



2020 Annual Report

Nimble.



Vision

02

Discoveries to inspire the best life for every child and youth.

Mission

Connecting exceptional talent and technology in pursuit of life-changing research for every child, youth and family in our community and beyond.

Values

We inspire trust in our research excellence by being curious, nimble, passionate and equitable.

nim·ble adjective : quick and light in movement or action

Nobody could have predicted the events of the past year, let alone be prepared for what was to come. Like many of you, the CHEO Research Institute had to quickly respond to the challenges of the COVID-19 pandemic and pivot our research and administrative activities.

Strategic planning during a global pandemic was a first for all of us, bringing unique perspectives to the consultation process. In February 2020, we launched our four-year strategic plan: Oh! The Places We'll Explore! Our bold new plan outlines four goals: to expand research (We will grow, it will show), support the growth of our researchers (As we teach, the heights we'll reach!), further integrate research across CHEO (Don't give up, we need support from you all. Join in research, no matter how small), and enhance technology to facilitate research (One tech, two tech, old tech, new tech). Following a pause due to COVID last spring, we relaunched the strategic plan in June 2020 and it was enthusiastically approved by both CHEO RI and CHEO Boards of Directors in October 2020. [We encourage you to take a look!](#) We also refreshed our vision, mission, and values to better reflect our breadth of research, and address current strengths and opportunities.

In March 2020, for the first time in our history, we closed our doors to all but essential research. While many of us worked from home, we also donated our time to help keep people safe. Jessica Cojocari and Rhonda Correll organized an impressive campaign whereby dozens of CHEO research staff volunteered their time to assemble thousands of urgently required face shields. Michelle Quinlan, our Patient and Family Engagement Coordinator, led SewHelpful, a community-based initiative that donated and distributed 15,000 individual cloth masks to CHEO children, youth, and their families. More recently, Dr. Dayre McNally and CHEO, in partnership with EcoEquitable and Dessius Ltd, produced The Ottawa Mask: a high-quality washable fabric mask tested for particle-filtration efficiency. The community response was massive with 10,000 purchases to date, with proceeds from sales donated to CHEO.

As you will learn in this report, many of our researchers pivoted to address concerns arising from the pandemic. Drs. Alexander Mackenzie and Tyson Graber initiated Canada's first daily wastewater testing for COVID-19. To answer pressing questions about the transmission of COVID-19, Drs. Maala Bhatt and Roger Zemek conducted a landmark study of immunity to COVID-19 among 200 households with a confirmed case of COVID-19. This project was funded by the highly competitive Ontario Rapid COVID-19 competition. Amid talk of possible personal protective equipment shortages, Drs. Dayre McNally and Richard Webster, along with Katie O'Hearn, made international headlines by identifying safe and effective methods for the decontamination and reuse of N95 masks. CHEO researchers also continued to develop adjuvants to help boost COVID-19 vaccines, study mental health impacts of the pandemic on children and adolescents, and determine how to deliver the best care, both virtually and in-person.

Using a phased-in approach, and thanks to the efforts of our staff, in collaboration with the CHEO Clinical Service Recovery Steering Committee and the CHEO Research Ethics Board, we were one of the first research institutes to safely restart clinical research in June 2020. While many of us continue to work remotely, our researchers and staff remain tireless in their pursuit of discoveries to inspire the best life for every child and youth.

I want to take this opportunity to acknowledge and thank Kevin Keohane, President and CEO of the CHEO Foundation, for his continuous advocacy and support for research at CHEO and wish him well in his upcoming retirement. Kevin will leave big shoes to fill. I also want to thank Alex Munter, President and CEO of CHEO, for his vision and partnership to imbed research into the fabric of the broader organization as an underlying goal of our Research Strategic Plan. A special thanks to Rhonda Correll (COO), Chris St. Germain (CFO), Chris Dyrda (Chair of the Board), our ORS team, all of our staff, researchers, Board members, and most importantly, patients and families for their constant inspiration, dedication and passion for the research mission. I wish you all a summer of kindness, reconnection, and relaxation.



