

Marshfield Clinic Research Institute

2021 YEAR IN REVIEW



**Marshfield
Clinic®**

Research Institute

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Mission

We enrich lives through discovery, translation and application of scientific knowledge that improves health and well-being.

Vision

We will innovate and define the future of health care for generations. Our research will be the source of innovation for the future of disease and injury prevention and integrated health care locally and globally.

Values

- *Discovery:* Will be the foundation of the overall activities of the research group.
- *Translation:* A major effort will be made to apply our discoveries in the health care setting.
- *Dissemination:* Results of work done will be distributed broadly on a timely basis.
- *Teamwork:* Will be a hallmark of the research group.
- *Excellence:* Will be the standard for all research and program activities.
- *Collaboration:* Partnerships both internal and external will be sought and encouraged.

It has been an honor and privilege to serve as the interim executive director of Marshfield Clinic Research Institute. I have been genuinely impressed with the depth and breadth of the research portfolio here.

Even more so, I've been impressed with the scientists and staff. Especially their dedication to doing meaningful research that benefits the organization, our patients and the communities from which they come. Please let me be more specific. When I use the term benefit, what I am referring to is making a positive impact, the theme of this year in review.

Inside this issue, you'll find a number of examples in which the Research Institute has made a positive impact - from the long history of trying to prevent illness and injury in the local population to helping to create national policy around the prevention and treatment of COVID-19. These are, however, just a small sample of the many impactful projects underway here. To my mind, this positive impact is why we have a research organization embedded within a health care system here.

The Research Institute is a true gem in this organization and in the community at large. I sincerely hope that you enjoy reading this year in review and take a moment to thank our hardworking scientists and staff.



Steven Jacobsen, M.D., Ph.D.
Interim Executive Director
Marshfield Clinic Research Institute

Oversight Board

The Marshfield Clinic Research Institute Oversight Board oversees the research activities of the Research Institute.

Marshfield Clinic Health System Physicians, Scientists and Leaders

Robert M. Haws, M.D.
Pediatric Nephrologist
Member-at-Large,
Executive Committee

Scott J. Hebbring, Ph.D.
Research Scientist, Center for
Precision Medicine Research
Marshfield Clinic Research Institute

Krista Hoglund, A.S.A., MAAA
Chief Actuary & Financial Officer
Security Health Plan

Matthew J. Jansen, M.D.
Medical Director for
Division of Education
Vice-Chair, Executive Committee

Jill R. Meilahn, D.O.
Physical Medicine and
Rehabilitation Specialist
Chair, Executive Committee

**Adedayo Onitilo, M.D.,
Ph.D., MSCR**
Medical Oncologist
and Hematologist

Tammy Simon, R.N.
Vice President
Institute for Quality, Innovation
and Patient Safety
Secretary, Executive Committee

Community Members

Brent Bergman
CEO, RevCycle, Inc.

Matt Berrier
Owner of Associated Sales
and Leasing
Member-at-Large,
Executive Committee

Ashley Fredrick
Owner/Realtor of NextHome
Hub City

Brian Forrest
Owner of Maple Ridge Dairy

Martin (Marty) Loy, Ph.D.
Dean, College of
Professional Studies
University of Wisconsin-
Stevens Point



Dr. Adedayo Onitilo, medical director for Cancer Care and Research at Marshfield Clinic Health System, and Rebecca Longman, multiple myeloma clinical trial participant

Cancer clinical trial provides important treatment for Rebecca Longman

Rebecca Longman is currently participating in a clinic trial to treat her cancer because she was unable to tolerate the current standard of care.

"I was happy that I could participate in a clinical trial because it helped me get the treatment I needed, the drug is provided at no charge, and I may be able to help others in the future who develop multiple myeloma," Rebecca said. "The clinic staff are so friendly and they explain my treatments and answer my questions. I would encourage anyone to participate in a clinical trial."

Rebecca is a patient of Dr. Adedayo Onitilo, medical oncologist/hematologist and Cancer Care and Research service line medical director.

"Marshfield Clinic Health System will continue to bring oncology expertise and access to the latest in cancer care through oncology research to our community," Dr. