

Sunnybrook

SAVING LIVES, ONE INNOVATION AT A TIME

COVID-19

A look inside Sunnybrook
during the early days
of an unprecedented
global pandemic

plus

FOCUSED ULTRASOUND TO
TREAT SEVERE OCD

ONE MAN'S REHAB JOURNEY
AFTER SURVIVING
'FLESH-EATING DISEASE'

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IN COMMUNITY HOUSING



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Respiratory therapist Julie Nardi cares for a patient in one of Sunnybrook's dedicated COVID-19 units
PHOTOGRAPH BY KEVIN VAN PAASSEN

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Sunnybrook nurse Terri Roberts in full personal protective equipment (PPE) during the COVID-19 pandemic. PHOTOGRAPH BY KEVIN VAN PAASSEN

A MESSAGE FOR OUR SUPPORTERS

Unprecedented. This word has been used countless times to describe COVID-19. But Sunnybrook's response to the pandemic has been equally unprecedented.

As president and CEO of Sunnybrook, I have witnessed many acts of bravery, kindness and ingenuity. I am proud of all those who continue to perform at the highest level for our patients when it matters most.

On my daily walk to work – a 7-kilometre act of self-care I've come to cherish – I have passed signs in support of health-care and front-line workers.

But it's not just the signs that give me hope.

It's the acts of generosity that showcase the strength of our social fabric and giving spirit in the face of adversity. From providing meals to front-line staff to creatively raising funds for research and equipment, thousands of individuals and businesses have also offered their support.

We are fortunate that Team Sunnybrook used lessons from SARS in 2003 and prepared for a situation like this prior to the pandemic. The preparation allowed us to successfully care for the first Canadian COVID-19 patient, diagnosed at Sunnybrook on January 25, 2020, and many patients since then.

In the months following that first diagnosis, our scientists have been at centre stage in trying to combat this disease. They were part of a team to first isolate the COVID-19 virus, enabling researchers across the world to search for treatments and investigate how the virus is spread. They are also leading several international clinical trials to determine better ways to treat COVID-19.

On behalf of all of us at Sunnybrook, I want to extend a sincere thank you to our patients, families, generous donors and dedicated staff.

Take care and be well,

Andy Smith, MD, MSc, FRCSC, FACS



President and CEO
Sunnybrook Health Sciences Centre



Dr. Andy Smith (right), here with Ingrid Daley, an advanced practice nurse, distributes meals to Sunnybrook staff

Sunnybrook

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We are Sunnybrook

BY ISHANI NATH



the
STROKE
NEUROLOGIST

Endless curiosity

When stroke neurologist Dr. Amy Yu isn't at Sunnybrook caring for patients and conducting groundbreaking research, she makes playtime a priority. A mother of two children aged six and seven, Dr. Yu says their endless curiosity inspires her work.

"To children, everything is so new and fresh and interesting," she says. Witnessing the world through their eyes motivates her to always keep an open mind.

For instance, Dr. Yu showed in a recent study that men and women experiencing a minor stroke or transient ischemic attack (a temporary blockage of blood flow to the brain) are both frequently and equally likely to report symptoms not typically thought to be stroke-related, such as dizziness, tingling or confusion. This finding is contrary to prior work suggesting women may be more likely to

report atypical symptoms.

"Our biggest message for clinicians is to consider a diagnosis of stroke even when there are atypical symptoms, because a stroke is a medical emergency," she says.

Dr. Yu is also investigating the accessibility of new therapeutic options for stroke. For example, she's leading a research team to better understand the accessibility and effectiveness of endovascular thrombectomy (EVT) in hospitals across Ontario. EVT is a new treatment that involves removing blood clots from blocked blood vessels in the brain. This research is funded by a \$1.3-million grant from the Canadian Institutes of Health Research.

In her clinical practice, Dr. Yu sees the difference research can make for her patients. Just like her children, Dr. Yu's curiosity is driving her to learn more.

"I want to improve lives affected by stroke and help people get back to doing the activities they enjoy."

Home away from home

To 85-year-old hospital volunteer Elaine Kowalchuk, Sunnybrook's St. John's Rehab is more than a leader in rehabilitation. "It's where miracles happen," she says.

In her 40 years of volunteering, Elaine has seen the impact of the program's holistic approach to recovery. She recalls one patient from her earliest days of volunteering who had arrived on a stretcher following a boating accident.

"After a few months, I remember seeing her walk out the front door. It was one of my first times really seeing how St. John's Rehab heals the whole patient – mind, body and spirit. It had such an impact on me," says Elaine, who has travelled the Road to Recovery, the aptly named street leading to St. John's Rehab, too many times to count.

One of more than 1,200 volunteers across Sunnybrook's three campuses,

Elaine is a self-described "people person." She first volunteered in the gift shop at St. John's Rehab, before lending a helping hand in the health records department and running the lottery desk. "We're not there just for selling tickets," she's quick to say. "We're there to be with the patients."

As much as Elaine supports St. John's Rehab, this close-knit community has also helped her. Elaine began volunteering shortly after losing her daughter to osteogenic sarcoma, the same cancer Terry Fox had. In the years that followed, she lost her husband and son to cancer – and she credits the patients and staff she met while volunteering with helping her through that difficult period.

"I don't think I could've survived without St. John's Rehab in my life," Elaine says.

"I come out after volunteering much better than when I went in. I give a lot, but I get a lot, too."



the
VOLUNTEER



Big-picture thinking

Dr. Harindra Wijeyesundera's work involves the tiniest details. As an interventional cardiologist, he diagnoses and treats structural heart diseases using novel devices small enough to fit inside a heart valve.

But he never loses sight of the big picture.

"Each aspect of my work informs the other," says Dr. Wijeyesundera.

At Sunnybrook's Schulich Heart Program, Dr. Wijeyesundera is part of a team that leads the country in minimally invasive treatments for patients, many of whom cannot withstand open-heart surgery. Among his specialties is the transcatheter aortic valve implant (TAVI) procedure, which involves repairing the aortic valve, responsible for pumping blood to the heart. Dr. Wijeyesundera threads a catheter through a small incision in the leg up to the heart, then deploys a mesh replacement valve in

the narrowed aortic valve, relieving shortness of breath and chest pain often immediately.

When Dr. Wijeyesundera isn't treating patients in the catheterization lab, he leads an impressive research program that evaluates how health technologies like TAVI can be used to treat even more patients.

"As physicians, we have responsibilities to the patient in front of us, but we also have bigger responsibilities as caretakers of the health-care system," he says.

Dr. Wijeyesundera and his team analyze large amounts of data involving patients who have received devices like TAVIs in order to put forward policy recommendations to key provincial decision-making groups about how such life-saving technologies can be optimized for more patients across the health system. His efforts have been recognized with multiple awards, including his most recent honour, the Distinguished Clinician Scientist Award from the Heart and Stroke Foundation of Canada.

Increasing access to care

Kim Nguyen always wanted to work in health care, but wasn't sure what role was the right fit.

"I knew I wanted to do hands-on work and build relationships with people," Kim says.

When she heard about physician assistants (PAs), Kim was intrigued. The role was introduced to Ontario's health system a little over a decade ago to help patients access care in high-need areas, such as emergency medicine, to improve the quality and safety of care and to shorten wait times.

PAs work alongside doctors, nurses and other members of an interprofessional health team. They take histories, conduct physical exams, order and interpret tests, diagnose and treat illnesses and can assist in surgery. They provide care where demand is highest.

Kim is one of more than

200 PAs working across the province. Recently, she helped develop and implement Sunnybrook's new Medical Oncology Urgent Care Pilot project to expedite care for some cancer patients outside of the emergency department.

Kim was reminded of the importance of her work when a patient she first met in an outpatient clinic later was referred to the urgent care clinic complaining of headaches. Thanks to the pilot project, Kim was able to assess the patient quickly, reducing his wait time. She conducted his physical exam and ordered tests, which revealed that his cancer had unfortunately spread. It was a difficult situation, but the patient was grateful to Kim and her team for the quick diagnosis.

"He said it also helped to have a familiar face to help him through the process," says Kim. "I'd like to think that made a little bit of a difference during this difficult time."





the
OCCUPATIONAL
THERAPIST

Healing connection

Estella Tse has worked with patients who have life-changing injuries for 30 years at Sunnybrook's Tory Trauma Program. She knows recovery rarely follows a straight line.

The healing process is a puzzle, Estella says, and her role as an occupational therapist (OT) involves finding the missing pieces that keep patients motivated as they regain a range of essential everyday skills.

"More than fixing a limb or teaching a skill, it's about bringing possibility into people's lives," she says.

Estella decided to pursue a career in this field after watching an OT interact with children with cerebral palsy, a movement disorder. "The OT connected with the kids by making them laugh and structuring playtime in a way that improved how they could move and what they could do," says Estella. "I saw the value of truly connecting with patients."

It is a lesson that continues to inspire Estella. She remembers one patient over a decade ago who was devastated to be missing a Pearl Jam concert because of the severity of his injuries. Estella and her team co-ordinated a shout-out for the patient on the radio. When the band heard about their efforts, they sent signed paraphernalia.

"It was so empowering to the patient to feel engaged and recognized in this way. It gave him hope," says Estella. "He realized he could find joy again in the things he loved."

Enabling meaningful recovery is a team effort for Estella. Her efforts to shape the next generation of OTs were recognized with the 2020 Exceptional Fieldwork Teaching Award, the University of Toronto Occupational Therapy Department's highest honour.

No matter the obstacle, she says, "If we put our heads together, there must be a way."

Breaking barriers

Dr. Agessandro Abrahao's research at Sunnybrook is breaking barriers he never thought possible.

Driven to improve treatments for neurodegenerative diseases, the investigator's focus is amyotrophic lateral sclerosis, or ALS, which slowly robs patients of their ability to walk, talk, eat and eventually breathe.

Multiple clinical trials have failed to find treatments. But as the world's first neurologist formally trained in focused ultrasound, Dr. Abrahao is coming at the disease from a different angle.

Focused ultrasound (FUS) uses a thousand beams of sound to treat targeted areas of the brain and body. As part of his research, Dr. Abrahao is harnessing the power of FUS at Sunnybrook's Harquail Centre for Neuromodulation to potentially deliver therapeutic agents to the brains of patients with ALS.

Sunnybrook researchers have demonstrated FUS can safely and temporarily open the brain's protective

layer. "The blood-brain barrier represents a major obstacle for the effective delivery of promising therapeutics," Dr. Abrahao says. "FUS may one day help to provide direct-to-brain treatments for patients."

Dr. Abrahao and his mentors Dr. Lorne Zinman, director of Sunnybrook's ALS Clinic, and Dr. Nir Lipsman, director of the Harquail Centre, were the first to use FUS to open the blood-brain barrier in patients with ALS. "We accomplished another world first in this trial using focused ultrasound to safely target the motor cortex, a part of the brain affected by ALS," says Dr. Abrahao.

Dr. Abrahao's research will also investigate FUS as a possible treatment option to help alleviate hand tremor in patients with multiple sclerosis. As his research continues, Dr. Abrahao draws inspiration from the bravery of patients who are helping make history.

"I came to Sunnybrook in 2015 to help make a difference for patients and their loved ones," he says. "This research promises to be nothing short of game changing."



the
NEUROLOGIST



If you want to give more than thanks

At Sunnybrook, something life-changing happens every moment, and sometimes words aren't enough to express your feelings of gratitude.

If you'd like to give thanks for the special care you received, recognize your Champion of Care by making a donation in their honour.

Hospital Notes



The Sunnybrook trauma team takes part in an “in situ” simulation, meaning it takes place in the true environment

TRAUMA SIMULATIONS LEAD TO REAL-LIFE LEARNING

One morning each month, Sunnybrook’s trauma team receives an urgent emergency page about an incoming patient. It could be someone with a gunshot wound, a brain injury or a major pelvic fracture. They’ve been rushed to the largest trauma centre in Canada to receive life-saving treatment, and it’s all hands on deck.

The team’s leader, surgeons, nurses, residents, respiratory therapists and others race to the trauma bay. But when they arrive, they’re not met with a person in serious distress. Instead, there’s a high-fidelity mannequin on the stretcher.

It looks human; however, it’s actually a prop used for simulation-based training.

The mannequin can blink. Its

pupils dilate. It is linked to a monitor showing its vital signs. It may even have a head wound to prompt the team that a head bleed may be present.

While simulated learning has been practiced for many years at Sunnybrook, the new “in situ” simulations are conducted in the actual trauma bay of the emergency department, rather than in a lab or SIM centre away from everyday equipment and where real trauma patients are treated.

“The element of surprise is important,” says Dr. Luis da Luz, a surgeon, head trauma team leader and a member of Sunnybrook’s trauma research group. Although the simulation session is always in the morning, when real trauma cases are less common, no one except the simulation organizers

know what to expect when they reach the bay. The lesson takes about 30 minutes and the team gathers immediately afterward to debrief and troubleshoot for another 30 minutes.

For instance, during the simulation they might discover that their intraosseous insertion kit (for administering medication and fluids directly into bone marrow) was kept locked in a cabinet away from the trauma bed, creating a two-minute delay.

“Two minutes in a life-threatening situation is too long,” says Dr. da Luz. “We’re able to identify problems and resolve them, so the team is more prepared to act when a real trauma comes. That’s the beauty of the thing.”

Kira Vermond

MONITORING YOUR HEART FROM FAR, FAR AWAY

In March 2020, cardiac electrophysiologist Dr. Benedict Glover, director of arrhythmia services in Sunnybrook's Schulich Heart Program, implanted a medical device into a patient to help control his heart function. But instead of asking the man to return for a three- or six-month checkup, Dr. Glover signed him up for a new service: remote device monitoring.

This method of community-based care allows heart specialists to keep tabs on implantable medical devices like pacemakers and defibrillators – no physical clinic appointment required.

For the patient, that decision was a godsend. He had just driven almost three days with a friend from his home outside Thunder Bay, Ont. Returning for frequent follow-ups would have been a challenge.

"We forget sometimes how massive Ontario is and that we get referrals from all over the province," says Dr. Glover. "A lot of follow-ups can be done remotely."

Even heart patients in Toronto can benefit. With remote monitoring, patients connect their pacemaker or defibrillator via Bluetooth to a small

receiver in their home that downloads real-time, encrypted data and transmits it to Dr. Glover's clinic. Staff check that information each morning, looking for abnormalities.

This ongoing diagnostic monitoring is more likely to lead to earlier interventions, Dr. Glover says. It can also mean fewer visits to the emergency department.

"The world is changing, and we are all moving to more remote systems for patients," he says. "The more data we can get, the better."

Kira Vermond



'A lot of follow-ups can be done remotely.'

Dr. Benedict Glover

AFTER A HIP OR KNEE REPLACEMENT: WHAT'S NORMAL?



According to Sunnybrook-led research, many Ontario patients are unsure of how much pain and swelling to expect after a joint replacement surgery. These "worried well" patients often end up in Ontario's emergency rooms.

Yet many can be treated remotely or as outpatients, says Dr. Bheeshma Ravi, an orthopaedic surgeon at Sunnybrook's Holland Centre, who examined

provincial-wide data about ER use within 30 days of a hip and knee replacement surgery.

"A lot of the times, patients are going to the emergency room for things they don't need to," says Dr. Ravi.

Sunnybrook's **myHip&Knee** app, available for phone or tablet, helps patients stay on top of their symptoms after surgery.

Kira Vermond

WHEN SHOULD YOU VISIT THE ER?

● GREEN LIGHT – Stay home and rest

If you experience ...

- Pain that gets worse once home
- More pain at the end of the day or after activities
- Some bruising and swelling at the surgical site
- Numbness around the incision
- Fatigue

● YELLOW LIGHT

Call surgeon's office or hospital immediately

If you experience ...

- Increased redness, swelling or sudden bruising
- Wound draining and soaking the bandage
- Less range of motion, despite exercising
- A bad odour, or yellow drainage from the incision site
- Fever, chills and night sweats

● RED LIGHT

Visit your nearest emergency room

If you experience ...

- New or worse chest pain
- New or worse trouble breathing
- Sudden, intense belly pain
- Fever over 39 C



SUNNYBROOK'S GIFT SHOPS

BY THE NUMBERS

SMALL WAYS TO BRIGHTEN A PATIENT'S DAY

Since 1967, the gift shops and retail vendors at Sunnybrook have offered an expansive array of products to satisfy, and surprise, shoppers of all ages and walks of life.

These spaces are redefining the idea of retail therapy. Each gift gives back, with profits helping fund patient comfort and care initiatives. For example, 3,100 free bowls of soup were provided to patients in the Odette Cancer Centre in 2019.

Here are some facts and figures:

100 Approximate number of volunteers who assist in the shops annually



16-96

Age range, of volunteers who assist in the shops

2,000*

Flowers sold

the top
seller!

533*

Lip balms sold

13,300*

Units of clothing sold

1,275*

Reading glasses sold



83

Original works
of art sold in 2019

100

Number of resident
Veterans who make
items by hand, such as
ceramics and paintings

Learn more, and shop online, at
GIFTSHOP.SUNNYBROOK.CA

Monica Matys

*Sold annually. Facts and figures
are approximate averages.

NEW TEST HELPS IDENTIFY DANGEROUS PREGNANCY COMPLICATIONS



Adele Savarie (left) being
examined by Dr. Dini Hui,
maternal fetal medicine
specialist at Sunnybrook

A pregnancy can bring excitement, but for some moms-to-be, that precious time can lead to something far more ominous: preeclampsia.

This serious condition, which causes symptoms such as hypertension (high blood pressure) and swelling in legs, feet and hands, can lead to kidney and liver problems and, in some cases, fatal complications for mother and baby.

The diagnosis of preeclampsia can be challenging, as many of its nonspecific symptoms can be commonly experienced in healthy pregnancies. Further still, the diagnosis can be complicated for those with pre-existing hypertension or chronic kidney disease.

In February 2020, Sunnybrook became the first hospital in North America to use a new assay, or blood test, in clinical care to diagnose preeclampsia in a pregnant woman with chronic kidney disease.

It was an important step in helping doctors diagnose preeclampsia more accurately, part of Sunnybrook's ongoing efforts to bring precision medicine and individualized care to patients.

By looking at the imbalance between proteins secreted by the placenta, the blood test can be used as a triage tool, separating patients who are very likely to have preeclampsia, or to develop it within the next seven days, from those at lower risk.

Dr. Nir Melamed, a maternal fetal medicine specialist at Sunnybrook, and Chief of Medicine Dr. Michelle Hladunewich have since witnessed the incredible value of this new test in more patients.

One patient with severe kidney disease went on to develop worsening hypertension during her pregnancy. The blood test allowed the team to tease out the truth behind the patient's worsening hypertension.

"Because her test came back normal, it gave us some assurance that it was unlikely to be preeclampsia," says Dr. Melamed, lead researcher, who worked together with Dr. Hladunewich on the year-long Roche Diagnostics-funded study involving the blood test. The patient was given blood pressure medication and induced at 37 weeks – a full-term delivery.

Since then, the blood test has helped identify another patient with borderline blood pressure, who was actually at very high risk of preeclampsia. She was admitted – and developed severe preeclampsia 48 hours later. The baby was delivered quickly and safely in hospital.

"This test can help us avoid unnecessary interventions, but also help us find very sick patients," Dr. Melamed says.

Several other medical centres have contacted the team to learn from their experience. "The introduction of this blood test really puts Sunnybrook at the forefront of individualized medicine," Dr. Melamed says.

Kira Vermont

ED ONE TEAM FIGHTS 'HALLWAY MEDICINE'

On Thanksgiving weekend in 2019, a senior arrived at Sunnybrook's emergency department with rib fractures after suffering a fall. She was in stable condition, but needed a new walker to get around. So, the woman was admitted.

The problem? No available beds. "She spent the whole weekend with us in our hallway in emergency," remembers Will Thomas-Boaz, advanced practice nurse for Sunnybrook's emergency department and trauma program.

Fortunately, change was already in the works to address this all-too-common problem. Sunnybrook had begun developing a new team of emergency department health-care workers with one main goal: helping seniors avoid long stays in the hospital by giving them the

supports they need to go back home to the community safely.

On October 28, 2019, Sunnybrook launched the ED One Team. In its first five months, the team showed a decrease of 323 admissions, or 2.1 per day, compared to the same time period the previous year, says Thomas-Boaz, who develops quality improvement initiatives with ED One.

The ED One Team consists of both a hospital and community social worker, geriatric emergency medicine nurse, physiotherapist, occupational therapist, community care coordinator, psychogeriatric case manager, a community mental health specialist and staff from home-care service agencies. After a daily huddle to discuss cases, they usually work with an average of eight to 10 patients a day.

To further support seniors care, the ED One Team works together with the Slaight Senior Care Navigation Pilot, a project supported by the Slaight Family Foundation Seniors Fund. The pilot places a trained navigator from SPRINT Senior Care in Sunnybrook to help facilitate safe discharges into the community.

Natalie Coyle, the ED One Team coordinator, says using a holistic, team-based approach to patient care makes all the difference. She pulls up a letter from one patient, Terry, a senior living alone who arrived in emergency with a hip fracture. ED One Team members ordered his new walker, helped him learn how to use it, made sure he could easily return to his home in community housing and scheduled a home cleaning, too.

"I'm a very proud person and I've never accepted this kind of help before, but she really made me feel safe and was always pleasant and professional," he wrote of his experiences with the ED One psychogeriatric case manager.

With a high number of seniors in the community, the ED One Team will be kept busy, but that's precisely the point.

"Now that we have [ED One], I can't imagine not having it," says Coyle.

Kira Vermond



Members of the ED One Team (from left): Will Thomas-Boaz, Lisa Chang, Val Soper, Judith Keen-Bingham, Anne Moorhouse, Nadine Narain, Solmaz Dehghan, Faith Gallant, Belinda Wagner, Jasmine Segal



A NEW WAY TO COMBAT ALCOHOL USE DISORDER SHOWS PROMISE

A team at Sunnybrook is investigating whether deep brain stimulation (DBS) can someday be used to treat the toughest cases of alcohol use disorder (AUD), a chronic brain disease characterized by compulsive alcohol consumption. DBS has long been used to manage movement disorders, such as Parkinson's disease and essential tremor.

In a North American first, Sunnybrook's Phase 1 trial is examining the safety and effectiveness of DBS for treatment-resistant AUD, where conventional therapies such as psychotherapy and medications have not worked for a patient. In DBS, the team surgically implants two electrodes in the region of the brain that controls reward processing. That area, called the nucleus accumbens, tends to be overactive in those

unable to resist the urge to drink. By stimulating it, the activity decreases.

"Study participants have described that when they do drink, it's not as pleasurable as before. It's more of a chore," explains Dr. Peter Giacobbe, associate scientist at Sunnybrook and the trial's psychiatric lead. "As a result, they can break the shackles of alcohol."

So far, four people have undergone the procedure and two more are enrolled in the trial. The team received permission to expand the trial to 10 patients after one of the first patients to take part, celebrated Canadian microbiology researcher Dr. Frank Plummer, went public about his encouraging results in late 2019.

"We had a huge burst of interest and potential referrals to the study," says Dr. Nir Lipsman,

a neurosurgeon and scientist at Sunnybrook and the trial's co-principal investigator.

(Sadly, Dr. Plummer passed away in February 2020 after suffering a heart attack unrelated to this treatment.)

If the trial eventually shows DBS to be effective for AUD, Dr. Giacobbe says he hopes it helps de-stigmatize mental illness and addictions.

"It may help people realize these are disorders of the brain, not dissimilar to Parkinson's or epilepsy," he says. "An approach like this can potentially help relieve the suffering of millions."

Kira Vermond



Top:
The late
Dr. Frank Plummer
(pictured here with
his wife Jo Kennelly)
was one of
the first patients
to take part in the
Phase 1 DBS trial

Above:
Dr. Clement Hamani,
pre-clinical lead
of Sunnybrook's
Harquail Centre for
Neuromodulation,
and nurse
Caroline Johnson
are part of the team
performing a deep
brain stimulation
procedure

INSIDE SUNNYBROOK'S PANDEMIC RESPONSE

When Canada's first case of the novel coronavirus, COVID-19, was confirmed in a patient at Sunnybrook on January 25, 2020, the hospital was preparing for a potential pandemic.

In the months since, Sunnybrook's teams have worked tirelessly through stress, fear, uncertainty and a fundamental shift in the way health care is delivered.

To recognize the strength and resiliency of our staff, physicians, researchers, students, volunteers, and patients and their loved ones, these photos offer a brief glimpse into the hospital during the early months of the pandemic, from March to May 2020.

By Sybil Millar and Monica Matys
Photography by Kevin Van Paassen





Two dedicated COVID-19 units opened in anticipation of a potential influx of patients requiring intensive care and respiratory support, with staff members from across the organization volunteering to work on the units. Here, the medical team on one of these units prepares to reposition a patient with COVID-19 onto their stomach. The technique, known as proning, helps critically ill patients breathe by allowing more oxygen to enter the blood.

Opposite page, from left to right: (top row) Subramaniam Vivagananda, Brenda Mayer; (second row down) Jennifer, Ekta Gupta; (third row down) Paulette Reece, Dr. Vikas Bansal, Marisa Moore, Hammad Aqeel; (bottom row) Thusi Thuraiamy, Sima Zendegany, Julie Nardi, Elsa Galiangan



From January to early March, patients who were experiencing respiratory symptoms arrived at Sunnybrook's Emergency Department in increasingly large numbers to be tested for COVID-19. To help alleviate that pressure, a space elsewhere in the hospital was renovated to become Sunnybrook's COVID-19 Assessment Centre. Here, three nurses screen one of the first patients to arrive at the Assessment Centre on March 17, its first day of operation.



A staff member in one of the dedicated COVID-19 units takes a moment to rest as patient volumes increased in April.

Environmental services team member Angela Corsaro sterilizes a patient room in the critical care unit. Each room requires a two-step cleaning process to ensure it is properly disinfected, and safety officers check the personal protective equipment of the environmental services team members to ensure they stay safe while doing so.



Physiotherapist Karen Montgomery holds a patient's hand in the critical care unit.





As nurses working on the dedicated COVID-19 units were redeployed from across Sunnybrook, not all of them had previous experience working in an intensive care unit (ICU) setting. To help familiarize them with the unique demands of ICU nursing, the units implemented the hub model: an ICU nurse is paired with another nurse, and together, they care for two patients as a team.



After three weeks in acute care with COVID-19, and another two weeks in a rehabilitation unit, Serena walks out of Sunnybrook's St. John's Rehab on May 6, 2020. Rehabilitation is an important step in the recovery process for many patients with COVID-19, whose muscles can weaken after being confined to a hospital bed for weeks. Seemingly simple tasks, like bathing and getting out of bed, can be difficult to do unassisted. Intensive physiotherapy and occupational therapy helped make those tasks possible again for Serena.



Vascular access nurse Adriana Ortiz Gonzalez visits Sunnybrook's chapel for a moment of quiet reflection.



With the barbershop at the Sunnybrook Veterans Centre closed because of the pandemic, registered nurse Roya Khudayar — a hairdresser in her former life — gives WWII Veteran Paul Murphy his first hair-cut in months.

To see more photos, go to SUNNYBROOK.CA/COVID19/PHOTOS

A breakthrough in the BATTLE AGAINST COVID-19

On March 10, 2020, Sunnybrook microbiologists Dr. Samira Mubareka and Dr. Rob Kozak were part of a team who isolated SARS-CoV-2, the virus responsible for the COVID-19 pandemic. Mirjam Guesgen spoke to these two researchers about how they did it and what isolating the virus means for science and the future of the outbreak

Q: What does it mean, isolating the SARS-CoV-2 virus?

Dr. Samira Mubareka: Essentially, isolating a virus means it has been cultured or propagated from an original sample, in this case from clinical specimens collected from patients presenting with signs and symptoms of COVID-19. This work was done in a high-containment lab, because SARS-CoV-2 is a higher risk virus compared to some of the more common ones we work with, such as influenza virus.

Dr. Rob Kozak: The nice part about virus isolation is that the virus does most of the hard work. What we do is take some liquid media from a tube that has the patient swab – in this case, from a nasal swab – and put it onto a cell line. These are basically cells used by research labs that are continuously replicating. The virus needs cells to grow. Then we just wait and look for the cytopathic effect, where the virus is breaking apart or killing the cell, and we can visualize this with a microscope. Then, you confirm the virus's presence with a molecular test.