Dr. Jason Berman
CEO and Scientific Director,
CHEO Research Institute
Vice-President Research, CHEO



Living our Values

The past year has been a remarkable one for CHEO Research Institute. Throughout 2020, the Research Institute lived its value of being nimble; quickly responding to public health restrictions while pivoting research activities to address questions emerging from the pandemic. Although non-essential research was paused for a few months, we continued to make compelling discoveries that had impact locally and globally. We are pleased to report on some of the highlights.

Even in the midst of a pandemic, CHEO Research Institute released an exciting and comprehensive 2020-2024 strategic plan. The Board is pleased by the progress already made towards achieving our strategic goals, particularly by strengthening the integration of research across CHEO. A significant investment in talent during the year has set the Research Institute on a clear path towards continuing to deliver outstanding discoveries to the benefit of youth and their families.

As 2020 kept reminding us, change is eternal. I would like to recognize and thank outgoing Board Chair, Caroline Somers, for her steadfast leadership. I would also like to thank departing Directors Rob Hanlon, Nicole Jauvin, and Jim Roche. A warm welcome to new Directors Sacha Baharamand, Margo Crawford, Natalie Evans and Sapna Mahajan.

The Board commends CHEO Research Institute leaders, researchers, trainees, and staff for their incredible efforts throughout the year. Additionally, we would like to acknowledge the tremendous contributions made by the staff of the entire CHEO organization and all front-line workers in all areas, as they worked to keep us all safe. As COVID-19 restrictions begin to ease and fine weather returns, we wish you an enjoyable summer of rest and renewal and look forward to a return to normalcy. CHEO Research Institute is ready to respond to whatever the 'new normal' looks like.

Chris Dyrda
Chair, Board of Directors
CHEO Research Institute

Stronger Together

While 2020 will forever be remembered for the global pandemic that brought so much in our world to a halt and caused suffering and heartache for millions of people around the globe, it should also be remembered as a year in which the words “stronger together” became a recurring theme. The CHEO Foundation represents CHEO’s community of donors and 2020 saw transformational progress in child health that resulted from years of relentless pursuit of answers and discoveries by CHEO researchers which have been supported for decades by our community of loyal donors and supporters.

The discovery of the gene causing SMA (spinal muscular atrophy) many years ago by CHEO’s Dr. Alex MacKenzie was such an important milestone in the progression of research that eventually identified new treatment options for babies born with this progressive, debilitating and life-limiting disease. Research has now identified treatments to reverse the course of this neuromuscular disease and enabled Dr. Hugh MacMillan to change the course of life for a baby boy named Aidan and his family. In an incredible twist of fate only six days prior to Aidan’s birth, SMA was added to the list of treatable diseases for which Newborn Screening Ontario at CHEO tests. Aidan became the first baby in Canada identified with SMA to start his treatment at just three weeks old. Instead of facing a short and difficult life, Aidan is expected to develop normally with no limits due to the disease. Hence, we witnessed the promise and potential of precision medicine which will change the way patients of the future are diagnosed and treated at CHEO and around the world.

This was the highlight of 2020 for me, and an inspiring glimpse into the future for CHEO and the kids and families we serve. I want to thank our dedicated researchers and our donor community for continuing to fuel and enable our progress toward further discoveries and better treatments in the years ahead. Donors are a critical part of Team CHEO and the words “stronger together” have never been more poignant.

Kevin Keohane
President and CEO
CHEO Foundation





Oh what a year.

As you will see in this report, the CHEO Research Institute's spirit of excellence, innovation and discovery shone through in the service of the community and the health of kids everywhere, as we all tackled some of the largest challenges of our lives throughout the pandemic.

CHEO researchers, scientists and staff didn't just pivot; they also took strides to make things better and lent a hand when one was needed, not simply when asked. Their contributions were wide ranging and all of them helped get us through this COVID-times rollercoaster. Whether volunteering to screen everyone entering CHEO or organizing the production of community-made masks to keep children, youth and families safe; whether re-focussing knowledge, equipment, and expertise to re-purpose N-95 masks during the global PPE shortage or looking at the level of antibodies in a household to understand better how the SARS-CoV-2 virus spreads, CHEO researchers saw needs and addressed them.

