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SIGNS of the Times

To keep patients, families and their providers safe during the COVID-19 pandemic, St. Jude had to limit the number of interactions on campus. The hospital created zones to reduce risk – separating clinical, research and administrative staff – to continue providing world-class clinical care and cutting-edge research. In this issue of *Promise*, you'll learn about the many changes that occurred so St. Jude could continue its lifesaving mission.

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Contact us: promisemagazine@stjude.org, 901-595-2125 The mission of St. Jude Children's Research Hospital is to advance cures, and means of prevention, for pediatric catastrophic diseases through research and treatment.

ON THE COVER: Photos by Seth Dixon

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A Message from James R. Downing, MD, President and CEO

WITH THE EMERGENCE of the COVID-19 pandemic earlier this year, life across the country and around the world transformed nearly overnight. At St. Jude Children's Research Hospital, we moved quickly to protect the health and safety of our employees, families and the most vulnerable members of our community—our patients. It is a sacred privilege to care for the children and families of St. Jude. I am

inspired by their courage, moved by their dedication and committed to being their advocate and partner through this crisis and beyond.

Our hospital founder, Danny Thomas, once said, "No man stands so tall as when he stoops to help a child." St. Jude employees stood tall and pulled together to create one of the safest harbors against COVID-19 in the nation.

As you will see in this edition of *Promise*, we instituted innovative protection measures across clinical, scientific and administrative operations. These include a first-of-its-kind COVID-19 testing program for employees, patients and families; campus zoning; reduced personnel and visitors' access; and heightened infection control procedures.

It takes a small village to accomplish institution-wide monitoring, preparedness, screening and surveillance. But thanks to these steps, we have been able to minimize the impact of the virus among the St. Jude community.

Beyond the gates of our campus, the

'It is a sacred privilege to care for the children and families of St. Jude. I am inspired by their courage, moved by their dedication and committed to being their advocate and partner through this crisis and beyond."

pandemic surges through communities near and far, with millions of people infected. Meanwhile, we continue to respond to the threat while pursuing cutting-edge research and providing exceptional medical care for children with life-threatening diseases.

When the pandemic weighs on us, it is important to recall the lessons inherent in our mission. We know that good can arise and challenges can be overcome when a shared purpose is coupled with love and courage. Let us hold tight to these powerful forces—and remember their capacity for positive change.

Racing a Pair of the second se

As COVID-19 spread around the globe, St. Jude prepared a response.

By Mary Powers and Elizabeth Walker

IN EARLY JANUARY 2020, Hana Hakim, MD, of St. Jude Children's Research Hospital heard reports of a mysterious pneumonia that had sickened dozens of people. The outbreak was halfway around the world in Wuhan, China.

"At that point the news registered with me, but not as a threat to our patients or staff," recalls Hakim, an infectious disease specialist, researcher and medical director of St. Jude Infection Prevention and Control. But as reports on the respiratory illness escalated, Hakim's apprehension grew. The pneumonia was soon linked to a novel coronavirus. Cases were appearing outside of Wuhan.

"My concern rose to a high level when it appeared the virus could transmit efficiently from person to person," she says. "Even more concerning was the potential viral spread from asymptomatic or mildly symptomatic people. That brought home the pandemic potential of this virus."

The threat took on new meaning January 21, when a person in Washington became the first reported U.S. case.

St. Jude values at work

As storm clouds gathered, St. Jude faculty and staff began working around the clock to thwart the pandemic's threat. Given the hundreds of employees serving daily in patient-care areas, swift action was required to help protect patients while allowing lifesaving work to continue.

In a 72-hour period, a space in the St. Jude Garden was transformed into a

Hana Hakim, MD

first-of-its-kind, off-campus drive-through testing center for employees who might be infected. Upon confirmation that individuals with no symptoms might spread the virus, St. Jude launched an unprecedented program for random testing of clinical staff (see related story, page 8). The tests provided an additional safety measure to the symptom screen that all employees received each day.

To further reduce infection risk for patients and staff, St. Jude drastically curtailed the number of people coming onto campus. Although the hospital corridors were quieter than usual, a hum of energy emerged from the campus' central hub of activity and decision-making: the St. Jude Incident Command Center.



"We adjusted the entire campus," says Colette Hendricks, Clinical Operations vice president. "Facilities, access, screenings, vendors, eating arrangements—everything—and we had to do it in a very short amount of time."

Protecting patients

Children already struggling with life-threatening diseases now had their fragile routines thrown off-kilter by the looming crisis. At St. Jude, patients and families rose to the challenge, displaying a level of strength that inspired hospital staff.

As the pandemic progressed, St. Jude had to place a protective bubble around the campus. That meant limiting the number of caregivers, visitors or siblings allowed in the hospital and its housing facilities. A testing program was also instituted for patients and families.

In the housing facilities, St. Jude staff raced to obtain additional cleaning supplies, hand sanitizer, wipes and shelf-stable foods.

"I know how a natural disaster unfolds," says Caron Byrd, JD, director of Housing and Patient Services. "But the shortage of supplies around the country—such as the scarcity of toilet tissue, for instance—I'd never seen or experienced anything like that before."

As the virus spread throughout the community, St. Jude suspended the use of grocery shuttles and food delivery services for families. Instead, refrigerated and freezer food-storage trucks were parked at Target House, one of the hospital's housing facilities. Patient families chose foods they needed from a shopping list. Staff members then "shopped" from the in-house items and delivered the requested groceries to patients' rooms or apartments.

Meanwhile, in the hospital, workers employed many tactics to create a safe environment, including using UV light to sterilize and kill microbiological contaminants.

"After we clean and sanitize the rooms, we put the ultraviolet machine in the area to let the blue lights kill any remaining germs," says Curt Vargo, Environmental Services director. "UV is an additional layer of protection after a patient's room has been cleaned." "Challenges like this can be physically draining. But **if you believe in something—and every day you come to work and are surrounded by people with the same passion** to do everything it takes for the safety of patients, families and staff—one keeps going."

— Aditya Gaur, MD



Driven by passion

As the pandemic unfolded, the hours were long for St. Jude employees and the families who waited for them at home. The tasks to accomplish seemed overwhelming at times. But the St. Jude community pulled together to keep infection rates low.

"Challenges like this can be physically draining," says Aditya Gaur, MD, St. Jude Occupational Health medical director. "But if you believe in something—and every day you come to work and are surrounded by people with the same passion to do everything it takes for the safety of patients, families and staff—one keeps going."











In Pursuit of a Hidden Enemy

St. Jude teams unite to launch a unique process for COVID-19 testing of patients and employees.

By Mary Powers and Carole Weaver Clements, PhD

EVERY FOUR SECONDS Kimberly Berg picks up a 15-milliliter vial in her double-gloved right hand. She unscrews the top, switches the tube to her left hand and positions it under a thin nozzle. The vial automatically fills with 3 milliliters of a clear solution. Then Berg screws on the top, places the vial into another tray and starts again. Before the day ends at the Children's GMP, LLC, she and her colleague Rhonda Cooper will fill and label 2,000 tubes with viral transport media.

The tubes are destined for the Marlo Thomas Center Auditorium across campus at St. Jude Children's Research Hospital. There, an employee COVID-19 testing program is underway. Each day, hundreds of staff members randomly selected for screening enter the auditorium, sit down at testing stations and have their noses swabbed. Meanwhile, patients and families undergo testing in another part of the hospital.

Nurses place the swabs into vials with transport media that has been produced and packaged at the GMP facility. The vials are then transported to the St. Jude Clinical COVID-19 Testing Lab, where pathologists test between 5,000 and 6,000 samples per week.

Innovation for protection

When the testing program began in March 2020, it was the only one of its kind in the world. The initiative combined an aggressive symptomscreening program with testing for asymptomatic employees. Although many hospitals already had symptomscreening programs in place, St. Jude took a giant leap forward by adding the testing component.

One danger of COVID-19 is that some individuals may be unaware they are infected and may unknowingly infect others.

"Those are the people we're trying to catch—employees who assume they're healthy but are actually infected," says James Hoffman, PharmD, chief patient safety officer. "It's exciting to be a part of something that's innovative and helps protect our patients, families and employees."

A well-oiled machine

In the early days of the pandemic, St. Jude scientists, clinicians, administrators and others began working to create a seamless testing process.

Scientists in the GMP facility began creating transport media to preserve any COVID-19 virus picked up during a nasal swab. Computer programmers designed software to identify which staff members would be tested each day. Workers transformed the elegant lobby of the Marlo Thomas Center into a screening facility. Nurses and other staff members were trained to collect the samples, and detailed procedures were developed to track the materials.

In the first week of the program, more than 700 employees received the new test. Today, hundreds of faculty and staff undergo random testing each day—a process that requires only a few minutes of their time.





Marching forward together

In March of 2020, Stacey Schultz-Cherry, PhD, and Richard Webby, PhD, of Infectious Diseases; and Paul Thomas, PhD, of Immunology temporarily shifted their focus from research so they could assist with the COVID-19 testing.

"This is what we do in our influenza surveillance programs at St. Jude: We look for viruses," says Schultz-Cherry. "We're already doing this kind of molecular diagnostic testing for research. That made it easy for us to say, 'OK, we do this for flu all the time. We can Vials of viral transport media produced in the Children's GMP, LLC (above) are used for testing patients, families and employees such as Herman Robinson (left), chef de cuisine in St. Jude Food Services.

do this for coronavirus."

Soon, researchers and their staff were able to return to their usual operations, as Pathology employees in the new Clinical COVID-19 Testing Laboratory assumed the responsibility for testing thousands of samples each week.

"We built an entirely new lab in a few weeks," says Randall Hayden, MD, who directs the Clinical COVID-19 Testing Lab. "A lot of people worked around the clock to get the new space prepared, equipment installed, tests validated and running, and a supply chain in place. As a result, we had the capacity for patient testing well before most other centers in the country. We're now able to process huge numbers of samples to support our employee testing program, which continues to grow as more staff return to work."

Hayden says people throughout the institution helped make the effort a success.

"This has been a team effort that has shown not only the talent and dedication of our staff, but their ability to work together in the new ways that this challenge has demanded," he says.

"St. Jude is a unique environment," he continues. "Not only do we have the right expertise and laboratory space in close proximity, but we have very close working relationships between the research and clinical laboratories—it's a setting that makes collaborative activities much faster and easier."

The Colors of Coronavirus

A collaborative effort at St. Jude results in a coloring book that helps children understand the new coronavirus and alleviates anxiety for families.

By **Tiffany Derrick**

CORNFLOWER, INDIGO, electric lime and apricot are among the hues in a box of crayons. But what color would you choose for the novel coronavirus that has transformed life as we know it?

Children across the country and around the globe can select any shade they wish as they fill in pages of a new coloring book designed by St. Jude Children's Research Hospital.

With the arrival of COVID-19 in the U.S., St. Jude staff recognized a need for resources for parents to talk about the pandemic with their children. And so, the idea for an ageappropriate educational tool in the form of a coloring book was born.

Crayons and conversations

Research shows children learn best through play, with a non-threatening approach to working through potentially threatening situations.

"Our goal was to help our patients find a way to adjust to these big changes happening around the world, but we also wrote the books more generally so that everyone could use them," says Pediatric Psychologist Kristin Canavera, PhD.

Canavera collaborated with Child Life Specialist Rachel Schmelzer and colleagues in the Department of Medical Content Outreach on the project. "It's not just St. Jude patient families who are anxious about COVID-19," Canavera says. "A lot of the information about the virus has been focused on adults, but many parents might not know how to start a conversation without it being too intense."

Colorful coping mechanisms

The team made coloring books for young children and activity books for older children. St. Jude graphic designer Emily VanGilder created an accessible design for both.

"Many parents know this is a scary time, so the coloring book is a way to bring this "Our goal was to help our patients find a way to adjust to these big changes happening around the world, but we also wrote the books more generally so that everyone could use them."

— Kristin Canavera, PhD

topic up without it being too overwhelming," Schmelzer says. "While the unknown is far more threatening than the known, it's important to have age-appropriate tools we can use."

The team hopes the coloring and activity books will help families manage their anxiety around COVID-19. Canavera says being open, honest and willing to discuss uncertainties and fears can help children learn better coping mechanisms.

Luminous in any language

Canavera credits teamwork throughout the hospital for helping the project develop quickly.





Coloring book for children ages 5–9: together.stjude.org/covid19-coloringbook

COVID-19 activity book for older children and tweens: together.stjude.org/covid19-activitybook

Download the books in other languages: together.stjude.org/covid19-coloring book-global

Resources for teens: together.stjude.org/covid19-teens "Working with colleagues in other departments has been one of the most rewarding experiences I've had," she says. "At St. Jude, collaboration has always been one of our strengths, but I've been impressed with how willing everyone is to work together during this challenging time."

The Learn About the Coronavirus Coloring Book is aimed at children ages 5–9. An activity book for older children and tweens, Learn about Coronavirus and COVID-19, includes more detailed information as well as interactive activities such as crossword puzzles and word

Age-appropriate tools

Nurse Tia Hermanson (right) and 11-year-old Zoe Simpson work through the *Learn about Coronavirus and COVID-19* activity book.

searches. The team also created a teen resource that is available online.

The books are offered in Arabic, Chinese, English, Farsi, Filipino, French, German, Hindi, Italian, Malay, Portuguese, Russian, Spanish, Swahili and Urdu. Download them for free on the hospital's Together website, an online resource about childhood cancer. During the COVID-19 pandemic, St. Jude Nursing brings a front-line approach to the pandemic response.

to the pander response. In the pander response. In the pander response. In the pander response. In the pander response.

By **Mike O'Kelly and Elizabeth Jane Walker** WHEN A 7-YEAR-OLD ANSWERS her apartment door to discover two Ghostbusters clad in protective gear and heavy-duty backpacks, what does she do?

If she's a patient at St. Jude Children's Research Hospital, she probably invites them in to see her toys.

That scenario plays out often in St. Jude housing facilities, now that nurses are visiting patients' rooms and apartments to provide routine care. It's one of many ways the hospital is preventing the spread of SARS-CoV-2, the virus that causes COVID-19.

"We look like Ghostbusters," admits Teresa Neal, RN. "We wear isolation gowns, masks and goggles, shoe coverings, head coverings and gloves." The team is also laden with backpacks, carts and coolers that contain all the supplies they require as they move from room to room.

Priority: safety

When the first COVID-19 cases appeared in the U.S., Nursing leadership began discussing contingency plans in case of rapid coronavirus spread. Staff gathered supplies, created and implemented new procedures, and brainstormed innovative ways to protect St. Jude patients and families.

That included deploying a team of nurses to housing facilities. Now, many patients no longer go to campus for routine bloodwork or central-line care. Instead, the care comes to them.

"If we can keep families in their homes, then we can help all the patients stay safe," says Tricia Mamer, RN, nurse manager in the Outpatient Clinics.

Tools and talent

Under the guidance of Chief Nursing Executive Robin Mutz, RN, Nursing leadership has taken proactive measures, implemented new policies and enhanced collaboration during the hospital's response to the pandemic.

Bryan Mathieson, director of clinical logistics in Nursing, shared his expertise in crisis training. As a nurse practitioner in the Indiana Air National Guard, Mathieson is part of a special operations unit that focuses on disaster preparedness and emergency response. **"I feel proud to be a nurse.** We chose this career knowing that unexpected things would happen. Because we care about our patients, we are stepping up, relying on each other as a team even more, and getting the job done."

– Kelsey Perry, RN

"We spent long hours trying to devise what a response plan might be from a nursing standpoint. We wanted to be prepared and proactive," Mathieson says.

Collaboration has led the way during these unprecedented times. Nurses are working in unfamiliar settings for the first time in decades or, in some cases, the first time in their careers.

Many nurses have offered to help with patient and employee screening as well as with COVID-19 testing. Clinical research nurses who haven't seen patients in years step in to assist with testing. Nurses who work in outpatient clinics help their colleagues on the inpatient floors. Their inpatient teammates return the favor.

"Everybody is making a difference and encouraging and pulling for each other. We are working together to get us through this crisis," says Carlene Edwards, RN, who volunteered 17 straight workdays to support her team.

Laughter on the front lines

Members of the traveling nursing corps say they find joy in their labors. Their day is peppered with laughter. The team poses for silly photos in the shuttle bus, en route to the Parcels at Concourse, in the Target House lobby, or perched on a bench next to the Ronald McDonald statue.

Instead of focusing on the hardships, they mention the visceral moments: The routine appointment that yields a poignant conversation; the scent of freshbaked empanadas wafting through a patient's apartment. The relationships they're building with the families and with one another; the refreshing bottles of ice-cold water gulped at the end of an exhausting day.

"These nurses have stepped out of their comfort zones," Neal says. "They're making sacrifices, and they've done it with grace and with pride for the institution. They've really gone over and above to make sure our kids are safe."

Kelsey Perry, RN, an oncology nurse on the Leukemia unit, says teamwork is keeping nurses focused. Even through the uncertain times and new policies, the goal remains the same for St. Jude nurses—to provide the best patient care possible.

"I feel proud to be a nurse," Perry says. "We chose this career knowing that unexpected things would happen. Because we care about our patients, we are stepping up, relying on each other as a team even more, and getting the job done."

St. Jude aims to better understand COVID-19 in children, including in young cancer patients

Information Hub for the Nation and World

When the new coronavirus roared on the world scene in late December 2019, scientists rushed to discover information about the mysterious virus and the disease it caused.

At St. Jude Children's Research Hospital, investigators began studying the literature surrounding COVID-19 and communicating with partners in China and Singapore to understand how the disease affects children with cancer.

"Right now, we don't know how to treat COVID-19," said Carlos Rodriguez-Galindo, MD, executive vice president and director of St. Jude Global. "There is controversy about what type of treatments are available and should be given. We don't know how this impacts children and the services required to deliver care. The problem is still evolving."

A national collaboration

In its role as a coordinating center for the Pediatric Infectious Diseases Transplant Network (PIDTRAN), St. Jude is hosting a U.S. registry of pediatric cases of COVID-19, available at *pedscovid19registry.com*. The network is part of the Pediatric Infectious Diseases Society, and the coordinating center is housed within the St. Jude Department of Infectious Diseases under the direction of Gabriela Maron, MD. St. Jude, the Children's Hospital of Philadelphia, Seattle Children's Hospital and Chicago Children's Hospital collaborated to launch the COVID-19 registry.

The registry opened in March to collect de-identified information about U.S. residents younger than 21 diagnosed with COVID-19. Doctors hope to learn more about the incidence, distribution, clinical presentation, management and outcomes of the infection in children. Health care providers and researchers will use those details to help develop better treatment and prevention strategies for pediatric patients with COVID-19.

By early July, data on more than 3,000 pediatric COVID-19 cases had been submitted to the registry from 127 institutions.

Worldwide resources

Around the time the registry was gearing



Carlos Rodriguez-Galindo, MD

up, Miguela Caniza, MD, director of St. Jude Global's Infectious Diseases Program, led an annual training session on global infectious diseases. Colleagues from 14 countries met at St. Jude for the scheduled course. With the pandemic on everyone's minds, the meeting quickly turned into a pediatric cancer-COVID-19 working group.

"We are facing a global challenge like never before, and we need to articulate a response that brings together multiple organizations around the world," says Rodriguez-Galindo. "Not only is this virus placing the lives of children with cancer at risk, but it is also disrupting the entire continuum of cancer care. Access to care around the world is limited, and our international partners, like us, are focusing substantial hospital resources on fighting COVID-19."

Building on that meeting, St. Jude Global created a website dedicated to the effect of the pandemic on the treatment of pediatric cancer patients around the globe. The Global COVID-19 Observatory and Resource Center for Childhood Cancer (global.stjude.org/covid19childhoodcancer) is for health care professionals who focus on pediatric cancer. The resource provides a way for providers worldwide to collaborate, connect and find the latest information on COVID-19 as it relates to childhood cancer.

St. Jude and the International Society of Paediatric Oncology (SIOP) developed the site. Clinicians can contribute to or access information from a COVID-19 registry that includes de-identified data on reported cases. Health care professionals around the globe can also consult the site's resource library or collaborate with their peers through online seminars and workshops.

The virtual center opened in April 2020. By early July, 405 COVID-19-positive de-identified pediatric cancer cases from 28 countries had been added to the registry.

"Through St. Jude Global, this new effort coordinates knowledge-sharing for treating pediatric cancer patients who have COVID-19," says St. Jude President and CEO James R. Downing, MD. "Development of COVID-19 is particularly worrisome because these patients have suppressed immune systems from cancer treatments. This platform is helping clinicians worldwide develop best practices for treating children with cancer and COVID-19."

Tracking a Deadly Virus

St. Jude employees and researchers join forces for a deep dive into the virus that causes COVID-19.

By Mary Powers

IN JANUARY OF 2020, Paula Condy, RN, felt crummy upon returning to Memphis from a New York vacation. Fever, body aches, cough, lack of energy, shortness of breath and other symptoms pointed to influenza. To her surprise, her flu test was negative. For weeks, Condy continued to fight the mysterious ailment, safely holed up in her home. By the time COVID-19 testing arrived in Memphis, she had recovered, and that test was also negative.

"There's a possibility I could have had COVID-19," says Condy, who has been a nurse at St. Jude Children's Research Hospital for 24 years.

So, when researchers asked St. Jude employees to join a yearlong COVID-19 study, she leapt at the chance.

"I wanted to help the hospital any way I could," Condy says.

Not only did she sign up for the study, but she also volunteered to collect blood samples from other participants.

Faculty and staff across St. Jude have answered the call to participate in the study, called St. Jude Tracking Study of Immune Responses Associated with COVID-19 (SJTRC). No PhD, MD or other degree is required—just a willingness to answer health questions and provide periodic blood samples and nasal swabs.

