Billy's case, using EMG, we were able to establish he had a complete injury because there was no signal getting through to his arm," he says.

With the severity of Billy's injury established, his surgical team could swiftly determine the next course of action: a nerve graft.

The aim of this surgical procedure was to restore most – but not all – movement and feeling to his left arm and hand.

"Typically with these complex cases, we can't entirely make the limb and hand as it once was," Dr. Binhammer says. "So we focus on things that are most important – like the fingers being able to flex and extend."

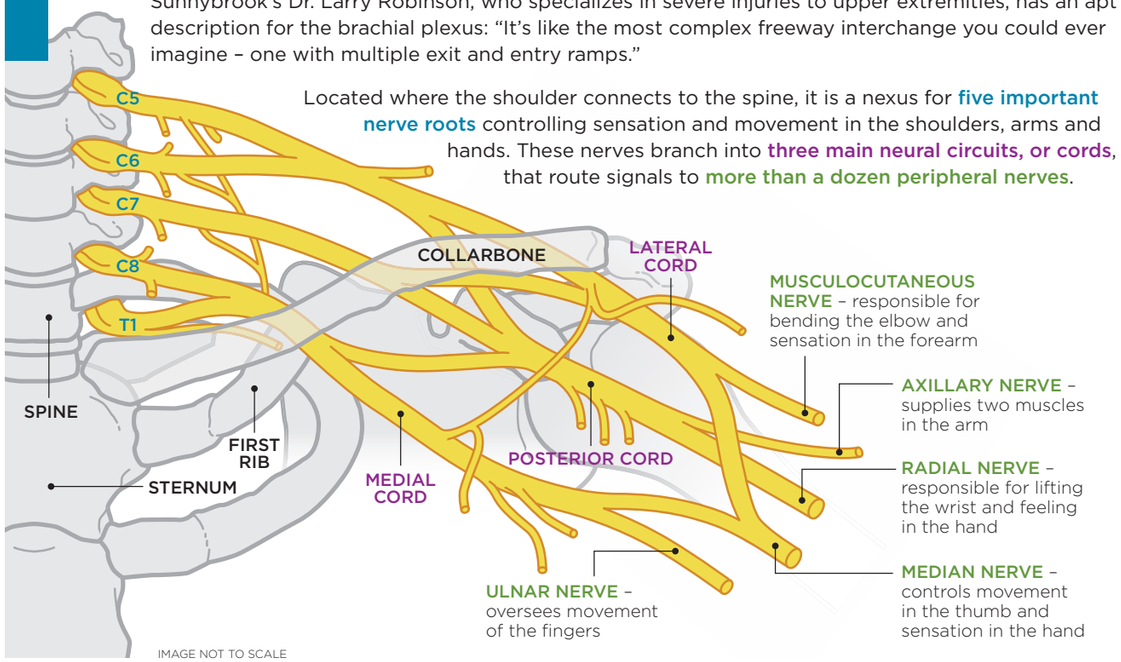
Billy had to wait a few months for the surgery while his other injuries healed. In the meantime, his doctors gave him the go-ahead to walk down the aisle.

"We asked if we could remove the halo, but the doctors said it would be too dangerous, so it made for some interesting wedding photos," Billy says with a laugh.

The brachial plexus, a complex freeway interchange

Sunnybrook's Dr. Larry Robinson, who specializes in severe injuries to upper extremities, has an apt description for the brachial plexus: "It's like the most complex freeway interchange you could ever imagine – one with multiple exit and entry ramps."

Located where the shoulder connects to the spine, it is a nexus for **five important nerve roots** controlling sensation and movement in the shoulders, arms and hands. These nerves branch into **three main neural circuits, or cords**, that route signals to **more than a dozen peripheral nerves**.



ILLUSTRATIONS BY TREVOR JOHNSTON

RIGHT: *Raysha and Billy at home in Toronto.*

PHOTOGRAPH BY KEVIN VAN PAASSEN

After the wedding, the procedure to repair the tear to his brachial plexus went ahead as planned. It involved Dr. Binhammer removing several centimetres of the sural nerve from Billy's left leg.

"We steal that chunk of nerve and graft it like you'd splice an electrical wire to repair a damaged cord," Dr. Binhammer explains. The sural nerve is often the ideal choice for grafts because patients can lose its function without affecting their quality of life much.

"They can still run, jump and lead active lives," he says.

Once complete, the graft procedure does not restore function immediately because the grafted nerve fibre cannot carry signals from the spine down the arm just yet. Rather, it serves as a bridge for sprouting nerves in the spine to cross the gap to the brachial plexus and regrow down the arm.

"With this pathway in place, the nerves grow about a millimetre a day," Dr. Binhammer says. "So my job, post-surgery, is to find out how the nerve is growing."

For Billy, it will be a long recovery, involving a lot of hard work for both him and his wife. She helps with his daily exercises and with common tasks he used to take for granted, like zipping up his jacket.

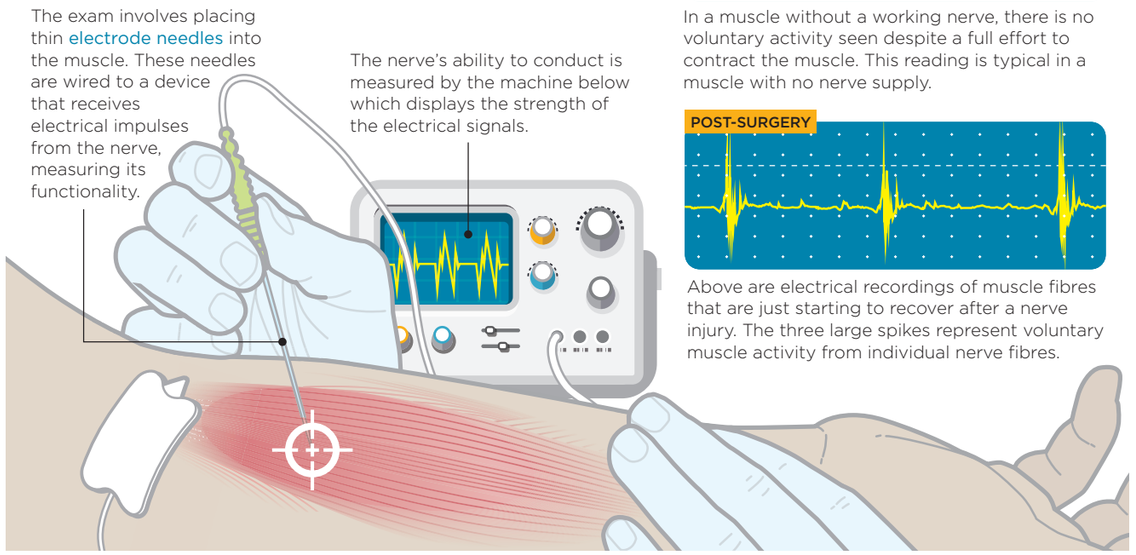
"I'm so happy she's by my side," he says.

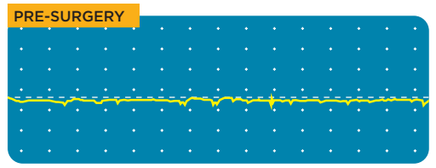
While it can be challenging to accept that his recovery may take up to three years, "I realize most motorcycle crashes of this nature have far worse outcomes," Billy says.

"I'm a positive person, so I wake up each day hoping for the best."

Mapping the damage

The initial **electromyography test (EMG)** shows the degree of injury to a nerve. Post-surgery, it measures how the nerve is growing.





In a muscle without a working nerve, there is no voluntary activity seen despite a full effort to contract the muscle. This reading is typical in a muscle with no nerve supply.

Above are electrical recordings of muscle fibres that are just starting to recover after a nerve injury. The three large spikes represent voluntary muscle activity from individual nerve fibres.

ACTIVE, HEALTHY & HAPPY

For older patients with cancer, treatment can be challenging. And they may not always get the care they need because of their age. A bold new Sunnybrook program aims to improve outcomes for older patients through a comprehensive team approach and tailored treatment plans

By Mirjam Guesgen

Twice a week, Nettie Yeoman spends her mornings at Sunnybrook's W. P. Scott Geriatric Day Hospital. For a few hours each day, she engages in therapies that benefit her body and her brain.

But Nettie doesn't view these prescribed therapies as stressful or burdensome. In fact, she equates her time at the hospital with being on vacation.

"For years, I was fond of saying that there were two places in the world that I thought were like heaven on earth," says Nettie, a 71-year-old Toronto resident. "One of those places was Disneyland. Now, I want to include Sunnybrook on my list."

Nettie's time at the Geriatric Day Hospital, one of the first programs of its kind in Canada, is filled with physiotherapy that strengthens her muscles and improves her balance, recreation therapy, where she can do activities she loves – like planting seedlings or playing Scrabble – and a lunch where she can socialize with others.

She also meets with her occupational therapist, who challenges her to problem-solving exercises to keep her mind sharp or invites her to bake with other patients.

These enjoyable activities are a far cry from the challenges she faced last year.

Cancer survivor Nettie Yeoman (right) bakes cookies with occupational therapist Beverley Moskovic at Sunnybrook's W.P. Scott Geriatric Day Hospital.

PHOTOGRAPHS BY KEVIN VAN PAASSEN

In May 2018, Nettie was diagnosed with early stage breast cancer. She underwent a mastectomy in July, followed by a series of chemotherapy and radiation treatments.

Now finished with her treatment, Nettie's regular visits to the Geriatric Day Hospital are part of a pioneering program at Sunnybrook designed to improve outcomes for older patients with cancer.

It's an initiative that's about more than ridding the body of disease. The ultimate goal is to build patients up and provide them with the services and care to keep them active, healthy and happy.

OVER-REPRESENTED AND UNDERTREATED

According to Canadian cancer statistics, of the more than 200,000 Canadians who are diagnosed with cancer each year, nearly 90 per cent are people aged 50 and over. Seventy per cent of all cancers occur in people older than 60. But while cancer mortality rates have decreased by at least 2 per cent, year over year, some patients may not be getting the treatment they need, simply because of their age.

"Studies have shown that older people with cancer have often been undertreated," says Dr. Ines Menjak, a medical oncologist at Sunnybrook. "They may not see the appropriate specialists to treat their cancer because someone early on in their care has made the decision that they're not appropriate for treatment."

Traditionally, there has been a reluctance to offer aggressive treatment to older patients because it was assumed they would not be able to cope, Dr. Menjak says.

But senior patients are diverse in their general health and fitness, as well as cognitive and physical functioning, Dr. Menjak says.

Nettie is a prime example. Aside from taking a low-dose medication and acetaminophen on occasion, she is healthy and relishes the chance to participate in aqua-fitness classes five times a week.

On the other hand, older patients may have other illnesses for which they take medication, or they may have difficulties with memory or getting around the house. These comorbidities, as they are called, can interact or interfere with standard treatments, not just on a biochemical level, but also in terms of how the patient will deal psychologically during and after treatment.

Oncologists might be fearful of causing harm when making these difficult treatment decisions, and that may lead them to err on the side of caution.

"Because of that concern, oncologists may end up undertreating older patients. They're giving them modified dosing or regimens that may not benefit them as much," she says.

Another challenge is that older adults with cancer have been historically under-represented in clinical trials. That means most standard treatments were devised without taking the needs of this group into account.

Instead of trying to fit the diversity of patients into a few treatment types, or not treating at all, Sunnybrook is finding ways to understand older patients' needs and tailor more personalized treatment plans for them.

WORKING AS A TEAM

To better understand the needs of older patients, Sunnybrook went directly to the source.

Researchers asked older women undergoing breast cancer treatment to tell them what they needed from their care. What came across from the women was a desire for more communication between physicians, more social support networks and to be more involved in deciding their treatment.

For patients' families, having a geriatric specialist

involved and having educational resources tailored for older patients was important.

In response to their findings, Sunnybrook formed an interdisciplinary team of oncologists, geriatricians, occupational therapists, physiotherapists, pharmacists and social workers. The group works together to assess and treat patients in a way that meets their individual diagnoses, as well as their cognitive or social needs.

"This is a group of patients who require really a team-based approach," says radiation oncologist Dr. Ewa Szumacher. She leads the Senior Women's Breast Cancer Clinic at Sunnybrook, where the initiative is being piloted before rolling out across all areas of oncology.

"There is an awareness of the problem that these patients have specific needs," Dr. Szumacher says. "We know exactly who the people are who can offer services to the patients, [and] we try to utilize those services as much as we can."

Occupational therapists, for example, take a holistic view of a patient's ability to function in everyday life: how they get dressed, buy groceries and cook for themselves or take their medications. Their ability to do these things reflects their cognitive, physical and mental status, and the treatment and supports they need to maximize their ability to function safely in their home and in the community.

"The most important question I ask always my patients is, 'What is the biggest challenge in your daily life?' It's not only about what they can and can't do; it's about what concerns them most," says Sunnybrook occupational therapist Beverley Moskovic, who works with Nettie.

Moskovic and her colleagues also provide emotional support to patients who have received a medical diagnosis, faced hospitalization or have declined in their ability to fulfill the roles in their life that gave them a sense of value. Sitting together, listening and talking about how they feel strengthens patients emotionally.

As of December 2018, all older Sunnybrook patients with breast cancer are screened at their first visit using a self-reporting questionnaire that assesses how frail or vulnerable they are. If the survey indicates the patient may need extra care, the patient is referred to a geriatrician who can do a more thorough assessment of their needs.

"We're trying to dig deeper and identify those people who may run into significant problems during treatment," Dr. Menjak says. "We try to address that upfront."

During the pilot phase of the screening initiative, close to 40 per cent of patients who completed the questionnaire had some vulnerability, such as a previously undiagnosed cognitive impairment or a new medical condition.

> "WE'RE TRYING TO DIG DEEPER AND IDENTIFY THOSE PEOPLE WHO MAY RUN INTO SIGNIFICANT PROBLEMS DURING TREATMENT."
>
> **Dr. Ines Menjak,** medical oncologist at Sunnybrook

LOOKING AT THE BROADER PICTURE

Geriatricians work with older patients across the hospital, including the oncology centre, and collaborate with other physicians and allied health professionals to form comprehensive treatment plans.