They also led by innovative collaboration. Researchers who usually studies rare diseases teamed up with water engineers from uOttawa and the City of Ottawa to develop Canada's first publicly used wastewater measure of COVID-19, which provides an early warning signal about the level of COVID-19 in the community. The poop meter, as I like to call it (we are a children's organization, after all) became integral to Ottawa's understanding of how well we were, or weren't, stopping the spread of disease. The effect on the public health of the city cannot be underestimated and is evidence of the research excellence that drives innovation and discovery at the CHEO Research Institute.

These are only a few highlights of the research that propels and informs CHEO's ability to provide the best care with the latest treatments; to provide the best life for every child or youth. I am looking forward to the results of all our researchers returning to their work, from the bench to the bedside, and advancing the impact of science at CHEO, and beyond.

Alex Munter
President and CEO
CHEO

The CHEO logo, consisting of the letters 'CHEO' in a bold, purple, sans-serif font.

Strategic Plan

2020-2024

The CHEO Research Institute launched CHEO's research strategic planning process in February 2020, driven by the following question: "What will success look like in 2024?" The strategic plan charts a path to success, with the theme of 'Oh, The Places We'll Explore! 2024' focused on exploration.

In an amazing demonstration of partnership across CHEO, the CHEO Research Institute and the CHEO Foundation, our branding features the CHEO Foundation Bear, the bear's debut in a strategic plan logo! The next few pages outline our new strategic plan.



Expand research in a sustainable fashion, measured through patient impact stories and tangible metrics of success

we will grow.
It will show.



Recruit
a minimum of
2-3 new
scientists



Improve
metrics that
measure
our success



Increase
external
grant
success



Enhance
current
policies and
processes



Optimize
our use of
Research
Institute space

Support the growth of child health researchers to achieve research excellence and improve patient care.



Redefine clear
areas of child
health research
excellence



Develop
and evaluate
new
programs



Leverage
the unique aspects
of pediatric
populations



Explore opportunities for
a dedicated research
investigation unit for
interventional trials



AS WE
teach, the
heights
we'll
reach!

Guide CHEO into becoming a research- intensive healthcare organization



Develop

meaningful metrics to assess research engagement during annual performance reviews



Create

and evaluate a pilot CHEO Research Champion program



Ensure

that all CHEO children, youth and families will be given the opportunity to participate in research



Reflect

CHEO Research Strategy metrics in the next CHEO strategic plan. Review regularly at hospital Executive and Board meetings

Don't give up,
we need
support from
you all! Join in
research, no
matter how
small.

Integrate technology to streamline communications and work processes and facilitate research using digital means



Complete

an extensive external IT review



Develop

comprehensive data platforms to facilitate access to all available data



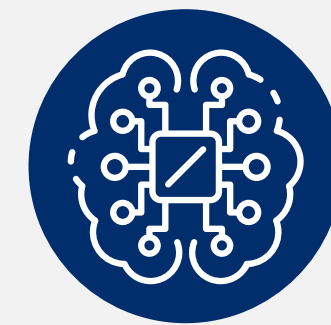
Optimize

external communications so CHEO Research becomes a real-time, trusted community resource for families and donors.



Increase

the use of technology, EPIC, MyChart, and social media



Partner

with clinicians to implement AI into clinical workflows

one tech, two
tech, old tech,
new tech.

Learning Opportunities

The impact of COVID-19 infection on children is a bit of a mystery: it isn't clear whether children who look healthy but are infected can transmit the virus to someone else. Early on in the pandemic, the Emergency Department (ED) team noticed that COVID-19 did not spread to all members within a family - despite a lack of social distancing. To understand why, pediatric emergency physicians Maala Bhatt, Research Director of CHEO Emergency Medicine, and Roger Zemek, Senior Scientist at CHEO Research Institute, worked with their interdisciplinary team to secure more than 1.2 million dollars to study COVID-19 transmission in households.