The hardest part on our side was just the patience. You're sitting there biting your nails, waiting for it to work.



Sunnybrook microbiologists Dr. Rob Kozak (left) and Dr. Samira Mubareka

Q: What can you do now with the isolated virus?

Dr. Mubareka: Now we have a tool we can use to pursue other research. We can look at the efficacy of antivirals or vaccines, or how good diagnostic tests are. You can't really do any of that if you don't have the virus. Viruses are like small molecular machines, and it is essential to understand how all parts of the virus interact with each other and with parts of the host cell.

Dr. Kozak: The more we understand about the virus, the more we understand about how it causes disease. If we better characterize how the virus replicates, we can figure out points in its life cycle that antivirals could target. We also need to have the virus if we're going to do vaccine-challenge experiments. That's where you vaccinate a preclinical model and then you wait for it to build up its immune response, then you give it the SARS-CoV-2 and see if the vaccine has provided protection.

Dr. Mubareka: One of the other things we're focusing on quite a bit now is doing whole genome sequencing of the virus.

Q: Why is it important to genome sequence the virus?

Dr. Mubareka: We know the virus is passing from person to person, but we don't know all the details about how the virus might change during that process. We need to know what the virus looks like right now for a couple of reasons. For one, once we start vaccinating people, we don't know how the genetic code of the virus might change, so genome sequencing is



important for surveillance to detect changes that may affect vaccine efficacy.

It is also possible that there are some subtle differences in parts of the virus that trigger different antibody responses. So if, for example, there are some differences in Canadian viruses versus ones from Europe or Iran, it would be good to be able to make sure that a vaccine will neutralize the virus that's in circulation in each of those places. It is also key to understanding viral transmission and to investigate outbreaks.

Q: Tell us a bit about the collaborations Sunnybrook is involved in.

Dr. Kozak: We had a lot of support and advice from a number of different international collaborators. I reached out to colleagues in China and Australia who were kind enough to share tips and tricks, which I think was incredibly helpful.

Dr. Mubareka: We also worked with in collaboration with Dr. Arinjay Banerjee from McMaster University. He brought quite a bit of expertise to the table, because he'd done his PhD on Middle East respiratory syndrome-related coronavirus (MERS).

Since isolating the virus, we've sent it to a number of other containment labs in Hamilton, London, Montreal, and we anticipate sending it to Vancouver and Calgary. We've also shared RNA from the virus and inactivated virus with other research groups, including the University of Toronto research community.



Staff members process samples at the Shared Hospital Laboratory, located at Sunnybrook's Bayview campus

Q: This is an unprecedented event. What are you learning from these challenging circumstances?

Dr. Kozak: This pandemic has highlighted that we need vaccines and therapeutics as quickly as possible, and it is difficult to be fully prepared for the unknown, but we can try to improve our chances. For example, you can support research to develop antivirals that work against entire groups of viruses, [such as] all coronaviruses, not just SARS-CoV-2. Then, when you have another emerging virus from that group, you have some potential options on the shelf.

Dr. Mubareka: RNA viruses cause the majority of emerging and zoonotic viral pathogens [viruses that pass from animal to human], including Ebola virus, Zika virus, MERS and now SARS-CoV-2. The challenge, not only in Toronto but provincially and nationally, is that there are few RNA virologists or centres of excellence in RNA virology.

One of the reasons we were able to act quickly early in the outbreak was that we had existing relationships and collaborations that could be leveraged. Going forward, we need to build programs based on what we have established over the past few months; this will develop resilience for future emerging viruses.

Dr. Kozak: The support for research, and all aspects of pandemic preparedness, must continue after COVID-19 is beat. We have to stop thinking of research and pandemic preparedness as a luxury. The cost of prevention is a lot less than the cost of response.

Q: Why have you both chosen to work in this area of research?

Dr. Mubareka: My interest in microbiology stems from my interest in infectious disease. What I find intriguing about infectious diseases is that it matters what happens on the other side of the world. There are so many variables – from a macroscopic population level all the way down to small changes in one part of the virus [that can] change the disease it causes, how easily it's transmitted or which hosts it infects.

Dr. Kozak: My mom was a virologist. As a kid, I read a lot of books like *The Hot Zone*, which is the story of the Ebola outbreak in Reston, VA. Between my mom's interest in viruses and these books that I read, I was kind of hooked on microbiology.

I also share some of the same thoughts as Dr. Mubareka. The more you learn about viruses, the more you start to see that we're all kind of one big community, and the things that happen in one person's backyard absolutely affect what happens somewhere else. 🐼

This interview has been edited and condensed.

The community responds

The Sunnybrook community rallied to support the COVID-19 effort. Thousands of individuals, businesses and volunteers have donated time, goods and funds to support Sunnybrook's health-care providers, researchers and staff. Sunnybrook is grateful to those who have made a difference during the pandemic.

CONNECTING PATIENTS



Restrictions to visitors and volunteers at Sunnybrook have been important to ensuring patient safety. Here's how donors helped ease the impact on patients and their families:

- › **83 iPads** were donated to allow patients to stay in touch with loved ones during the pandemic.
- › This technology also allowed physicians, social workers and spiritual care workers to offer virtual care and supportive services to patients and their families.
- › A pilot project at Sunnybrook's Holland Centre enabled volunteers to record customized musical **virtual birthday greetings**, which patients can watch on iPads.
- › Another volunteer took photos of his **therapy dog Cooper** outfitted with a special birthday message to send to inpatients on their birthdays.

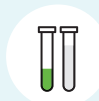
SUPPORTING VITAL RESEARCH

There are close to 50 COVID-related research projects happening at Sunnybrook. Here are four examples of these important, donor-supported initiatives:



SERV RESEARCH PROGRAM

The Sunnybrook Translational Research Group for Emerging and Respiratory Viruses (SERV) unites top infectious disease experts with the goal of better understanding, preventing and treating the virus.



CONCOR-1 TRIAL

Sunnybrook is helping lead this Canadian initiative to investigate the therapeutic use of blood plasma from recovered patients as a treatment for COVID-19.



CATCO TRIAL

Sunnybrook is lead hospital for Canadian Treatments for COVID-19 (CATCO), part of the World Health Organization Solidarity trial, to test the effectiveness of different drugs in treating COVID-19.



HEROs TRIAL

Together with University Health Network and several other hospitals, Sunnybrook is assessing an antimalarial drug's ability to prevent coronavirus infections in front-line staff.

CARING FOR OUR HEALTH-CARE TEAMS



Sunnybrook received an overwhelming number of offers from across the GTA to help provide meals and personal care items to front-line staff. More than 6,000 meals were delivered to Sunnybrook staff, and four businesses have partnered with Sunnybrook to provide meals on an ongoing basis.

Other donated items include:

Cookies, muffins, granola bars, energy drinks, juices, popcorn, coffee pods, oranges, hand sanitizer, soap, shampoo, hand lotion

Protecting patients and staff

Sunnybrook issued a plea to the community to donate unused and unopened masks, gowns and eye protection to those who need it most. The community answered the call.

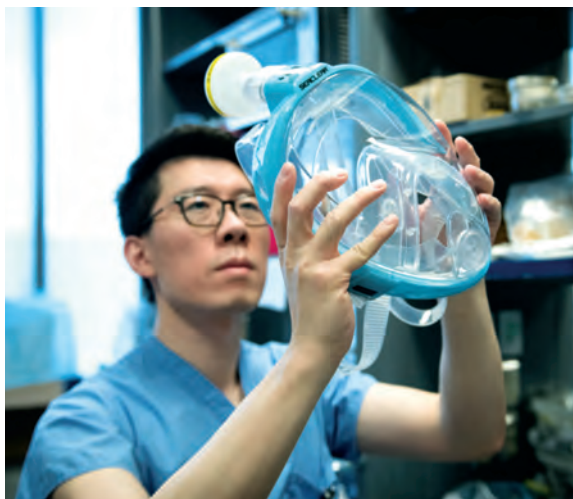
650,000+

pieces of PPE were donated.

More than

12,500

hand-sewn masks have been donated to Sunnybrook.



MASK INNOVATION

With N95 masks in limited supply worldwide, innovators at Sunnybrook are developing and testing an alternative using a **modified full-face snorkel mask**. This project was made possible thanks to generous donors, including a gift of 1,100 full-face snorkel masks.

More than 9,500* donors have contributed over \$7 million* for Sunnybrook's COVID-19 Response.

This fund advances critical research initiatives and ensures our dedicated frontline health-care providers, researchers and staff have the equipment and support they need to serve the community.

DONORS ALSO FUNDED:

- › A welding machine so Sunnybrook can make its own masks
- › Extracorporeal membrane oxygenation (ECMO), a portable heart-lung support system that supports the sickest patients
- › Two tents to provide overflow space for the emergency department

To donate to the COVID-19 response fund, go to SUNNYBROOK.CA/COVID19RESPONSE

For other types of donations and for more information, email foundation@sunnybrook.ca

Conquering anxiety

Jeffrey Kotas spent years trapped in the prison of his treatment-resistant obsessive-compulsive disorder.

Thanks to a combination of focused ultrasound and a unique residential program at Sunnybrook, he's enjoying newfound freedom

BY ANNA SHARRATT

Two years ago, Jeffrey Kotas's life was at a standstill. He spent his time holed up at home in Toronto, taking two to four showers each day and spending up to 12 hours in the bathroom to combat what he believed was widespread contamination. Simple daily activities like using the bathroom or taking out the garbage would invariably trigger his severe obsessive-compulsive disorder (OCD).