"A geriatrician's job is to look at the broader picture of functioning and cognition, and then put that into context of someone's cancer or proposed therapy," says head of geriatric medicine Dr. Rajin Mehta, who leads the geriatric oncology initiatives at Sunnybrook.

For women with breast cancer, for example, the plan takes into account the stage of the cancer, any comorbidities and the patient's cognitive and physical abilities. If a patient is dizzy or off-balance, they could have their medication adjusted, for example, or see a physiotherapist to strengthen their muscles.

Details of the comprehensive care plan are then shared with the oncologist, surgeons, family members or anyone involved with a particular patient, so everyone is on the same page.

According to surveys conducted by Sunnybrook researchers, both patients and physicians felt more confident in a treatment plan when a geriatric assessment had been done. Of note, the nature of the treatment plan changed by close to one-third after such assessments.

Overall, patients felt more informed, more supported and less uncertain about their decisions for treatment, says Dr. Menjak, who led the research project.

Sunnybrook's efforts in geriatric medicine reflect a growing trend across Canada and worldwide to provide more inclusive oncology care.

The American Society of Clinical Oncology now advocates for this, including assessments of function, comorbidity, falls, depression, cognition and nutrition in older patients receiving chemotherapy.

"I think it speaks great volumes [about] where this field has come [from] and where it's going," Dr. Menjak says.

The aim is to foster a comprehensive approach to patient care both across the hospital and throughout the profession as a whole.

"The hope is that this field will continue to grow, and the next generation of oncologists and geriatricians will help to develop it even further," Dr. Mehta says.

For Nettie, the kind of care she's received at Sunnybrook has been a great boon to her recovery post-cancer – and likely the reason it's one of her favourite places.

"The professionals and volunteers at the Geriatric Day Hospital are so kind, courteous and helpful," she says. "You don't necessarily receive that kind of treatment out there in life."

Personalizing breast cancer chemotherapy

One-size-fits-all has no place in Sunnybrook's personalized breast cancer program. Using imaging, innovative genomic approaches and high-tech cellular analysis, doctors and scientists are taking a bold new path to treat breast cancer with precision-based medicine

By Anna Sharratt

Debbie Duclos, diagnosed with breast cancer in 2014, benefited from Sunnybrook's innovative personalized treatment program.

Debbie Duclos had a gut feeling something was very wrong with her left breast. It was November 2014 and the 42-year-old registered nurse from Campbellville, Ont., noticed that its shape and feel had changed.

After a local hospital ordered a mammogram and an ultrasound, "a sizeable area of concern" was identified through imaging. Stricken, Debbie conferred with her family doctor and was referred to Sunnybrook for her biopsy, having worked at the hospital in the past.

"Within 48 hours, I had my diagnosis. Stage 2 breast cancer," she recalls. "The tumour was the size of a lemon."

The news led to a lot of anxiety and fear.

"The uncertainty of a cancer diagnosis really rocks your boat," says Debbie. "I was thinking, 'Why me? Why did this happen?'"

Reeling from the news, Debbie was comforted by the support of her husband, parents and friends, and by the fact that she had an appointment with a team of oncologists at Sunnybrook by the end of the week.

During that first meeting, the team of doctors and radiologists provided Debbie with a detailed plan for her care. Within the next nine months, they were going to give her chemotherapy, surgery and radiation, while continuously tracking her tumour's response to treatment.

She was also enrolled in several studies during her breast cancer journey, including a tumour-mapping study.

Debbie left the meeting understanding her diagnosis and with a personalized plan, giving her an enormous feeling of relief.

"I felt like they had taken me under their wing," she says. "They had a clear direction for me. It's what enabled me to really think I was going to be okay."

A PERSONALIZED APPROACH

Debbie had become part of Sunnybrook's ongoing clinical research program that aims to provide a personalized approach to cancer care.

This approach focuses on obtaining as much information as possible about tumours through quantitative magnetic resonance imaging (MRI), digital pathology and genetic mapping, known as genomics. Using these advanced techniques, Sunnybrook oncologists and scientists work together to determine exactly how these tumours behave – and what treatments are best at eradicating them.

"We decided to form a core team of clinical and scientific experts here at Sunnybrook" says Dr. William Tran, a radiation therapist and clinician-scientist at Sunnybrook and a vital part of the new precision medicine program. The team includes Dr. Katarzyna Jerzak, a medical oncologist at the Odette Cancer Centre and assistant professor in the Department of Medicine at the University of Toronto, pathologists and radiation oncologists at Sunnybrook and Dr. David Andrews, director and senior scientist in the Biological Sciences Platform at Sunnybrook Research Institute and professor of biochemistry at the University of Toronto.

They work holistically with patients at every stage of their care program to assess the responsiveness of the tumour to the treatment.

Traditionally, tumours aren't viewed multiple times over an extended period during treatment, says Dr. Tran. The new, personalized approach tracks the cancer as it evolves in a

patient's body. In addition, the information gleaned from these patients will be tracked, recorded and stored in a databank, to be used for guidance on future cases at Sunnybrook and other Canadian hospitals.

Dr. Tran says there is a great interest in the medical and scientific community to improve treatments for breast cancer. "We're trying to shake [things] up in this research program."

'A CHANGING PARADIGM'

As part of the precision-treatment program, the team is trying to identify women who are at high-risk for developing metastasis (the spread of the disease beyond the primary site). Once a patient with high-risk breast cancer is identified by medical oncologists at Sunnybrook, they are followed by the team as part of a study.

At the onset of treatment, these patients receive chemotherapy to shrink their tumours. This approach can halt the cancer cells early and help prevent metastases, even prior to surgery.

"There's a changing paradigm now," says Dr. Jerzak. "Historically, women with early breast cancer were treated with surgery first, followed by chemotherapy. But increasingly, women with triple-negative or HER2 positive tumours are getting chemotherapy first, instead of surgery first."

For some women, the upfront chemo means the tumour shrinks entirely or enough that breast conserving surgery is possible, rather than a full mastectomy.

At select points in the chemotherapy regimen, quantitative imaging will be done to determine if the tumour is responding well to treatment, says Dr. Tran.

"We are exploring new ways to analyze tumours using quantitative MRI, ultrasound and digital pathology; we think these are our best shot right now," he says. Unlike conventional MRI, quantitative MRI (and imaging) provides clinicians with measurable and consistent data of the biological and physiological properties of the tumour.

Dr. Katarzyna Jerzak (left) and Dr. William Tran.

MORE GOOD NEWS

In accordance with the Sunnybrook team's personalized approach, Debbie underwent chemo immediately after her diagnosis. She watched as her tumour shrank dramatically.

"[The doctors] could see how the chemo was reducing the tumour size," Debbie recalls. "And they were able to give me results."

She later had a mastectomy of her left breast, 36 lymph nodes removed and 25 sessions of radiation.

Dr. Jerzak is happy that she now has more good news to share with patients like Debbie.