A deeper understanding

Public health interventions, such as social distancing and limiting business services, can slow the spread of COVID-19 and "flatten the curve" of the disease. But, new cases occur when those efforts are relaxed. There was one question on the agenda: Could St. Jude mobilize the hospital's faculty, staff and resources to perform an important pandemic study that could not be done by anyone else?

Ending the pandemic requires a scientific understanding of how our immune system responds to the virus.

The immune system defends against infection of all types, but the immune response can vary person to person. Although some COVID-19 cases can be life threatening, many people will have only mild cold-like symptoms or no symptoms at all. Scientists want to find out how some people's immune systems are able to recognize and control the virus without developing severe disease. That will help researchers better understand the illness and its spread. It will also help scientists know if having antibodies to the virus protects people from future illness.

A year of exploration

SJTRC participants, most of whom have no history of COVID-19, will provide

By studying the immune response to the virus, researchers aim to contribute to vaccine efforts and other strategies to fight COVID-19.

Post Minut

blood samples several times throughout the coming year. These employees also volunteer to receive periodic screenings along with nasal swabs to monitor for evidence of infection. Anyone who becomes infected will be asked for additional blood samples.

Scientists use the blood to track the immune response at the molecular level. The findings will aid vaccine development underway at research centers in the U.S. and worldwide.

Some employees will be eligible to join the study if they become infected with the pandemic virus. They will have their blood sampled to study their immediate and long-term immune response to COVID-19.

"We designed this study to try to identify what it is about some people that allows them to cope well with the infection, while others have a far more difficult time," explains Josh Wolf, MBBS, PhD, of Infectious Diseases. "That requires getting blood samples before and

Research in action

Paula Condy, RN (left) of Pharmaceutical Sciences collects a blood sample from study participant Miriam Dillard Stroud of Cell and Molecular Biology.

after infection and focusing on differences in their immune response."

Global challenge

The project began just days after World Health Organization declared COVID-19 a pandemic. James R. Downing, MD, St. Jude president and chief executive officer, asked researchers from across campus to answer one question: Could St. Jude mobilize the hospital's faculty, staff and resources to perform an important pandemic study that could not be done by anyone else?

The global reach of St. Jude science meant task force members knew what kinds of COVID-19 research were underway at other research centers. The St. Jude



scientists were also aware of pandemic research gaps.

"Widespread asymptomatic testing is crucial for understanding the natural history of COVID-19, including possible reinfection, but it was not being done elsewhere. St. Jude was poised to start," says Paul Thomas, PhD, of St. Jude Immunology.

Dozens of clinicians, researchers and administrators from many departments united to open the study within a few weeks. Today, nearly 1,000 employees have joined the study.

"I tell people St. Jude is a little village," Wolf says. "But we have never been afraid to look outside that village and say, 'What can we do to help the world?"" **1**

SUPPORTING SURVIVORS

St. Jude supports long-term survivors through the pandemic.

By Katy Hobgood Ray

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COVID-19 HAS BROUGHT unprec-

edented change to St. Jude Children's Research Hospital, including limiting campus access to active patients with urgent medical needs. To reduce the risk to current patients, long-term pediatric cancer survivors are not returning for routine checkups. This includes those in the After Completion of Therapy (ACT) Clinic, as well as participants in St. Jude LIFE, a study that brings childhood cancer survivors back to campus for health screenings throughout adulthood.

When it became apparent that survivors wouldn't be able to come back to campus for a while, St. Jude began creating resources about COVID-19related health risks.

"Many survivors have health issues related to their cancer or its treatment, some of which have been linked to a higher risk of having a severe course of COVID-19," says Melissa Hudson, MD, Cancer Survivorship Division director. "We are particularly concerned about our older survivors with chronic heart and lung disease."

Guidelines for survivors

Hudson collaborated with national and international peers to develop a statement to provide guidance to survivors related to risk and preventive measures for COVID-19. She co-chairs the International Late Effects of Childhood Cancer Guideline Harmonization Group (IGHG), which develops global guidelines for the long-term follow-up of childhood, adolescent and young-adult cancer survivors.

"Dr. Hudson made a tremendous effort, in concert with others, to develop resource information and materials for our survivors," says Greg Armstrong, MD, of Epidemiology and Cancer Control.

"She led the effort to develop the first national health surveillance guidelines for childhood cancer survivors over 15 years ago. And now amid COVID, she is an expert at being able to say, 'Well, what do survivors need during this time?""

We're in this together

The hospital's Together website team used information from Hudson, IGHG and other health agencies to create resources for patients, long-term survivors and Childhood Cancer Survivor Study participants.

Together provides information about medical concerns as well as resources to address the distress, anxiety and uncertainty of patients, long-term survivors and their families. The resources are available at together.stjude.org/en-us/care-support/ covid-19-resources.html.

Hudson and her coworkers communicate with survivors regularly via phone calls, emails and texts, making sure survivors can access needed care and resources.

"Many survivors have health issues related to their cancer or its treatment, some of which have been linked to a higher risk of having a severe course of COVID-19," **says Melissa Hudson, MD, Cancer Survivorship Division director**. "We are particularly concerned about our older survivors with chronic heart and lung disease."



The team is also updating Survivorship Care Plans so survivors who contract COVID-19 can share their information with local health care providers. The Survivorship Care Plan offers details on an individual's cancer treatment and associated health risks, recommended health screening, and active health problems.

"Cancer survivors are clearly a vulnerable population for COVID-19," says Alia Zaidi, MD, of St. Jude Epidemiology and Cancer Control. "The need for re-establishing patient communication becomes an essential service for them."

Speedy communication

During the pandemic, the hospital's staff created a new electronic patient communication process for survivors.