They studied more than 200 households with at least one family member who tested positive for COVID-19, conducting a comprehensive analyses of COVID-19 transmission, infection, and immunity. Participating household members had a series of blood tests to look at multiple markers of immunity as an indicator of past infection. In addition, each household was surveyed about how their house is set up (e.g. type of housing, number of rooms), chronic medical conditions, and whether social distancing was maintained. "In this study we act like a 'fly on the wall' to really understand the transmission of COVID-19" says Roger.

The ED team has lived our value of 'nimble', pivoting to a new challenge and collaborating to solve problems. "It is a huge undertaking to bring a household with a confirmed case of COVID-19 to the hospital for study procedures. We worked with everyone at CHEO to keep people safe". The community response has been extraordinary. "We are thrilled with the study participation", says Maala. "For 80% of our study households, all household members are participating".

Fellow scientists are also excited: "This study has snowballed," says Roger, "we keep securing additional funding and establishing new collaborations". A new collaboration with Marc-André Langlois, a molecular virologist at University of Ottawa, has been essential for their success. They are breaking new ground, using his comprehensive and automated antibody test to get a rapid and robust measure of immunity to COVID-19.

While the team is finishing its analyses and getting ready for publication, they already have exciting results: 'most households experience transmission, and both kids and adults can transmit the virus' says Maala. Their final results will answer important questions such as whether people develop immunity after being infected with COVID-19 and how long immunity lasts. Stay tuned!



Left to right: Dr. Maala Bhatt, Lauren Dawson, Dr. Roger Zemek, and Candice McGahern

Thinking on our feet

At the beginning of the COVID-19 pandemic, there were widespread concerns about the availability of personal protective equipment, especially N95 masks. This prompted a team of CHEO researchers to explore whether N95 masks, designed to be worn once and then discarded, could be safely re-used. “We were worried about how possible shortages would affect our friends and colleagues and their families,” says Dayre McNally, Scientist and pediatric intensive care physician: “this started as an effort to help keep them safe”.

Dayre, together with Katie O’Hearn (Research Coordinator) and Richard Webster (Team Lead for Health Informatics), decided to find out what was already known. The best way to do this is a systematic review, which identifies all relevant research on a topic to provide a comprehensive overview of all available evidence.

Systematic reviews typically take six months or more to complete – but Dayre had a more nimble idea: crowdsourcing. With funding provided by the CHEO Research Institute, Dayre had demonstrated that it was possible to recruit a large number of qualified people online to review articles and produce rigorous systematic reviews in weeks rather than months or years. In partnership with Algonquin College, the insightScope platform was launched in 2019 to facilitate crowdsourcing... just in time to review safe and effective methods for decontaminating N95 masks.

Dayre, Katie, Richard and others completed their first systematic review within seven days – and found that ultraviolet light is an effective and safe way to decontaminate N95 masks. Subsequent reviews evaluating microwave irradiation, heat, and vaporized hydrogen peroxide were completed in less than three weeks. ‘The speed with which we completed these reviews is unheard of’ says Katie, ‘the importance of the insightScope platform to expedite our research cannot be overstated.’ The response was immediate and massive: their work received global press coverage and the reviews were downloaded thousands of times. “I knew we had addressed a pressing and global need when Katie made the New York Times” says Dayre. Although thankfully not needed at CHEO, their findings were used by other hospitals to develop N95 decontamination protocols.

Clearly, research at CHEO goes beyond children’s health. Our researchers’ curiosity, skills, and connections make a global impact. “So many people collaborated to complete these systematic reviews and use our findings” says Richard. “From CHEO to the Perley and Rideau Veterans Health Centre ... Health Quality Ontario, the Public Health Agency of Canada, and the Office of the Chief Science Adviser of Canada...the reach of this work was incredible”.