"Now I can answer patients who ask, 'How do you know if the chemo is working?'" she says.

Dr. Jerzak says she's currently working to recruit patients with triple-negative or HER2 positive breast cancer for a study that not only incorporates imaging, but also measures blood-based and genomic markers of response to chemo-therapy. Later, she hopes to work with women with metastatic breast cancer as well.

DATABANK FOR THE FUTURE

A biopsy of a tumour taken at the onset of treatment can provide scientists with vital information about its composition. Tumours are often made up of a variety of cancer cells – rather than just one type – meaning that each portion of a tumour can react differently to different medications.

That's why after Dr. Andrews and his team remove a tumour sample, they culture the cancerous cells in the lab. Then, they effectively grow 3-D models of the tumours in order to determine their composition and their responsiveness to a variety of drugs. (See sidebar.)

"We try to extract a lot of information from images of the cells," says Dr. Andrews. "We're trying to find out how they'll respond to treatment, [and] within weeks, instead of months, we have an answer."

The end game, says Dr. Andrews, is that the patient will be given targeted chemotherapy to treat the exact cancer – or cancers – they have, rather than being bombarded with drugs that wipe out not only cancer cells but healthy cells as well.

And the work done in the lab won't just benefit each individual patient. All the information being gathered from patients is being stored, with the hopes of building a large databank in the future that doctors can access.

In essence, the databank will illustrate what worked – and what didn't – for each patient and their particular type of tumour. This valuable information will be used to help oncologists plot the best treatment plans for future patients.

> "Now I can answer patients who ask, 'How do you know if the chemo is working?'"
>
> **Dr. Katarzyna Jerzak,** medical oncologist at the Odette Cancer Centre at Sunnybrook

GIVING BACK

Now 46, Debbie has been in remission since September 2015. She gets follow-up appointments every six months and is still undergoing active surveillance as part of the precision medicine studies. Last year, imaging caught some shadowing in her right breast, which could indicate a tumour. Luckily, the area hasn't changed in subsequent scans, and Debbie is confident she's being watched carefully by her team at Sunnybrook.

She is now the founder and CEO of a medical-device training company, having been inspired by some of the technology used during her care.

Debbie's also been volunteering in her community, including participating in events supporting women's cancer research. She says she's happy to share her energy and enthusiasm, having received a new lease on life.

"I am just so grateful to my entire care team and want to show my appreciation by giving back," she says. "I always say, 'Is there a way you can pay it forward?'"

PHOTOGRAPHS BY KEVIN VAN PAASSEN

SOLVING COMPLEX CASES

In the High Content Screening Lab, at the Sunnybrook Research Institute, senior scientist Dr. David Andrews and his team are growing cancerous tumour cells sourced from breast biopsies into 3-D models called organoids. These models can provide key information about the cells within them – and give clues as to which medication combinations will prove successful.

"We're trying to mimic what's going on in the patient's body," explains Dr. Andrews.

Dr. David Andrews in Sunnybrook's High Content Screening Lab.

ZEROING IN ON THE 'BAD GUYS'

Some of his research looks at how cancer driver cells work. These cells, which are responsible for fuelling tumour growth, are notoriously tough to treat. ("They're the real bad guys," he says.) Dr. Andrews wants chemotherapy to be more precise, zeroing in on these types of cells that resist chemotherapy and often come back.

To that end, he and his team analyze how the cancer cells in his samples behave. These behaviours can offer clues as to how effective chemotherapy will be. "In response to chemotherapy drugs, we ask, 'Are they stressed? Are they starving? Are they going to sit there and wait it out? Or are they going to die?' Chemotherapy regimens can evoke those behaviours," says Dr. Andrews.

Ultimately, scientists won't just be analyzing cellular behaviour. Dr. Andrews says scientists may someday be able to activate a built-in self-destruct program in these tough-to-treat cancer cells, instructing them to die off.

PREDICTING THE RIGHT TREATMENT

To witness this kind of sophisticated cellular interplay, Dr. Andrews and his team use state-of-the-art technology. New, automated microscopes generate data sets containing millions of images. This data is then evaluated though a process called high content analysis – using microscopes and computers to employ complex algorithms that can identify and categorize cells.

Once the information on the cells is available, it is then stored in the lab's servers. The information can then be accessed by radiologists and oncologists with the goal of helping them treat high-risk breast cancer patients.

"The goal is to be able to tell patients what drug combination they should be taking," says Dr. Andrews. "We need a way to predict success upfront." •

Less radiation, better results

Radiation has long been a critical tool in the fight against prostate cancer. But sometimes, less is more. Doctors at Sunnybrook have pioneered a way to deliver fewer radiation treatments to tumours while 'packing a greater punch'

BY ALEXIS DOBRANOWSKI

After Bill Temos's good friend died from prostate cancer in 2017, he knew he had to look into his own PSA levels.

Bill's PSA (prostate-specific antigen) tests, which examine blood for this protein, had been rising steadily for years. Higher levels of PSA can mean cancer is present.

Soon after returning from his friend's funeral, Bill visited his doctor, who agreed to investigate further.

above: Bill Temos was part of a trial that saw him receive just two doses of radiation.

After some additional tests, a biopsy came back positive for prostate cancer.

"You know, you think the worst when someone says 'cancer,'" Bill says. "Then there's the CT scans, the bone scans and all the worry that comes with those, and the worries about what the treatments will be like."

Bill's doctor referred him to Dr. Andrew Loblaw, a radiation oncologist at Sunnybrook.

"My doctor explained that Dr. Loblaw was targeting tumours with radiation in more precise doses, for a fewer number of treatments," Bill says.

Dr. Loblaw and his colleague Dr. Patrick Cheung have spent decades researching and perfecting SABR – stereotactic ablative body radiotherapy – a high-precision, external beam radiation treatment.

In 2018, Sunnybrook became the first hospital in Canada to change treatment protocols for most men with intermediate risk prostate cancer. Traditionally, radiation treatment plans involved visits to the cancer centre five days a week for eight weeks.

PHOTOGRAPHS BY KEVIN VAN PAASSEN (BILL TEMOS & DR. LOBLAW); DOUG NICHOLSON (SUNNYBROOK TEAM)

"With SABR, we've reduced that to once per week, for five weeks, and we are really proud of that change," Dr. Loblaw says.

The SABR treatment involves implanting tiny markers made of gold into a prostate tumour and using image-guidance to precisely target the tumour with radiation from outside the body. It is done on a regular linear accelerator, which is the standard equipment used for external beam radiation. That means any cancer centre providing radiation treatment could adopt SABR, Dr. Loblaw says.

"Because of the precision, we are actually able to deliver less radiation into the body, which is better for patients too," he says.

The new SABR treatment plans were years in the making.

"We were always taught that the best way to treat prostate cancer was with six to eight weeks of low-dose treatments. Then about 20 years ago, some scientists in the United States noticed that prostate cells were more easily killed with high dose per day radiation," Dr. Loblaw explains. "So we used that theory to start developing this technique – delivering fewer radiation treatments to a tumour, but ultimately packing a greater punch."

above: The Sunnybrook team targets prostate tumours using stereotactic ablative body radiotherapy (SABR), a high-precision radiation treatment.

left: Dr. Andrew Loblaw, radiation oncologist at Sunnybrook.

Because prostate cancer is often a slow-growing cancer, researchers had to watch and check in on patients for years to ensure the SABR was working effectively, Dr. Loblaw explains.

And, since the side effects of radiation treatments can take years to surface, it was important for the researchers to track patients over time to ensure the treatments were also safe. In fact, the first cohort of patients was followed for a minimum of 11 years.

"This kind of work takes a long time to fund and to complete," Dr. Loblaw says. "But ultimately, we've found that SABR is highly effective for treating prostate cancer, it's well tolerated by patients – meaning there are few side effects – and it's very convenient for patients."

Now, Dr. Loblaw and his team are going even further in their SABR research.

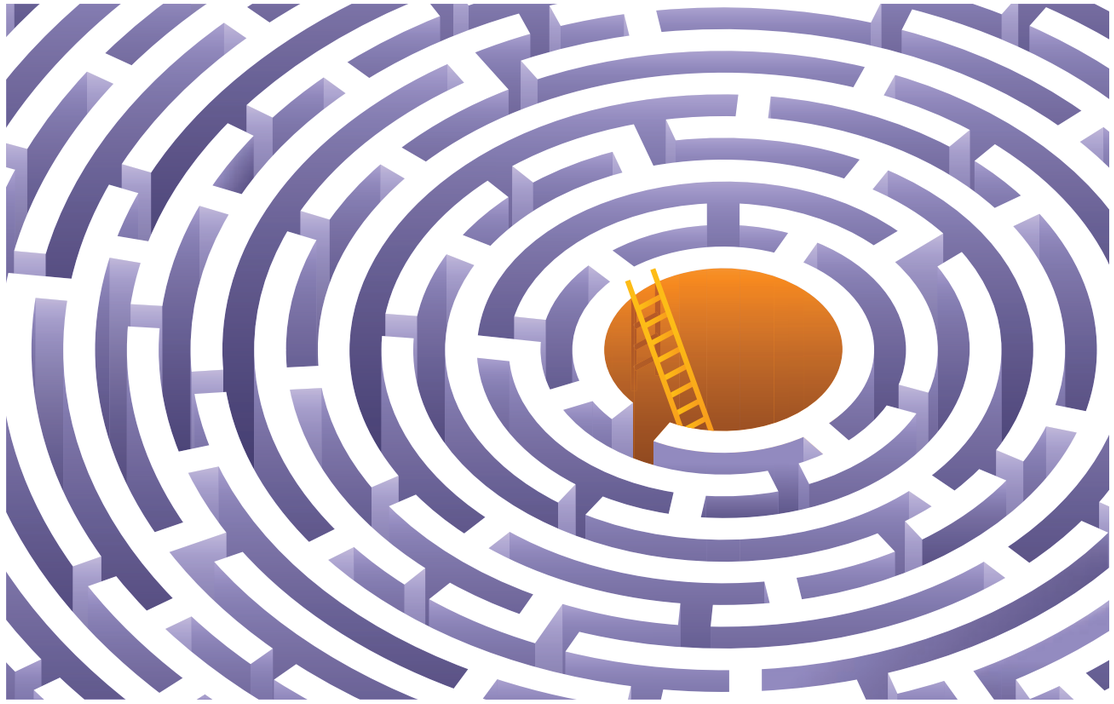
"We are looking into whether we can effectively treat some prostate patients with just one dose of radiation," he says.

Bill was a part of a trial that saw him receive just two doses of radiation, saving him dozens of trips from his Nobleton, Ont., home and allowing him to continue running his bakery equipment business, where he has worked for the past 40 years.

"If you have to undergo eight weeks of radiation because that's best for your type of prostate cancer, then you should," Bill says. "But for me, to have the option to undergo just two doses was amazing. It was the least invasive and disruptive option."

Just shy of one year post-treatment, Bill says his PSA levels have dropped dramatically and he is in good health.

"I just got back from a business trip abroad and a vacation with the whole family, including the grandkids," Bill says. "I'm very lucky."



Helping families navigate the health-care maze

Since 2013, Sunnybrook's Family Navigation Project has helped thousands of youth and their families find the mental health care and addiction services they need. Now, Sunnybrook is sharing its knowledge by collaborating with Humber College on a unique graduate program

BY MARJO JOHNE

For years, the health-care system was a frustrating maze to Cathy Walsh.

She first faced difficulties finding the right kind of help for her daughter who grew up with developmental challenges. Then, when her younger daughter began grappling with mental health problems, Cathy again struggled to find the right programs and care for her child.

"The mental health care system is really complex," says Cathy, who lives in Ajax, Ont., with her husband and two children. "And with mental health, there needs to be the correct fit between client and service provider for treatment to be successful."

The situation took a turn for the better about two years ago, when Cathy connected with the Family Navigation Project (FNP) team at Sunnybrook. Within days, a family navigator at FNP found a residential placement with services and programs that matched her daughter's needs.

"We had exhausted all resources in our jurisdiction," she recalls. "By using FNP's navigation services, we were able to find this residential placement outside of our region. Their help made a huge difference."

Since launching in September 2013, FNP has helped more than 2,500 youth and their families, like the Walshes, find the health-care providers and programs best suited to their needs.

GROWING TO MEET DEMAND

The idea of FNP began with a group of families committed to make it easier for other families to get help for their loved ones. Over the years, the program has grown from two navigators to a team of 20, including an intake coordinator, a parent advocate with lived experience and 10 navigators – all working with Sugy Kodeeswaran, the executive director, and Dr. Anthony Levitt, the medical director. Navigators at Sunnybrook have diverse educational backgrounds and work experience, from social work to psychology to child development.

"Our goal since the project's inception has been to provide direction for patients and their families, and at the same time act as a beacon for education and the dissemination of health-care system information," says Dr. Levitt.

"We have excellent health-care services in this province, and there is a great deal of information available, but often people don't know how to access the services or what to do if things don't work out – or what to do if the youth themselves are not motivated to receive care. Too frequently the youth and their families get lost trying to understand and find resources in the system," he says.

Health-care navigation originated in New York in 1990 to help cancer patients, and in Canada programs have also largely focused on cancer care. However, at Sunnybrook, FNP was established to help families who have a youth dealing with mental health and addiction challenges.

As with any start-up, seed funding was essential to the early success of FNP. Sunnybrook was fortunate to partner with RBC to launch the program, and it has continued to provide critical support through the annual RBC Race for the Kids.

"There are so many reasons people don't talk about mental health or addiction, so it is often even harder for them to know what to do and what particular services to seek," Dr. Levitt says.

"That's why it's so important to have someone who can help ensure you're going down the right care pathway."

This means much more than just handing patients a list of health-care providers and asking them to sort out which to contact. Effective navigation requires in-depth knowledge of the health-care system and a dedication to understanding the unique needs of each client. It also requires empathy for families as they juggle the logistics of getting the proper care, while coping with the physical and psychological challenges of a serious illness, and their own health, family and financial issues.