"I was obsessed with the idea

below:

Jeffrey Kotas has struggled with OCD since he was a child

of particles being on different objects," says Jeffrey, 32, of his OCD. He would use tissues, paper towels and disinfecting wipes to touch surfaces, going through over \$200 in cleaning products per month and racking up a huge water bill.

Jeffrey was physically and socially isolated, feeling powerless to overcome his compulsions.

Now, things are different. In the past year, Jeffrey has resumed

taking university courses over a decade after he was forced to leave school because of his OCD. He has many friends, and has appeared on national television to speak about his disorder – a point of pride, as being photographed or interviewed were once among some of his biggest fears. Jeffrey is also coping well in the midst of the COVID-19 pandemic, an unprecedented event that made most of the population hypersensitive about germs.

Jeffrey's success in the face of a debilitating disorder is the story of one person's perseverance and willingness to seek new treatments. It's also the story of Sunnybrook's quest to find novel and safe ways to treat a wide range of severe anxiety disorders.

Sunnybrook's residential treatment program for OCD, the first of its kind in Canada, is working in tandem with researchers who are pioneering the use of focused ultrasound



PHOTOGRAPH BY KEVIN VAN PAASSEN

for OCD. As a result, people like Jeffrey with severe, treatment-resistant forms of the disorder are finding pathways to better lives.

'IT WAS UNBEARABLE'

OCD is a disorder of the brain that causes severe anxiety and involves obsessions and compulsions that interfere with daily life. Some of these may include fears of contamination, superstitions or a relentless quest for perfection. People with OCD can spend hours washing their hands, double-checking locks and ensuring loved ones are safe. In some cases, they are unable to leave their homes and cannot hold down jobs or manage relationships.

OCD is the result of issues in communication between critical structures in the frontal lobe and deeper, subcortical structures, explains Dr. Nir Lipsman, a neurosurgeon, scientist and director of the Harquail Centre for Neuromodulation at Sunnybrook.

"The brain's anterior limb of the internal capsule is a key pathway that connects those structures and that mediates things like anxiety," says Dr. Lipsman. In OCD, that pathway is hyperactive, leading to the obsessive and compulsive symptoms patients experience.

The majority of patients with OCD respond to antidepressants and cognitive-behavioural therapy (CBT), the gold standard of psychotherapy for changing negative thought patterns.

But as many as 10 to 20 per cent of patients fail to improve. Jeffrey was one of them. He had been seeing a psychotherapist since his childhood. By his late 20s, he had tried over 30 medications, which did not work for him.

"There were two or three over my whole life that worked at all," Jeffrey adds. But none had a lasting impact on improving his OCD symptoms.

He also tried outpatient CBT, though he felt the structure was too rigid and didn't address the

full range of his symptoms.

By 2014, Jeffrey knew he was in trouble. "I would get so anxious that I would start convulsing from the anxiety," he recalls. Some episodes would leave him shaking uncontrollably on the floor for as long as 15 minutes. He also suffered from depression, spending entire days in bed.

"It was unbearable," he says.

Then he found out about Sunnybrook's clinical trial involving focused ultrasound (FUS) for patients with severe OCD, he liked that the procedure didn't involve open surgery and that the recovery time was rapid. He remembers thinking, "This is the perfect thing for me."

"I had a lifetime of change in a short span of time."

Jeffrey Kotas on the treatments he received at Sunnybrook

A PROMISING NEW APPROACH

Sunnybrook's FUS procedure uses ultrasound waves to create a small lesion on the brain. The idea is that the focused waves alter the brain's neurocircuitry, quieting the OCD "loop" that leads to symptoms.

"We are breaking the cycle," says Dr. Lipsman of FUS. "It's a safe procedure in neurosurgical terms, and it can be helpful for some patients who are treatment-resistant."

FUS has been used for years to treat conditions like essential tremor and uterine fibroids, but this is the first clinical trial in North America to demonstrate the safety of this treatment for OCD.

First, a patient's head is shaved and a local anesthetic is applied. Then, the patient is fitted with a helmet-like device and while lying in an MRI machine, an exact location in the brain is pinpointed and ultrasound waves are focused on that area to create a lesion. The procedure takes three hours, and the patient is admitted overnight for observation.

"The risk of infection, bleeding and swelling is reduced as well," says Dr. Lipsman.

Jeffrey was the first person in North America to participate in the Phase 1 clinical trial at Sunnybrook, and he underwent FUS in July 2017. "It was extremely exhausting," he says, and he experienced some pain during the procedure.

"But I wanted to be on the cutting edge of science," he says. "Even if it didn't work for me, it would for someone else."

Jeffrey gradually began noticing subtle changes. As his mother sorted laundry, mixing clean laundry with what he perceived as dirty laundry, something that usually led to an anxiety attack in the past, he just stared at her calmly. "I wasn't feeling that anxiety," he says.

While on a rare grocery trip, Jeffrey realized that he was not sweating. Before, "it had been excruciatingly painful," to go to the grocery store, he says. "Now, I wasn't sweating at all. That was a moment of shock for me."

REINFORCING POSITIVE CHANGES

Jeffrey says that over the next year, the intensity of his anxiety in a variety of situations continued to recede.

In September 2018, Jeffrey enrolled in Sunnybrook's residential treatment program for OCD, Canada's only intensive residential program. It's where he met Dr. Peggy Richter, a psychiatrist and head of the Frederick W. Thompson Anxiety Disorders Centre at Sunnybrook.

The residential program is for the 10 per cent to 20 per cent

“Jeffrey is one of the success stories.”

Dr. Peggy Richter, head of the Frederick W. Thompson Anxiety Disorders Centre at Sunnybrook

of people with OCD who don't respond to drug treatments or whose symptoms are too severe for routine outpatient CBT, says Dr. Richter, director of the program. “They are unable to function in any meaningful way.”

Participants come from across Canada to take part, with out-of-province patients usually accepted within a month or two of applying. The program has a capacity of 12 patients at a time.

Residents typically stay for three months, participating in eight hours of CBT and other therapy daily. “The CBT focuses on challenging cognitions and behaviours,” Dr. Richter says.

It's an intense process that is individualized based on each participant's symptoms and needs. Part of the CBT program includes patients gradually exposing themselves to triggers that bring on symptoms. “You unlearn that fear response,” says Dr. Richter. “We also target avoidant behaviours [patients] might have. It's a graduated approach, and the anxiety eases.”

For Jeffrey, the residential treatment program reinforced the positive new changes he was seeing in his behaviour following the FUS procedure.

“It allowed me to use the gains that I had made to that point,” he says.

Jeffrey says the program also helped him develop the valuable social skills he had lacked in



above:
Sunnybrook
psychiatrist
Dr. Peggy
Richter

the past, having always been too afraid to open up to others because of his OCD. He met friends in treatment and was able to participate in social activities.

“I hadn't had friends in 15 years,” he says. “The whole world opened up to me at the time.”

Dr. Richter says she is impressed with Jeffrey's progress. “His OCD has been so severe,” she says. “Jeffrey is one of the success stories.”

BRAVE NEW WORLD

Jeffrey is continuing to see changes three years after his FUS procedure. “I still have obsessions and I still feel uncomfortable, but it doesn't affect my decisions,” he says of his OCD. “It's just a nuisance.”

Dr. Lipsman acknowledges that focused ultrasound is just one key tool in the OCD arsenal.

“We don't view it as a cure-all,” he says. “It's part of a comprehensive treatment plan with treatment-resistant OCD.” He says people who have metal implants, are claustrophobic or cannot tolerate an MRI, or have tumours or vascular lesions in the brain are not good candidates for the FUS procedure.

But Dr. Lipsman says FUS has the potential to offer more

effective treatments to a greater number of patients, due to the relative ease of the procedure as well as its fast recovery time. “The goal is to have a safer, more effective way of treating OCD, [as opposed to] open neurosurgical approaches,” he says.

Focused ultrasound may also eventually be used to treat other anxiety disorders, such as post-traumatic stress disorder, says Dr. Lipsman.

“We view this predominantly as an anxiety-treating trial,” he says. “We know anxiety is part of many conditions like post-traumatic stress disorder, generalized anxiety, phobias – and if one can potentially access and show an effect on those anxiety circuits, one may have a more versatile tool to treat more than just OCD.”

For Jeffrey, the combination of FUS and the residential treatment program has been transformative. “I had a lifetime of change in a short span of time,” he says.

While he notes that he has to stay “on guard” to avoid slipping into old patterns, he feels he's been given a new lease on life.

“I don't feel threatened by the OCD,” Jeffrey says. “That's just so empowering. I compare it to reaching the top of Mount Everest.” 🏔️



Breaking new ground

The new Garry Hurvitz Brain Sciences Centre will bring disciplines across Sunnybrook together under one roof to tackle the most challenging neurological and mental illnesses of our time

BY JOEL SCHLESINGER

Jennifer Farber felt like she was on a health-care merry-go-round, searching for an answer to the dizziness, anxiety and fatigue that plagued her for months.

"I could barely be out of bed for more than a few hours; I was so dizzy I could barely stand and I had extreme anxiety," says the 42-year-old Toronto school teacher.

Over the course of a year, Jennifer saw a long list of specialists, including a neurologist, rheumatologist, gynecologist, psychiatrist and ophthalmologist. But none of them were able to determine the root cause of her symptoms.

It was a frustrating and challenging time, Jennifer says.

Unable to work, she battled with her insurer to claim disability, because doctors couldn't come up with a cause. "I didn't know what was wrong with me," she says.

Then Jennifer saw Dr. Matthew Burke, a cognitive neurologist and member of Sunnybrook's Hurvitz Brain Sciences Program.