A global impact

Dr. Tyson Graber, a Research Associate and cell biologist at CHEO Research Institute, didn't expect to become an expert at detecting COVID-19 in poop. In March 2020, Dr. Alex Mackenzie, Senior Scientist, wanted to test Ottawa's wastewater for SARS-CoV-2, the virus that causes COVID-19. SARS-CoV-2 is normally shed in feces and can be detected before someone shows symptoms of COVID-19 infection. Alex teamed up with Dr. Robert Delatolla, a wastewater engineer and Professor at University of Ottawa, who was interested in whether wastewater testing could provide an early-warning signal of COVID-19 outbreaks. They needed someone with expertise in detecting RNA – the genetic material of the COVID-19 virus and invited Tyson to collaborate. At the time nobody knew whether detecting SARS-CoV-2 was possible: "Wastewater testing is trendy now, but it's incredibly hard to do well", says Tyson.

While most laboratories shut down, Tyson and Alex were granted access to CHEO Research Institute to study SARS-CoV-2 detection in wastewater and secured targeted funding to support their project. It took them a month to demonstrate that you could detect Sars-CoV-2 in wastewater, and another few months to show that you can reliably measure the virus and observe trends over time. Their detection methods are now used by communities across Canada and around the world. Key to their success was CHEO Research Institute's nimble approach, says Alex: "Access to the lab and funding gave us a 3-month runway to figure out and publish the methods. Everybody else had to play catch-up after that".

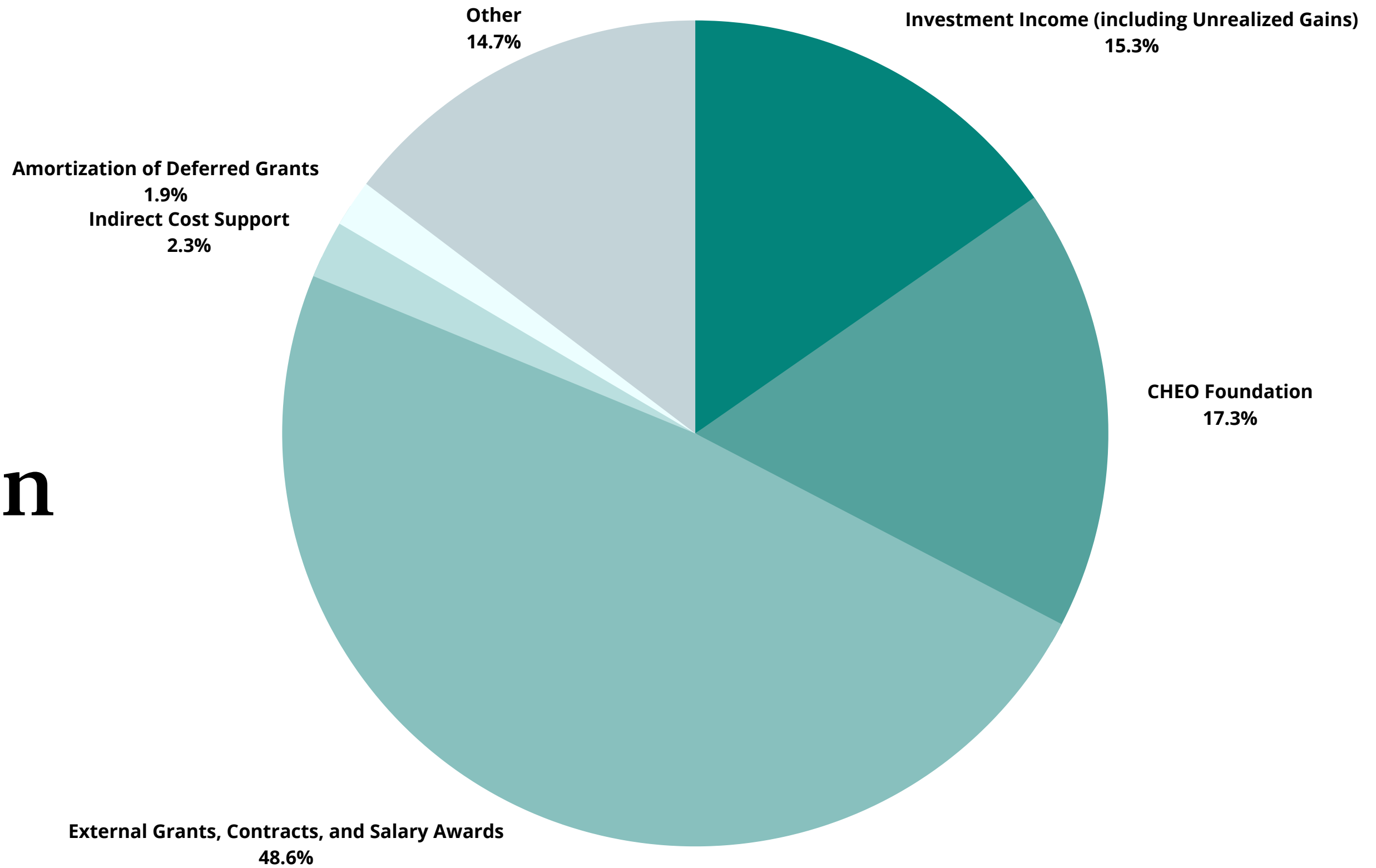
Their research has expanded to look for variants of concern (VOCs) in wastewater, which has already resulted in meaningful health impacts. Universities in Windsor and Guelph tested their wastewater for VOCs when students began returning to campus. The delta variant, which is causing a sharp spike in COVID-19 cases in the UK, was detected before it showed up in clinical testing. This early signal gave public health precious time to test, isolate, and trace affected individuals and prevent further transmission.

Their work also led to the establishment of a first-of-its-kind SARS-CoV-2 wastewater surveillance initiative to identify known and emerging VOCs across Ontario. "It's amazing to see how the science has matured over the course of the pandemic" says Tyson, "It's an excellent example of how collaborations between basic research, epidemiology, and public health can move discoveries out of the lab and improve health."

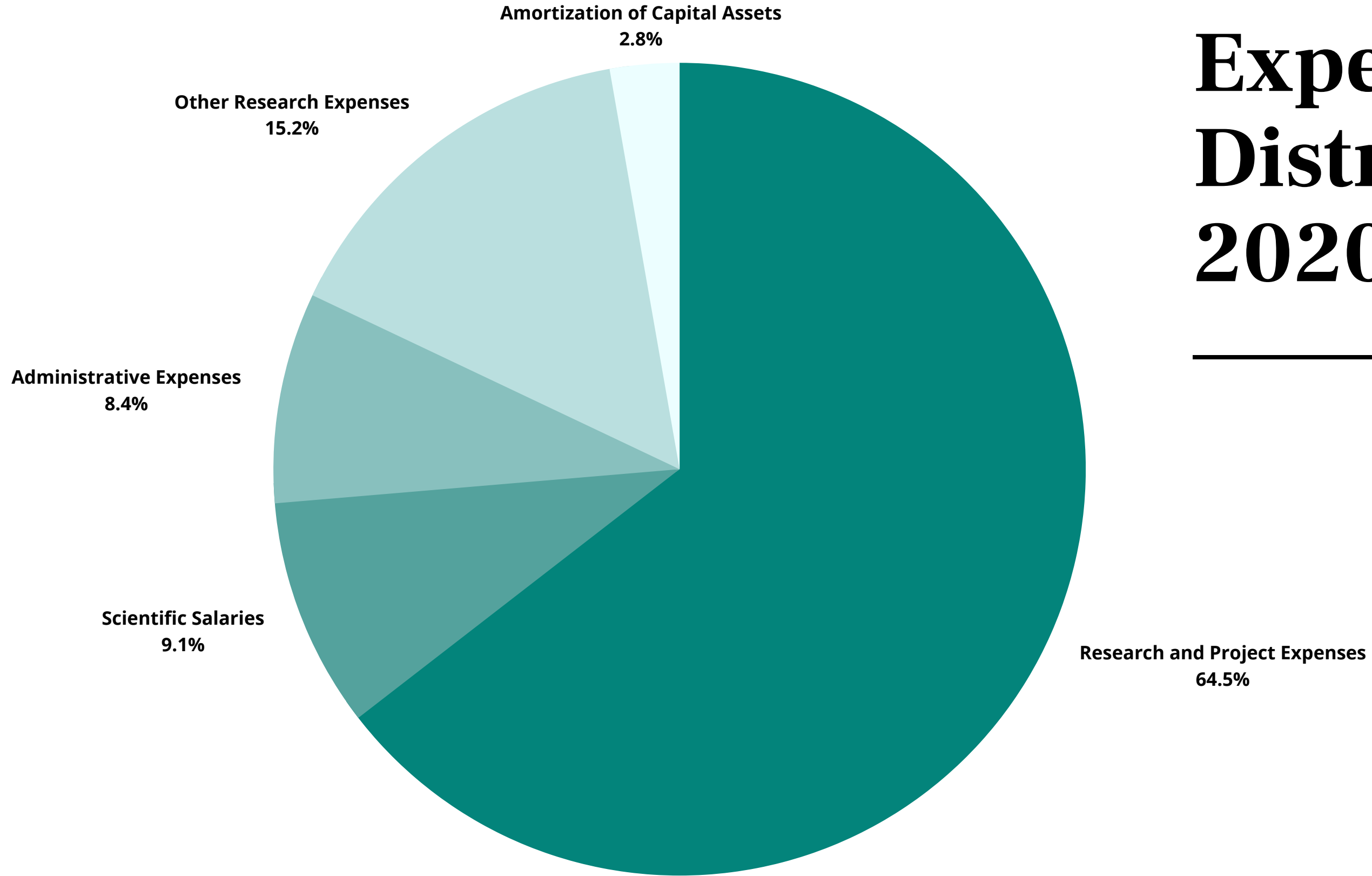


Left to right: Dr. Tyson Graber, Dr. Alex Mackenzie, and Dr. Robert Delatolla

Revenue Distribution 2020-2021



Expenditure Distribution 2020-2021





Renewing our plan of action

Together the CHEO Research Institute, CHEO and the CHEO Foundation formed a **Joint Equity, Diversity Inclusion and Indigeneity Task Force** made up of over 20 members across all three organizations including staff, medical staff, research investigators, volunteers, and family advisors. We will uphold the call to listen and learn, and to review our practices to create ever safer, respectful, and equitable spaces for persons involved in both conducting and participating in research. We are committed to engaging Black, Indigenous and other racialized voices, as well as underrepresented groups, both internally and in the broader research community to create a renewed plan of action.

We are proud of the early work completed by the CHEO Research Institute in this area in 2020.