"All visit-specific patient evaluation documents can now be collated in a single digital version for upload to a St. Jude portal for viewing and download by the patient," Zaidi says.

Return to campus

When will long-term survivors be able to return to campus? Hudson says her team is working to prioritize ACT patients who have the most urgent clinical needs—those with serious health concerns best managed by St. Jude clinicians.

The survivorship group is working with survivors and families to determine the best options for local care until it is safe to open the ACT Clinic. That entails identifying community providers and resources to assure that survivors have access to medications and services.

Despite the pandemic disruption, ACT staff members have embraced the opportunity to re-evaluate routine clinic procedures and explore new initiatives.

"We hope that when COVID-19 is behind us, we will emerge with stronger partnerships with local health care teams that will facilitate the transition of care when survivors graduate from ACT," Hudson says.

Tune in for Telehealth

Telehealth services connect patients and providers amid coronavirus concerns.

By Keith Crabtree, PhD

IT'S MONDAY MORNING, and a patient at St. Jude Children's Research Hospital is scheduled for a checkup. But because of the COVID-19 pandemic, he and his parent will not be taking a shuttle bus from his housing facility to the hospital. Instead, the checkup comes to him.

Thanks to telehealth, patients can now undergo some medical exams from the safety of their rooms or apartments avoiding the risk of traveling to and from the hospital during the pandemic. Using digital stethoscopes and fiberoptic otoscopes, telepresenters meet with the patients, allowing physicians and advanced practice providers back at the hospital to conduct in-depth physical exams.

Safe and sound

A telehealth visit is a viable option for many patients.

Once the patient and provider connect, the provider can do the usual things: obtain history, assess symptoms, conduct a physical exam, review labs and diagnostic imaging test results, explain the treatment plan and schedule the next visit. If needed, a telepresenter collects vital signs and uses exam equipment to share digital images and data with the provider—as if the provider and patient are in the same room.

For patients who test positive for

COVID-19, families are given a telehealth kit and are taught how to use the equipment, reducing the risk to telepresenters and the need for personal protective equipment.

Patients usually access the telehealth app via tablets and laptops. The hospital's telehealth carts also include an on-demand feature for interpreter services.

The smart option

Suzette Stone, PhD, director of the Center for Advanced Practice at St. Jude, says that telepresenters go to Target House and other patient housing facilities with carts that carry the medical scopes and a kit. Kits are packed with gowns, gloves, goggles and masks; antibacterial wipes; ear specula; laptops and vital signs monitors; thermometers; and a few other essentials.

Smart tablets sit atop the telehealth carts, which are located in the hospital's housing facilities and clinics. Carts are also located on each hospital floor. The hospital provides full telehealth kits to a small number of patients at home.

Sidestepping anxiety

When the COVID-19 pandemic began, Nina Antoniotti, RN, PhD, director of Interoperability and Patient Engagement, and her colleagues realized that telehealth services—already in the planning stages—would be crucial during the coming weeks and months. The team purchased equipment and, during a three-day span, assembled 15 telehealth carts.

"We were about two weeks away from starting the program when COVID-19 hit," Antoniotti says.

The team refocused to accelerate telehealth training for physicians, advanced practice providers and psychosocial staff, among others. More than 160 providers and 20 nurse telepresenters trained in the program's first month, with the numbers increasing weekly.

"We went from zero to up to 20 patient visits a day within a month," says Ellie Reece, Clinical Operations director in Ambulatory Procedures.

About 1,200 patients received telehealth services between April 16 and June 25.

St. Jude staff and patients have had to embrace new ways of connecting during the pandemic. Elyse Heidelberg, PsyD, meets with 3-year-old Maddie Kate Harris during a psychology telehealth appointment.

Teletest

To ensure telehealth appointments run smoothly, Information Services staff Nina Antoniotti, RN, PhD (on screen), David White and Sarina Horn test equipment.

"Psychology was willing and able to do their visits via telehealth," Reece says. "They showed up as leaders and got all their staff trained early on."

"To this day, they're our biggest user, and they've spread it across all Psychosocial Services," she adds.

St. Jude has also begun getting clinicians licensed in other states so the program can expand. The team has helped identify new uses for telehealth that can begin while clinicians and patients are still at home.

"Once they've used telehealth, they keep



requesting it," says Stone, who explains that families appreciate the option to shelter in family housing during the pandemic and sidestep the anxiety of unnecessary community travel.

Joyful connections

On a busy Monday morning, an advanced practice provider quietly waits for a telehealth visit to begin. When the child's picture suddenly snaps into place, both the clinician and patient exclaim with excitement.

"It's so good to see you!" the St. Jude provider says.

"I miss you!" the child replies.

It's more than a routine appointment. For both clinician and patient, it's a joyful connection. It's another St. Jude moment.

GOVID Q&A

By Michael Sheffield

Three St. Jude scientists answer your questions about COVID-19.

The Infectious Diseases Department at St. Jude Children's Research Hospital has been at the forefront of influenza research since virologist **Robert Webster**, **PhD**, first set foot on campus in 1968. Webster, who is responsible for finding the link between the world's influenza virus reservoir and migratory aquatic birds, dedicated his career to hunting the flu virus and helping the world better prepare for the next pandemic.

Now retired, Webster joined **Richard Webby, PhD**, and **Stacey Schultz-Cherry, PhD**, of St. Jude Infectious Diseases along with **Paul Thomas, PhD**, of Immunology to discuss the coronavirus pandemic and vaccine development. St. Jude is home to the World Health Organization's Collaborating Center for Studies on the Ecology of Animals and Birds.

How is COVID-19 different from influenza?