"Within 30 minutes of telling him everything, he said, 'I know what's wrong,'" Jennifer recalls. Dr. Burke diagnosed her with persistent postural perceptual dizziness (PPPD), a complex disorder of brain network dysfunction that is treatable.

That quick, breakthrough assessment of Jennifer's condition is a testament to Dr. Burke's

above:
Architectural rendering of the new Garry Hurvitz Brain Sciences Centre

skill as a physician. It's also an example of the creative thinking happening at one of the world's leading hubs of interdisciplinary research and clinical care for complex brain disorders and disease.

Soon, this innovative research program will have a new home. Sunnybrook's Garry Hurvitz Brain Sciences Centre will bring together some of the greatest minds across diverse areas of expertise in brain health, including psychiatry, neurology and neurosurgery, to encourage collaboration. The highly integrated team will develop the next generation of treatments for mental illness, dementia, stroke, neurological disorders and more.



TEARING DOWN SILOS

The Hurvitz Brain Sciences Program “involves any kind of specialty in medicine that involves anything to do with the brain and central nervous system,” says the program’s chief, psychiatrist, Dr. Anthony Levitt.

Created five years ago with Dr. Levitt at the helm, the program’s mission was to encourage collaboration between psychiatry, neurology, neurosurgery, ophthalmology and otology (ear, nose and throat medicine), as well as neuropharmacology, neuroradiology and neuropsychology.

“The major brain afflictions of our time – mood disorder, stroke and dementia – are all inter-related,” Dr. Levitt explains. “So it makes sense for us to understand and treat them with meaningful collaboration between specialties that have previously functioned separately and in silos.”

An ongoing challenge, however, has been that these specialties are spread across Sunnybrook’s sprawling Toronto campuses, which can sometimes impede collaboration. The new Garry Hurvitz Brain Sciences Centre will bring Sunnybrook’s top clinical and research minds together.

above:

Sunnybrook
cognitive
neurologist
Dr. Matthew
Burke

below:

Dr. Anthony
Levitt, chief
of the Hurvitz
Brain Sciences
Program

Thanks to generous donations from the public and corporations, Sunnybrook raised more than \$60-million for the 121,000-square-foot, three-storey facility. A matching \$60-million contributed by the provincial government will help increase the capacity for adult and youth inpatient mental health care, making Sunnybrook one of the largest adolescent mental health services in the Greater Toronto Area. The building, which will house a number of Sunnybrook’s Hurvitz Brain Sciences Program treatment programs for youth, adults and the elderly (see sidebar), is specifically designed to be able to expand and accommodate additional floors in the future.

In the past, and even today, experts in mental health and neurological disease have tended to work independently, notes Dr. Levitt. But there’s a growing realization that previous distinctions between all brain-related disciplines like psychiatry, neurology and neurosurgery are increasingly blurred.

“In the last five years, for example, we’ve recognized many psychiatric disorders are not only caused by a chemical imbalance, but might also reflect circuitry issues, too,” says Dr. Levitt. “The brain is an electrical organ, and

there may be specific circuits that are malfunctioning in disorders such as depression and obsessive-compulsive disorder (OCD).”

Jennifer is an example of someone with a challenging health problem that doesn’t fit neatly into one medical discipline. PPPD is a disorder that involves the vestibular system, a sensory system located in the inner ear that is crucial to maintain normal balance and equilibrium. In PPPD, there is a problem with the signals sent back and forth by the vestibular system and the brain, causing a sensation of dizziness in the body.

Patients like Jennifer with functional neurological disorders – complex conditions where patients experience physical symptoms without a clear structural problem in the nervous system – are at risk of falling through the cracks, because their disorders straddle neurology and psychiatry, Dr. Burke says.

“What often happens is, they’re assessed by a neurologist, who finds no evidence of disease,” says Dr. Burke, who recently authored a groundbreaking article on the subject in *JAMA Neurology* entitled, “It’s All in Your Head – Medicine’s Silent



Epidemic.” Says Dr. Burke: “You’ve essentially ruled out a structural – or a hardware – problem.”

But patients are left with very real symptoms, he adds, “and the message they often take from that is, ‘It’s all in your head.’”

Jennifer’s condition and similarly challenging functional brain disorders are “software” problems, Dr. Burke explains. “This means the connections between brain regions – the networks and circuits – become disrupted and dysfunctional, which doesn’t show up on structural MRI and CT scans.”

Dr. Burke notes the Garry Hurvitz Brain Sciences Centre represents a significant leap forward for standard of care for this emerging area of brain disease.

“Generally, [functional] disorders require collaboration across the brain sciences, and patients may suffer when that doesn’t happen,” he says.

EXPERTISE AND EDUCATION

In addition to helping researchers collaborate and improving patient care, the centre will also be a venue for unique educational opportunities, including a new Brain Medicine Fellowship supported by the Hurvitz Brain Sciences Program.

Fellowship director Dr. Sara Mitchell who, like Dr. Burke, is a neurologist also appointed within the Department of Psychiatry, says traditional fellowships often focus on one area of expertise. For instance, a psychiatry trainee might be involved in treating bipolar disorder through therapy and medication, and pay less attention to the underlying neuroanatomical basis of the disease.

“But the goal of the Brain Medicine Fellowship is to develop cross-disciplinary competencies,” she adds. “It tries to broaden perspectives and show physicians how when different brain-focused

specialties collaborate, patients ultimately receive better care.”

Dr. Sarah Levitt (no relation to Dr. Anthony Levitt) was the first fellow to embark on the new training program beginning last year. Her focus is on improving care for individuals with severe mental illness who are also diagnosed with life-threatening medical conditions.

“We know people with severe, persistent mental illness – like schizophrenia – tend to die 20 to 30 years younger of cardiovascular disease, cancer and diabetes,” she says.

Dr. Sarah Levitt further notes that these patients are often best served by a multidisciplinary approach that synchronizes the efforts of many professionals toward one goal. The new centre will foster better collaboration not just through the fellowship, but also by creating a physical space for multidisciplinary clinics where patients will see a few specialists at once.

“It helps patients for them to have access to different expertise at the same time,” she says.

In short, the new centre is designed to help patients get the care they need, when they need it, in a co-ordinated space, says Dr. Anthony Levitt.

“Our goal is to have several related specialists seeing patients in the same clinic space, providing integrated care. This reduces the burden of patients and caregivers trying to navigate a complex process of specialist referrals and separate departments – in a population that is often challenged in managing these tasks as a result of the underlying illness”

Now on the mend, Jennifer says she is grateful for the treatment she received at Sunnybrook and believes the Garry Hurvitz Brain Sciences Centre will only improve care for others like her going forward.

“My hope is this new centre leads to more research, so future patients are diagnosed more quickly and get the care they so desperately need.” ■

A NEW HOME FOR WORLD LEADING RESEARCH AND CLINICAL CARE

Sunnybrook’s Garry Hurvitz Brain Sciences Centre will feature some of the world’s most state-of-the-art facilities for treating mental illness, dementia and other brain-related disease. These include:

THE HARQUAIL CENTRE FOR NEUROMODULATION

Already a world-class facility at Sunnybrook, the new Harquail Centre will be a dedicated space for the latest in neuromodulation – technology that alters, or modulates, activity in the nervous system. Treatments include cutting-edge focused ultrasound, now in clinical trials for obsessive-compulsive disorder (see page 22 for Jeffrey’s story), treatment-resistant depression and brain cancer.

THE MURPHY FAMILY CENTRE FOR MENTAL HEALTH

Inpatient treatment for mental illness will be offered in a home-like environment. Designed with substantial input from patients’ families, the centre gives patients the ability to engage with laundry, exercise and other facilities, making the transition between hospital and home easier.