- We identified key research personnel to lead this important work related to Equity, Diversity, Inclusion and Indigeneity on behalf of the organization, all of whom now sit on the joint EDII task force.
- When creating a new vision, mission, and values for the organization, we ensured that equity was a key value of our organization for the first time.
- In the management and dispersion of the Canadian Research Continuity Emergency Fund (CRCEF) an Equity, Diversity and Inclusion Committee was also formed to ensure fair management of these important COVID funds.
- The CHEO RI holds three town halls (Leadership Check In) annually for all researchers and research professionals to attend. In 2020, for the first time, we promoted unconscious bias training to our research community at this important forum.
- At a Board of Directors level, we amended our by-laws to include EDII language and as we embarked on the recruitment of three new Directors, we ensured a focus on EDI in our recruitment efforts.
- Based on feedback from within our organization, we updated our external website visuals to ensure all images were more representative of the community we aim to engage in research.

Our Partners

CHEO

[Children's Hospital of Eastern Ontario - Annual Report](#)



[CHEO Foundation - Annual Report](#)

Discoveries to inspire the best life for every child and youth.

Des découvertes pour inspirer la meilleure
vie à chaque enfant et adolescent.

CHEO
RESEARCH INSTITUTE



Left to right: Amanda Sully, Aidan Deschamps, and Adam Deschamps