"Navigation also involves 'getting in the boat' with families to make sure they really do connect with the services we provide as options," Kodeeswaran explains.

NAVIGATOR EDUCATION

FNP's first wave of navigators trained with Dr. Levitt, a psychiatrist, and with therapeutic placement professionals in the United States. Today, FNP has the depth of family navigation knowledge and experience to provide its own in-house training for new team members.

"Family navigators come into FNP with varied experience in supporting clients and families finding their way through the system. Even with this background, it takes several months of on-the-job training to become a skilled family navigator," Dr. Levitt says.

Their education doesn't stop there, adds Kodeeswaran.

"Our navigators are constantly learning from each other, learning about and sharing new resources daily," she says. "We have our finger on the pulse of the system, so our knowledge is real-time and not restricted only to a database. Our focus is being on the ground, finding out about programs and constantly sharing information with each other."

COLLABORATING WITH HUMBER

This commitment to sharing systems navigation knowledge expanded even further last year, when Toronto's Humber College reached out to FNP for help in developing a new Systems Navigator graduate certificate program.

Launched this past September with a cohort of 24 students, the one-year program – which combines in-class learning with 240 hours of field work – is designed to build skills for guiding patients and families through complex health-care and social care systems. Admission into the program requires a bachelor's degree or diploma in health, social and community service or other health-related or human-services field.

"When our committee came together to design the program, one of the first things we asked was, 'Does it have to be just health care? Or could it also address navigation needs in other systems, such as social, housing, Indigenous and criminal justice?'" says Colin MacRae, coordinator for Humber's Systems Navigator program.

Students learn how to work with interdisciplinary teams in hospitals, medical centres, community services organizations, correctional facilities and other public and private entities, all while keeping the needs of patients, clients and their families front and centre.

With three representatives at the table, Sunnybrook's family navigation team had a "large presence" on the Humber program development committee, MacRae notes. "After the committee was dissolved, we went back to Sunnybrook again and asked if any team members would be interested in helping us write the curriculum," he says.

When the program was ready for launch, FNP clinical and research staff stepped up to teach six courses: systems theory, health literacy, professional self-care, professional communication, strength-based approaches to service and a field-based internship.

"We were thrilled when the folks at Sunnybrook agreed to help us draw up and teach the program," MacRae says.

TEACHING AND LEARNING

For Miriam Blond, one of two Sunnybrook navigators now teaching at Humber, the opportunity to share her knowledge with future system navigators was too good to pass up.

She teaches a strength-based approach to service course, which she explains is a relatively new approach in the field of health. "It focuses on resilience and a positive approach to concerns, rather than focusing on pathology," says Blond. She came to family navigation from a background in social work and community mental health. "It's looking at what people can bring to a solution and what's working well for them that we can bring forward to achieve better outcomes."

Like the other courses in the program, Blond's teachings apply to systems beyond health care. But the students aren't the only ones learning from the program, she says.

"I'm also able to bring the theories back to Sunnybrook, which helps to improve our practice," she says. "My team has asked me to bring in academic material that we can use to review and evaluate our navigation model at Sunnybrook and potentially to translate into training material for our staff."

above: Cathy Walsh (left) in class with Sunnybrook navigator and Humber College instructor Miriam Blond (right).

"Navigation also involves 'getting in the boat' with families to make sure they really do connect with the services we provide as options."

Sugy Kodeeswaran, executive director, Family Navigation Project at Sunnybrook

CONTINUED EXPANSION

Patient navigation continues to expand, becoming part of the gold standard of care for chronic conditions such as cancer, diabetes, cardiovascular disease and mental illness – as evidenced by the creation of the Humber certificate program. Yet while the growing number of such programs means improved access to care for more patients, a lack of common standards for navigation itself could also lead to a fragmented navigation system in the future, says Dr. Levitt.

This is why Sunnybrook recently began speaking and working with stakeholders to explore building a system that ties together the disparate navigation services across the province.

"There's a need to create a cohesive system of navigation," Dr. Levitt says. "With our years of experience in family navigation, we'd like to contribute to this integration."

FULL CIRCLE

For Cathy, working with the FNP team at Sunnybrook has translated into a smoother journey through the health-care system and better solutions for her daughter. Cathy remembers how the navigator, having identified the right health-care facility, contacted the doctor in charge of the facility and explained her daughter's medical and care history.

"By the time we talked to the doctor and the facility staff, they had a good background of what we were coming for," says Cathy. "So it took away the stress of having to tell our story over and over again."

For Dr. Levitt, "Cathy's family journey is an example of how navigation is not simply about putting a bandage on a fragmented system, but rather that navigation is an integral part of an effective system. Navigation takes a family-focused approach to improve access to and transitions through the system, even when all the services are actually in existence. So there's lots to teach our community and lots still to learn."

For Cathy, her positive experience with FNP inspired her to pursue a new career.

After being out of the workforce for a decade, she had been thinking about rebooting her career but wasn't sure what she wanted to do. Then, a navigator at Sunnybrook mentioned the new program at Humber.

"I said to my husband, 'That's the program I've been waiting for,'" says Cathy, who has a psychology degree and work experience in the insurance industry.

"I applied that same day."

PHOTOGRAPH BY KEVIN VAN PAASSEN

Choosing wisely

Blood tests are crucial tools in diagnosing and treating illness. But when not medically necessary, too many blood tests can be too much of a good thing. These, and other medical tests, are being scrutinized at Sunnybrook in order to improve patient care and free up resources

BY CLAIRE GAGNE

No one likes being pricked with a needle for a blood test – especially when it's happening every day.

In September 2018, Stafan Williams was undergoing surgery at Sunnybrook to remove tumours caused by colon cancer. The 70-year-old Toronto resident spent four days in the hospital, and each day she had blood drawn.

"It didn't seem necessary," says Stafan of the daily tests. "Especially for a patient like me, who has low iron."

Daily blood tests are a familiar routine for anyone who has spent a significant amount of time in any hospital for surgery or another medical procedure.

But Dr. Jeannie Callum, a blood transfusion specialist at Sunnybrook, says that in many cases, daily blood tests have become a habit for doctors everywhere. "We get our coffee, then we check everybody's blood work results from that morning and then we go and see the patients," says Dr. Callum, who is also an associate scientist at the Sunnybrook Research Institute.

It would make more sense, she says, to check on the patient first, then perform only blood tests that are required for the patient's care.

Daily blood work is just one of the practices that are being scrutinized at Sunnybrook through an initiative called Choosing Wisely, a program that aims to improve patient care and free up resources. The premise is simple: Doctors should consider which tests and procedures are necessary to properly diagnose and care for a patient – and then make smarter choices about what's done.

With a more judicious review of the benefits of a test or procedure, doctors can reduce tests that offer little or no value to specific patients.

Choosing Wisely was started in the United States by the American Board of Internal Medicine Foundation in 2012, and the movement made its way to Canada in 2014. Dr. Adina Weinerman, a general internist at Sunnybrook, is leading the charge to implement significant changes around the hospital.