FRESH START

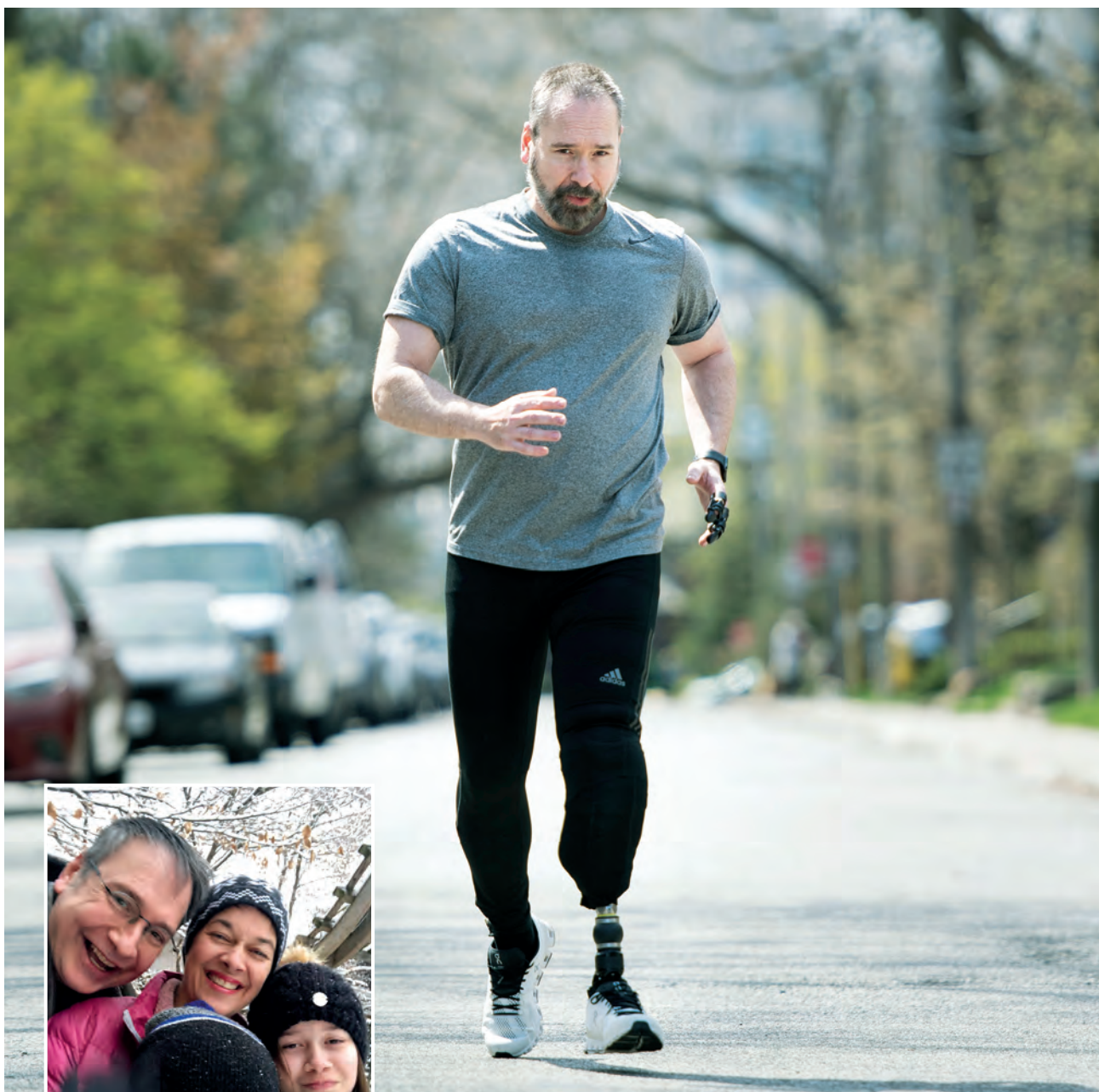
This intensive day-treatment program assists local teens who are recovering from mood and psychotic disorders. As an alternative to, or next step from, inpatient hospitalization, the facility’s school-like environment will help patients pursue the lives they want to lead.

CIRCADIAN SLEEP CENTRE

Ontario’s first facility dedicated to 24-hour testing of sleep/wake cycles will allow patients to stay for a few days at a time. This will give specialists the ability to observe and diagnose circadian rhythm (internal clock) problems related to both sleep and wake periods.

PLUS:

- A secure main floor outdoor space for psychiatric in-patients
- An exercise facility for large-scale research projects on the connection between fitness and brain health
- A rooftop garden



Moving forward

A harrowing experience with 'flesh-eating disease' nearly killed Mark Opauszky. The team at St. John's Rehab, and Mark's positive mindset, helped him recover and get his spark back

BY JORDANA FELDMAN

In February 2019, Mark Opauszky flew down to New York for what he thought would be a quick business trip. The Toronto-based CEO and founder of a rapidly growing marketing automation company was scheduled to present at a conference and take in a few sales meetings.

Two days in, Mark fell sud-

denly, severely ill. With a fever spiking and on the brink of losing consciousness, his business partner rushed him to a Manhattan hospital. Mark emerged several weeks later from a medically induced coma to discover he had developed necrotizing fasciitis, more commonly known as “flesh-eating disease,” and it had brought him to the brink of death.

“I found out later that my probability rate of survival had been in the 5 per cent range,” says Mark, now 51.

The full extent of Mark’s ordeal reads like the plot of a horror movie. Necrotizing fasciitis is a disease in which bacteria infects the connective tissue, or fascia, under the skin. The disease rapidly kills the tissue, causing it to peel, blister and turn black as it dies. Most often caused by Group A streptococcus bacteria (the same bacteria that causes strep throat), it usually enters the body through a break in the skin like a cut or scrape.

Mark’s strain of necrotizing fasciitis resulted in septic shock, a worst-case scenario where the major internal organs begin to shut down and blood pressure dips dangerously low. In order to save his life, surgeons were forced to cut away a vast quantity of Mark’s muscle and flesh to remove damaged tissue, exposing some limbs down to the bone.

The New York team had saved Mark’s life. But by the time he arrived via air ambulance at Sunnybrook’s Ross Tilley Burn Centre four weeks later, Mark says he was in extremely rough shape.

“They did what they did [in New York] and then they sort of shipped me back to Toronto in pieces,” he says.

THE JOURNEY BEGINS

Mark’s arrival at Sunnybrook was the beginning of a long healing process that would involve multiple surgeries on his limbs, extensive rehabilitation and an extreme level of determination.

Mark went through eight sur-

geries over four weeks at the Ross Tilley Burn Centre, including the amputation of several fingers and toes. He was then transferred to Sunnybrook’s St. John’s Rehab to begin the next phase of recovery.

St. John’s Rehab is renowned in Canada for its personally tailored programs that incorporate multidisciplinary teams to treat complex medical traumas, such as burns, falls, limb loss and vehicular accidents.

Multidisciplinary teams at St. John’s Rehab include physicians, nurses, physical and occupational therapists, prosthetists, speech-language pathologists and dietitians to support patients back to previous daily functioning. Equally important are psychologists, social workers and spiritual care providers to support the mental and emotional aspects of recovery.

“We use a holistic approach to care that focuses on the mind, body and spirit of each person,” says Dr. Amanda Mayo, physiatrist (rehab specialist) at St. John’s Rehab. “It’s one thing to save a life, and it’s another to rebuild that life in a way that is meaningful for that person.”

opposite page:
Mark Opauszky exercising on the streets of Toronto

inset:
Mark with his wife, Danielle, and children Racquel and Max

below:
Mark in his room at Sunnybrook’s Ross Tilley Burn Centre, a few days after his arrival

Mark’s program involved a rigorous schedule of cardio and calisthenics designed to rebuild atrophied muscle. Physiotherapy and occupational therapy helped him start walking again and learn how to use his injured hands. He also required regular massage and stretching for his limbs due to the volume of skin grafts he’d received – an extremely painful procedure.

For the entire duration of his stay at Sunnybrook, Mark says he didn’t once turn on his phone or watch TV. A tech entrepreneur who had previously been perpetually plugged in, Mark transitioned to a near meditative state that allowed him to focus on healing.

“It was me and my brain and my time, and that’s all I did,” he says. “I would spend hours just picking one body part at a time to concentrate on. Or I would open and close my fist because I was trying to get my fingers to work again.”

Doctors anticipated Mark’s in-patient stay at St. John’s Rehab would take eight weeks. He walked out the front door two weeks later. Mark says his quick



HEALING THROUGH MINDFULNESS

How much does your state of mind dictate how well you heal?

At his Sunnybrook lab, physiatrist and researcher Dr. Robert Simpson develops mindfulness and yoga programs for patients with disabling long-term conditions, including multiple sclerosis, stroke and amputations.

"There's now robust, high-quality evidence for mindfulness improving mental health outcomes – mainly stress, anxiety and depression. There's also fairly robust evidence that it leads to beneficial changes in cognitive function and probably pain," says Dr. Simpson, who is trained to teach both mindfulness and Hatha yoga.

Mindfulness can be defined as the act of paying attention to the present moment, non-judgementally. It is often taught through guided meditation practices that focus on the breath and sensations within the body.

The concept hit the North American mainstream in the late 1970's when a program called Mindfulness-Based Stress Reduction (MBSR) began to infiltrate medical and wellness circles as a treatment for chronic pain and stress. The program had been adapted from Buddhist and Yogic principles by U.S. medical professor Jon Kabat-Zinn.

Dr. Simpson says he considers a host of factors when deciding who might benefit from a mindfulness-based intervention (MBI). For example, someone with an amputation who also has conditions like diabetes, high blood pressure and depression may face more challenges with rehab than someone without these conditions.

That's why a combination of personalization, education and support are key to improved results, he says.

"Humanistic factors like encouragement, empathy, compassion, understanding – I think these are all really important factors, and different people likely need different 'doses' of these things."

"I would spend hours just picking one body part at a time to concentrate on."

Mark Opauszky

recovery time was a combination of the outstanding care he received and the extreme discipline he had maintained in his previous life as a high-functioning CEO.

"I would get up in the middle of the night, get my walker and do laps around the nurses' station at 2 a.m.," Mark says of his time in rehab, noting that he was motivated by his desire to get back home to his wife, Danielle, and his two children.

ONE MORE STEP

In October, Mark returned to the Ross Tilley Burn Centre for a final amputation of his lower left leg. He had a bone infection, his left foot wounds weren't healing and despite a top-of-the-line orthotic to offload his painful foot, he was in constant pain.

Dr. Mayo says she recognized that Mark's left leg below the knee might need to be amputated due to the extensive damage back when he first arrived at the Ross Tilley Burn Centre. But she also understood how important it was to his emotional recovery to give him the opportunity to make that decision on his own time.

"Limb loss is a life-changing event. A lot of patients with chronic infections have to go through this journey and they go through multiple treatments or surgeries that can become quite

draining," says Dr. Mayo, who led Mark's limb-loss rehabilitation team. "And then they realize, 'I'm actually better off not having the foot. The foot is painful. This foot has wounds. I can't walk on this foot.' And Mark came to that decision."

The left below-knee amputation surgery, led by plastic surgeon Dr. Alan Rogers, proved successful and has improved his quality of life, Mark says.

He began outpatient rehab at St. John's Rehab to learn how to use his new prosthesis. Esther Chung, Mark's physiotherapist, says that Mark's dedication was a key factor in his specific recovery.