SCHULTZ-CHERRY: There are many parallels between COVID-19 and influenza. Both are caused by viruses that circulate in animals but under certain conditions can jump into humans. Both COVID-19 and influenza can spread quickly and cause severe disease. But there are differences and plenty of unanswered questions. For example, SARS-CoV-2, the virus that causes COVID-19, penetrates deeper into human lungs than flu does. One of the many unanswered questions we have about COVID-19 involves the long-term consequences of the infection on lung function and how susceptible COVID-19 survivors are to other respiratory infections.

What are the steps to developing a safe and effective vaccine?

SCHULTZ-CHERRY: Once you have an experimental vaccine that is safe and effective in the laboratory, the next step is a clinical trial, and those are all about safety. That's why vaccines take so long to develop. An unsafe vaccine would do more harm than good. Phase I clinical trials are small and focus on safety. Phase II trials are larger, and you start focusing on effectiveness—like the antibody response, how long immunity lasts and related questions.

How soon could we see a vaccine?

WEBBY: While opinions differ, I believe it will be 2021 before a vaccine is widely available. The two experimental vaccines that are furthest along in the development process could fail. Once approved, vaccine production, distribution and delivery would also take time. I think the chances of having a COVID-19 vaccine this year are slim. SCHULTZ-CHERRY: I would say we're nine months to a year away from a vaccine. We have had experience with the production and distribution of flu vaccines. There are systems in place. But SARS-CoV-2 is a new virus. That requires extra precautions when developing a vaccine.

What role will antibodies play in treating the virus?

THOMAS: It does seem that some patients who have recovered from the infection mount protective immune responses, including productive antibody and T cells. Such an immune response can clear the virus or limit the severity of infection to the point where if you were infected again you wouldn't know if you had it. We also know that antibodies in some COVID-19 survivors can help other patients recover faster. But there are some things we don't understand, including how the antibodies work and how long they persist following the infection.

WEBBY: The big question is how long the immunity will last— six months, 12 months, a lifetime. But we don't know yet.

What have scientists learned about the virus?

WEBSTER: People have learned it is extremely transmittable. It is a frightening virus that has many side effects in elderly people that can last for weeks and weeks. We've learned it won't be easy to control, but it is possible with testing, testing and more testing. That is the key along with tracing people who have been in close contact with COVID-19 patients so they can also be tested for the infection.

SCHULTZ-CHERRY: We're looking at the impact on different populations because we don't know all the complications and long-term effects. That will be one of the next things to address. The genie is out of the bottle, but we can still control how the genie behaves.



Research Highlights



Predicting protein

phase **separation**

Tanja Mittag, PhD

ST. JUDE and Washington University are studying liquid-liquid phase separation. Cells sort and separate proteins and other components through the process.

Intrinsically disordered proteins lack structure. Some of them can also drive liquid-liquid phase separation. Researchers have developed a way to predict how proteins phase separate. The answer will help scientists studying how these proteins contribute to disease.

"Predicting phase separation is important because it is involved in many cellular processes as well as disease," said Tanja Mittag, PhD, of Structural Biology.

The team identified chemical groups they dubbed stickers that

are present on proteins and guide their interactions. These stickers drive phase separation. They also found stretches of protein, called spacers, that keep the stickers in specific patterns.

This led to the creation of a stickersand-spacers model. Researchers can use the model to predict how proteins will phase separate.

This work was part of the St. Jude Research Collaborative on Membraneless Organelles in Health and Disease.

Science published a report on this work.



Downing receives inaugural AACR award

THE AMERICAN ASSOCIATION FOR CANCER RESEARCH (AACR) recently

RESEARCH (AACR) recently bestowed its inaugural AACR-St. Baldrick's Foundation Award for Outstanding Achievement in Pediatric Cancer Research upon St. Jude President and CEO James R. Downing, MD.

The award honors individuals whose major research discoveries have improved the understanding and treatment of childhood cancer.

Downing has focused his career and research on understanding the genomic basis of pediatric cancer to improve treatment for children with the disease.

"I'm grateful to accept this award for St. Jude and for all the colleagues with whom I've had the pleasure of working throughout my career," he said. "Together, we've made steady progress in understanding why childhood cancer arises, spreads and resists treatment. I feel privileged that my work has helped advance the fight against this disease."

Research Highlights

Green elected to **National Academy** of Sciences

ST. JUDE IMMUNOLOGY

Chair Douglas Green, PhD, has been elected to the National Academy of Sciences. Green is one of 120 new members and 26 international members elected this year by the renowned society of scholars in recognition of their distinguished and continuing achievements in original research.

His research focuses on the process of active cell death and cell survival, extending from the role of cell death in cancer regulation and immune responses in the whole organism to the molecular events directing the death of the cell. One of the world's most highly cited researchers, Green has published more than 600 papers, chapters, commentaries and books.

Other St. Jude faculty in the National Academy of Sciences are Nobel Laureate Peter Doherty, PhD, of Immunology; Brenda Schulman, PhD, of Structural Biology; Martine Roussel, PhD, and Charles Sherr, MD, PhD, both of Tumor Cell Biology; and Robert Webster, PhD, of Infectious Diseases.



Research Highlights



Expanding ways to tame a global childhood killer

MALARIA IS a leading cause of illness and death in children worldwide. The first human study of an experimental anti-malarial drug discovered at St. Jude offers reason for hope.

Malaria is caused by a parasite spread by the bite of infected mosquitoes. The disease can be prevented and cured. Despite that fact, it still kills almost 500,000 people every year. More than 60% of the deaths are young children. Resistance to current anti-malarial drugs is a problem.

The St. Jude drug was tested in a small number of healthy adult volunteers.