"We grew up with a North American culture in medicine that 'more was more,' and, as technology advanced, we started using it," says Dr. Weinerman, who also chairs the Choosing Wisely committee of the Canadian Society of Internal Medicine. "But now the pendulum has swung, where we're sometimes using things because they're available and not because they're necessary."

There can be a downside to unnecessary procedures for both patients and the hospital, Dr. Weinerman says.

PHOTOGRAPH BY KEVIN VAN PAASSEN

Because phlebotomists (the clinicians who draw blood) have so many patients to attend to, in some cases they have to wake patients in the middle of the night or early in the morning to have their blood drawn. It's a time-consuming process that can be uncomfortable for patients. Also, a surplus of routine blood tests can create a backlog in the lab where the blood is analyzed, delaying more urgent tests.

In some cases, too many blood tests can lead to patients developing anemia or requiring a blood transfusion. Transfusions can be risky procedures for any patient, and they can be problematic for patients like Stafan, a Jehovah's Witness whose religion prohibits blood transfusions.

Beyond blood tests, the initiative at Sunnybrook is reviewing the routine administration of other procedures such as computerized tomography (CT) scans.

Like blood tests, CT scans are invaluable tools that aid in the diagnosis of illness and injury. They provide images that are much more detailed than ultrasounds or X-rays. But they shouldn't be overused, Dr. Weinerman says. If a CT scan is administered unnecessarily, doctors may see something on the scan that appears abnormal, but never would have caused problems for that person.

"[Once] we see [those abnormalities], it leads to a snowball effect where we feel compelled to do more tests, like a biopsy," she says.

Patients may need to take time off work for unnecessary tests that might have been avoided if an ultrasound had been done instead of a CT scan.

Reducing unnecessary CT scans also cuts down on wait times for those who really need them, Dr. Weinerman notes.

"There's a finite number of resources and a finite number of hours in the day, and if we can reduce the number of medically unnecessary tests, that frees up those resources," she says.

The initiative at Sunnybrook has already shown the positive impact of reducing unnecessary tests. In 2017, Dr. Callum decided to tackle two high-volume blood tests: one a measure of kidney function, the other a liver test. Both are not needed except in very specific cases, she says, but doctors routinely order them.

Dr. Callum first held widely publicized "grand rounds" with hospital staff, where she and her team outlined the tests they wanted to reduce and why. Then, she ensured that these tests were not automatically included in the order sets for patients getting other kidney and liver tests done.

opposite page: Dr. Jeannie Callum, blood transfusion specialist at Sunnybrook.

After that, it was a matter of sending monthly emails to doctors who were still ordering these tests, unless their patients needed them.

Dr. Callum's efforts paid off. "Between 2017 and 2018, we reduced the volume of [these two] tests by 75,000, which was a 75 per cent reduction," she says.

In addition to reducing the total number of tests, Dr. Callum says they have decreased the amount of blood drawn for all blood tests.

"We switched the entire hospital to low-vacuum tubes for drawing blood," she says.

With low-vacuum tubes, about half the amount of blood gets drawn per tube. There is also less pressure on the blood that's drawn, leading to less of the sample becoming haemolyzed (when red blood cells become ruptured). Haemolyzed blood is unfit for testing, which subsequently leads to more blood having to be drawn.

"We've dramatically cut down on the amount of blood that we're taking out of a patient, which helps keep them healthy and fit," Dr. Callum says.

Efforts to improve the use of resources and patient care are ongoing, says Dr. Weinerman. So far, she has looked mostly at tests and procedures already identified by Choosing Wisely as most likely to be overused. But now she is turning to examples more specific to Sunnybrook, to see what changes can be made.

For her part, Dr. Callum has two new targets in mind: one is a routine heart muscle blood test that has been replaced by a newer and better test; the second is a blood test which assesses vitamin D levels.

In Canada, about half of all blood vitamin D measurements in healthy people are low, says Dr. Callum.

"In a healthy person without any serious diseases who eats a complete diet, there is no evidence that these low levels need any treatment – so why are we doing the measurement in the first place?"

How the brain listens

After cochlear implants allowed Gord Mason to hear again, he wanted to give back. The Mason Scientific Discovery Fund will investigate how the brain turns sound into signals, to improve implant results for all patients

BY DAVID ISRAELSON

Gord Mason, who has enjoyed a long and successful career as a homebuilder and businessman, loves to share how he regained the ability to hear.

Gord first noticed trouble with his hearing as a young man. It was the late 1950s, and he was training with the Royal Canadian Air Force. The training included being tested in a decompression chamber to simulate the thin atmosphere pilots encounter at 3,000 metres in the air.

"I thought my right ear was going to blow apart," Gord remembers. "It was killing me. They told me it was routine, but I ended up not going into the Air Force."

Gord's hearing difficulties continued after he founded his Stouffville, Ont.-based house and condo-building business, Mason Homes, in 1961.

"I used to travel a lot for business. I'd get off a flight and I wouldn't be able to hear until the next day," he says.

Progressive hearing loss over the next few decades affected Gord professionally and emotionally.

"You lose your confidence when you can't hear," he says. "I remember sitting down with four people, two on either side of me. They had a cross-conversation going. I'm sitting in between and I'm not getting anything."

Gord says he wouldn't realize that he was talking too loudly because of his hearing loss. He said he felt that could sometimes give the impression to others that he was angry or hot-tempered.

By the time Gord reached his 70s, he had lost much of his ability to hear the people and the world around him.

"It's hard, and it's especially hard when you're in business," he says.

Today, Gord hears quite well, thanks to dual cochlear implants he received from Sunnybrook's Cochlear Implant Program. He received his second implant last year, several years after the first ear.

Gord says for him, the ability to hear properly is life-changing.

"It gave me my confidence back. Now I can go to meetings and hear people at the other end of the table," he says. "And when I drive, I put on the radio. I listen to music!"

Gord's journey back to hearing – and greater happiness – meant so much to him that he decided to donate funds to establish the Mason Scientific Discovery Fund at Sunnybrook.

The fund's researchers are working to advance the science of cochlear implants, studying how the brain "listens" to sound and investigating why some implants are more successful than others.

"The Mason Scientific Discovery Fund will allow us to create a hub and bring researchers from different areas of electrophysiology and auditory science to innovate and find novel solutions to improve outcomes," says Dr. Joseph Chen, director of the Sunnybrook Otology-Skull Base Fellowship Program and provincial coordinator of the Ontario Cochlear Implant Program.

In cochlear implant surgery, which takes up to two hours, an electronic device is implanted into the patient's skull and inner ear, and the patient wears an external piece of the device behind the ear.

The implanted device stimulates the hearing nerve directly, bypassing damaged parts of the inner ear and sending signals directly to nerves connected to the brain.

After the surgery, the device must be calibrated with a computer, and it takes up to four weeks for it to start working at full capacity.

"It's a medical miracle that has actually outperformed our wildest dreams," says Dr. Chen, who began performing cochlear implant surgery at Sunnybrook in 1992. The Sunnybrook program is the largest in Canada, performing 200 implants every year.

Dr. Chen, who performed Gord's implant surgery, says that cochlear implants have traditionally been implanted in people who were completely deaf.

"Now I can go to meetings and hear people at the other end of the table."