"Mark is very strong mentally, and I think it helped him progress," she says. "He also had a strong support network of family and friends, which is important to maintain motivation over the long run."

Dr. Mayo agrees that mindset and attitude are crucial aspects of the rehab process at St. John's Rehab.

"A patient's perseverance is very important," she says. "Somebody who's very active and doesn't have any other medical comorbidities should be going back to most of the activities they did before, [only now] wearing a prosthesis or maybe [using] some adaptive equipment."

Today, Mark is thriving. He is adjusting to a new normal that seems much closer to his previous life than he had initially imagined.

"I lift weights. I have a treadmill. I started [martial art] Muay Thai again. I've been learning to be a bit more agile on my limb," he says. "I don't even walk with a limp anymore. Some people can't even tell that I've lost a leg."

Feeling immense gratitude to his Sunnybrook team, Mark says he is inspired to give back.

"I would very much like to transition from just being a patient to being somebody who can contribute to the [organization] in some way, shape or form," he says. 🍀



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Safe at home

Sunnybrook researchers are using ‘implementation science’ to support and improve the lives of seniors living in community housing

BY MARJO JOHNE

Gerry Banks has built his life in the Toronto Community Housing Corporation (TCHC) building he’s called home for the past 30 years. But now, at age 72, Gerry worries about his future as an older person living in social housing.

“I think about things like falling in the bathtub, and no one hears me. Or what if I need to move some furniture around – how will I do that with my bad back?” says

below:
Gerry Banks
in front of
his home in
Toronto

Gerry, who shares his apartment with a dog and a cat. “There are a lot of things I have a hard time doing now, because I’m old.”

Health and safety become greater concerns for most people as they get older. But for senior tenants of social housing – who tend to be especially disadvantaged by poverty, health problems, social isolation and mobility barriers – these concerns are often magnified and, in many

cases, left untended.

Sunnybrook scientists are stepping up to build and implement solutions to these urgent problems, in order to help seniors like Gerry remain in their homes safely and comfortably.

In a joint project that started almost two years ago, TCHC, the City of Toronto and the Toronto Central Local Health Integration Network (LHIN) have launched an “integrated services model” that addresses the issues faced by older Canadians living in government-supported housing. Key features of this new model include greater engagement of tenants in building affairs, on-site staff dedicated to each building, access to social and wellness programs and care coordinators who connect tenants to support services.

While these features are novel for Toronto Community Housing, what’s especially unique about its development is the application of implementation science – a field of expertise at Sunnybrook that uses carefully designed frameworks to translate research into strategy, actions and, ultimately, success.

FROM ANALYSIS TO EXECUTION

“Basically, it’s the study of how to get research evidence into practice and on to the front lines,” says Sander Hitzig, PhD, a scientist at the St. John’s Rehab Research Program, a Sunnybrook Research Institute program focused on advancing rehabilitation sciences to improve patient recovery.

“We often see great ideas for a new intervention or model of care that works really well under a controlled setting, but that doesn’t work as well when you try to implement it in the real world,” Hitzig says. “By applying implementation science, you can create and put into action the best possible model based on real-world evidence.”

Hitzig says the successful implementation of any project depends on five key factors:





left:
Sunnybrook
researchers
Sander Hitzig
(far left) and
Christine
Sheppard

characteristics of the intervention, project setting, stakeholders' needs, the people involved and the process for executing and evaluating the intervention.

"Without this framework, you risk looking at the trees and missing the forest," says Hitzig, who has used implementation science to develop and launch new models of care at Sunnybrook. As an example, he cites the decision to expand the work of physiatrists (specialists in physical medicine and rehabilitation) at St John's Rehab to include consultations in acute care.

"Everyone liked the idea, because we knew it would lead to better outcomes for patients, such as a lower need for pain medications, but there was confusion around what

physiatrists should do, and whether they should be at various sites or dedicated sites," recalls Hitzig. "We used implementation science to determine the best model and the best way to implement it."

For the senior housing project, Hitzig and post-doctoral research fellow Christine Sheppard, PhD, worked with a team to analyze 34 social housing models in Canada, the United States and Europe. They then narrowed their investigation to five models that aligned most closely with what TCHC, the city and Toronto Central LHIN wanted to accomplish.

They also interviewed 58 senior-aged community housing residents (including Gerry Banks) and consulted with 132 diverse stakeholders who

included health-care providers, social workers, geriatricians, city hall officials and community advocates.

"We learned a lot," says Sheppard. "For instance, how [to] empower tenants by helping them improve their financial literacy in things like everyday banking, setting up direct deposits and filling out forms. Because when tenants are empowered, they feel more free to ask for help."

A BOLD NEW MODEL OF CARE

Andrea Austen, head of seniors, services and long-term care for the City of Toronto, says that having access to Sunnybrook's experts in implementation science has made a big difference. Their work has led to key findings that shaped the integrated services model for TCHC's 83 seniors-designated buildings.

"Under this new model, we will have these integrated teams of care coordinators, dedicated building staff and service providers like social workers and personal support workers working together to coordinate their services and to flag any issues," says Austen.

"We will also be upping training in many different areas related to seniors, including how to identify and support cases of elder abuse, and how to communicate with people who have mild cognitive impairment."

In addition to conducting research and presenting their findings and recommendations, Hitzig and Sheppard created a "logic model" that outlines goals and how various actions would affect outcomes for the short, intermediate and long term. They also created a dashboard to present a visual overview of 26 indicators for a healthy building.

"We are lucky to have access to experts like Christine and Sander," says Austen. "Through the framework they've created, we will be able to closely monitor this new integrated services model and see the intended impact and outcomes." 📌

COMMUNITY HOUSING THAT WORKS

Here are some of the elements identified by Sunnybrook researchers Christine Sheppard, PhD, and Sander Hitzig, PhD, that indicate a healthy building:

CLEANLINESS:

Buildings are clean, free of pests and repairs are completed in a timely manner

ACCESS:

Tenants have access to health services, social supports and community agencies right in their buildings

SAFETY:

Tenants feel safe in their homes and community, resulting in reduced safety incidents and reduced calls to police and fire departments

COMMUNICATION:

Frequent, proactive and respectful communication from housing staff to tenants





KEEPING SUNNYBROOK RUNNING 24-7

The Sunnybrook Power Plant provides centralized utilities to the whopping three million square feet of building space located at the Bayview campus. Anything related to heating, cooling, water and medical gases is managed here

“Everything needs maintenance, and we provide 24-7 support across all systems,” says Nick Poulidis, chief operating engineer. “It’s wonderful to be able to serve and help our patients, families and staff every day. This is a real group effort, and we’re lucky to have the expertise of such great engineers and specialists.”

Because the power plant is always running, so is the team. Fifteen staff members work day and night to make sure all of the systems relied upon by patients, families and staff are there when needed. Here are some highlights of the main utilities:

Monica Matys

1 FULL STEAM AHEAD

Sunnybrook has four large steam boilers that support all heating in the hospital, including that needed to sterilize medical equipment. Each boiler is about 2,000 times the size of a home water heater and produces a maximum of 60,000 pounds of steam per hour. The exhaust passes through an impressive 178-foot chimney, equivalent to a 16-storey building.





2 COOL IT

About 300,000 liters of water are continually filtered through chillers in this closed water system. A total of seven chillers keep water temperatures at five degrees Celsius, providing air conditioning and keeping everyone comfortable during the warmer months.



3 POWER SOURCE

Six generators provide backup power in the case of an outage. Collectively, these provide about 9,500 kilowatts of power, which is more than enough to keep essential services at the hospital running in the case of an emergency or a blackout.

4 AIR-HANDLING SYSTEMS

Every area of the hospital is affected by the heating, ventilation and air conditioning (HVAC) systems to ensure an optimal patient care environment. Having enough air changes in an operating room, for example, helps keep the space safe and clean. Maintenance of these systems is led by six HVAC mechanics who work within the power plant group.



5 NEXT GENERATION

This cogeneration plant is a new installation at Sunnybrook with construction currently underway. It has a gas turbine generator, which is powered by natural gas and produces both electricity and waste heat that is used in a boiler to produce steam. The cogeneration system produces electricity and steam more cost effectively than through traditional means.

When completed later this year, this new addition will allow Sunnybrook to generate about 85 per cent of the electricity it needs in-house. It will be equivalent to removing approximately 6,000 single homes off the power grid.

We're in this together

Sunnybrook is deeply grateful to our community for your messages of support. Each one has been shared, and these messages continue to provide inspiration to our teams. Here are a few examples.

Thank You

to every person who walks into a hospital for work every day. Whether you cook, clean, are a doctor, tech or a nurse, you put yourself at risk for our health.

You are our heroes!

**STAY
SAFE.**

Your hard work and dedication during these tough times **SHOULD NOT** go unnoticed!

#ThankYouTeamSunnybrook

for being an example of care, professionalism and treating each person, whether it be staff or patients, like family.

Words are not enough to express our gratitude for your dedication. There is a shining light, and that is each of you.

One thing
COVID -19
can't do

is take away the

HOPE we all have

knowing we have you
on our team.

Thank you so much.

Sending many blessings and gratitude to all front-line workers at Sunnybrook Hospital.

You are all
amazing
individuals with
hearts of gold. ❤️

**THANK
YOU**

**FOR ALL THAT YOU
DO TO CARE FOR
OUR LOVED ONES.**

Standing true to Sunnybrook's powerful motto, thank you Sunnybrookers for protecting us
"when it matters most."

There aren't enough words or accolades that we can bestow on these critical healthcare professionals.

Much love and gratitude for all that you and your colleagues do. 🙏❤️

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