Some of them were infected with malaria. The drug is called SJ733. It was well tolerated and worked fast to kill the parasite.

"While a single dose of SJ733 was not enough to completely clear the malaria parasites from the volunteers, given how well it was tolerated and its rapid anti-malarial activity, we think it holds promise as part of combination therapy," said Aditya Gaur, MD, of St. Jude Infectious Diseases.

Lancet Infectious Diseases reported on this work.

Significant global investment could save 11 million children

A SIGNIFICANT, sustained, global investment in treating children with cancer could save 11 million lives and yield a triple return on investment, according to a report published by *Lancet*.

Today, more than 80% of children with cancer live in low- and middle-income countries, where they lack access to adequate diagnosis and treatment. Most of those children will die from their disease. This is a sharp contrast to developed nations, where survival rates for pediatric cancers exceed 80%.

The report analyzed the potential return of a cumulative, global investment of \$594 billion in three simultaneous interventions: access to care, treatment and supportive services. The result could be 11 million lives saved and a 3-to-1 lifetime productivity gain of almost \$2 trillion to the global economy.

"Our findings indicate that \$20 billion (U.S.) of funding per year over a 30-year period could bring a return of \$3 for every dollar spent. This report should reassure policymakers that a sizeable return on investment is realistic and feasible," said St. Jude Global Director Carlos Rodriguez-Galindo, MD.

Inherited mutation can drive SHH medulloblastoma

ST. JUDE AND OTHERS

studied how gene mutations passed down through families help cause a type of childhood brain tumor. The team found that inherited mutations in the gene ELP1 can make kids more apt to have the SHH subgroup of the disease.

Medulloblastoma is among the most common cancerous childhood brain tumors. Inherited mutations were known to play a role in the SHH subgroup. But the known mutations did not explain all cases.

"The scientific evidence and the experiences of patients and families told us that inherited mutations may play a bigger role than previously thought," said Paul Northcott, PhD, of St. Jude Developmental Neurobiology.

The team looked at all proteincoding genes in more than 1,000 children with the disease. They compared that to more than 118,000 people without cancer.

Results showed that ELP1 is mutated in 14-15% of children with the SHH subgroup.

ELP1 is not included in routine genetic testing. This work supports including ELP1 in testing for patients with SHH medulloblastoma.

Nature published a report on this work. 🔼

Research Highlights



Combo therapy holds promise for rare immune disorder

ST. JUDE SCIENTISTS and

their colleagues are studying a rare immune disorder called hemophagocytic lymphohistiocytosis (HLH).

In HLH, an overactive immune system produces too many cytokines. These chemicals in the bloodstream recruit and activate even more immune cells.

"For 20 years, treatment for HLH has stayed the same," said Kim Nichols,

MD, of Oncology. "But we know many patients either do not respond to therapy or later relapse, so we dug into the biology to come up with a different treatment strategy."

The JAK1/2 inhibitor ruxolitinib has been shown to work well in models of HI H Nichols and her team wanted to study how this drug interferes with cytokines. They also wanted to test whether any one cytokine was more important to inhibit.

The researchers found that the cytokine interleukin-2 drives HLH treatment resistance. They found that combining ruxolitinib with the currently used drug dexamethasone was more effective. The study supports testing this combo in a clinical trial. St. Jude will launch a multi-site Phase Ib/II study of the regimen this fall for patients with newly diagnosed HLH.

Blood published a report on this work. 🔼



When Times Are 'Ruff'

By **Tiffany Derrick**

Therapy dogs and their handlers continue their work amid the COVID-19 crisis.

"How do you provide care when you can't physically see patients?" That's

the question facing therapy dogs Puggle and Huckleberry and their handlers at St. Jude Children's Research Hospital. The dogs are trained to help patients cope with their illness, symptoms, pain and anxiety.

From the earliest appearance of COVID-19 cases in the U.S., St. Jude began implementing new policies and procedures to protect patients, their families and staff. Many employees began working from home to reduce the chances of bringing the virus onto the hospital campus. When possible, patients had appointments in their St. Jude housing facilities—often via telehealth.

The hospital's therapy dogs and their



Instant stress relief

On a stressful day in the Incident Command Center, Puggle shares a quiet moment with Diane McGarry of Patient Experience.

Child Life handlers also shifted from interacting with patients in person to connecting virtually.

"Being at home has given us the flexibility to meet with patients whenever they need us," says Brittany Reed, Puggle's primary handler. "Having a virtual option so patients can still interact with Puggle has been amazing. I love being able to see patients' faces and read their reactions during our sessions."

The COVID commute

The adjustments haven't been easy. One of the main challenges to navigate was

Virtual appointments

Child Life Specialist Shandra Taylor (above) and Huckleberry support patients via teleconferences.

how to maintain the dogs' daily schedules. Both handlers have worked to preserve their canine companions' skills, while also adding new ones.

"I've tried to keep Huckleberry's routine as close to normal as possible," Shandra Taylor says. "We wake up at the same time every morning and even get in the car and drive around, so he feels like he's going to work. Although he misses being on campus and seeing all our patients, he has enjoyed the extra outside time."

Reed and Taylor say supporting the staff at St. Jude has also been a priority.

"Huckleberry is really perceptive. Before we began working from home, I could tell he noticed the heightened stress levels," Taylor says. "He approached staff members more eagerly and was more snuggly with them than normal. It was a small thing that he could do to help, but I saw how much it brightened each person's day."

"Wear a mask as an act of **kindness** for me."

St. Jude Children's Research Hospital





FINDING CURES, SAVING CHILDREN ... WHILE PROTECTING PATIENTS, FAMILIES AND STAFF



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