Gord Mason

"Over time, we have learned that people with a bit of residual hearing can benefit the most," he says.

Adults with normal language skills who lose hearing later in life are perhaps the best candidates for cochlear implants, says Dr. Chen. Within this group, patients who are younger may have physiological and cognitive advantages to perform better.

But after 30 years of implant surgery, "what we have realized is that everything else being equal, the biggest impact to performance is related to the intensity of rehabilitation immediately after activation in the first six to 12 months of use," says Dr. Chen. "We are becoming more and more focused on this window."

Andrew Dimitrijevic is research director for the Cochlear Implant Program at Sunnybrook. He says the Mason Fund will enable researchers to study the interaction between cochlear implants and the nerves that translate sound into signals to the brain.

"We look at the brain waves of people who are hard of hearing and also of people who hear normally to see how the brain responds to sounds, including specific sounds such as speech and noise," says Dimitrijevic, who holds a PhD in neuroscience.

"It turns out that you need to reach the higher centres of the brain to understand and process speech," he says. "We hear with our ears, but our brain is where the listening takes place."

He explains that our brains store a "template" of sounds we have heard in the past that helps us understand what we're hearing. Cochlear implant patients may not have heard these stored sounds for years, or ever, so they must build new connections between what the implants allow them to hear and how the brain listens to these sounds.

"We're trying to understand these connections better, so we can improve how patients hear," Dimitrijevic says.

The research is endlessly exciting to Gord.

"I'm funding an idea," he says. "And when I talk to Andrew and hear his excitement, I'm convinced there's something [big] coming."

While hearing has made him more productive at work, Gord says the subtle joys are perhaps the most satisfying.

"Shortly after I had the second implant, I stayed late at the office. I came outside around 7 p.m., and I heard something strange," he says.

It was a gentle noise that Gord could not recall ever hearing before.

"It was a soft rain," he says. "It was such a pleasant sound."

PHOTOGRAPH BY DOUG NICHOLSON

opposite page: Gord Mason supports cochlear implant research, so more patients can fully benefit from the device.

FINER DINING

Hospital food has long had a bad reputation, but Sunnybrook is leading the charge to change that perception.

With a new production kitchen, customized menus, the guidance of nutrition experts and an executive chef at the helm, in-patients now have every reason to clean their plates.

Sunnybrook's "Fresh Flex" menu is tailored to fit patients' needs, within a wide range of culturally diverse dishes. Patients submit their food preferences, then meals are personalized in compliance with their medically prescribed diet. Most recipes are made from scratch on-site in a newly renovated kitchen.

Sunnybrook's first executive chef, Serge Kostenko, and a team of experienced cooks manage every step of the process.

Fresh meal items and more choice may be welcome perks for patients, but there's another important benefit: they can boost recovery. Research shows that providing quality nutrition can accelerate the healing process and can decrease a patient's length of stay.

For overall health and happiness, good food matters!

Monica Matys

PHOTOGRAPHS BY KEVIN VAN PAASSEN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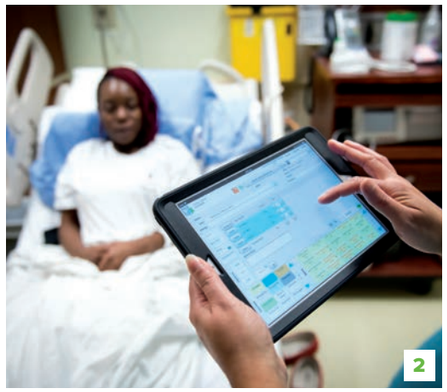
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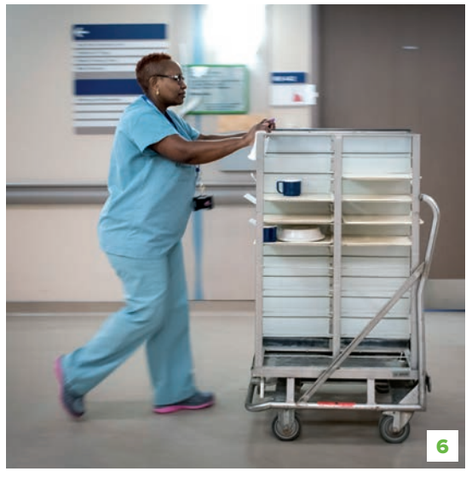
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1 THE PRODUCTION KITCHEN

Sunnybrook's newly renovated space is brimming with fresh ingredients and cutting-edge equipment. Recipes for the dishes are formulated in an off-site test kitchen to ensure they can be replicated on a larger scale.

2 MEAL SELECTION

Inpatients are offered a customized selection of dinner choices, which they preorder on iPads brought to their bedside.

3 THE PERSONALIZED TICKET

Each order generates a ticket, which tells kitchen staff exactly how to customize each meal. Approximately 3,000 meals are prepared daily.

4 TRAY ASSEMBLY

Freshly cooked items are assembled on each patient's tray one meal in advance.

5 FINAL PREPARATION ON THE UNIT

Meals are transported from the kitchen to each patient care unit, where specialized equipment reheats each tray to a specific preset temperature.

6 DISTRIBUTION TO PATIENTS

Customized dinner items are delivered to each patient's room.

7 BON APPÉTIT

Patients tuck into their meals at their bedsides. After dinner, patients are encouraged to provide feedback. This survey information will help inform future menu choices.

Road to recovery

When Brenda Coulter got into her car in June 2014, she never could have imagined the long, challenging journey that lay ahead.

While she was driving to work along Highway 403, a piece of metal – likely from a truck – flew up and smashed through Brenda's windshield. It sheared off most of her face, irreparably damaging her left eye.

More than a dozen surgeries followed to rebuild Brenda's skull and facial bones, which are now three-quarters titanium.

To fill her empty left eye socket, Brenda was fitted for an adhesive prosthesis. But with limited vision in her existing eye, gluing it into place was a long and finicky process that often ended in failure.

"Without my prosthesis, people would stare and ask difficult questions," she says. "But there were many days I couldn't get it on properly, so I would give up and just stay home."

Two years ago, Brenda learned she was eligible for treatment in the Craniofacial Prosthetics Unit, an innovative program offered through Sunnybrook's Department of Dentistry. Following a rigorous planning process, head and neck surgeons implanted specialized screws into the delicate bone around her eye. After several months of healing, they were able to secure magnets into her eye socket. Then, specialists met with Brenda again to begin fitting and sculpting her new prosthesis.

In a process where medicine and artistry intersect, the team builds lifelike eyes, ears and noses for patients with congenital facial differences or who have survived illness or trauma.

For Brenda, the result was a perfectly fitted eye prosthesis that, thanks to the magnets, snaps precisely into place.

"I'm thrilled with the results, which are so natural," she says. "It's nice to interact with people again. Interaction as opposed to reaction."

Brenda says putting on her new eye is easier than putting on a pair of earrings.

"I just snap it on, and wow, my face is whole. I've finally reached the light at the end of the tunnel."

For more information, visit sunnybrook.ca/BrendaCoulter

Monica Matys

PHOTOGRAPH BY KEVIN VAN PAASSEN

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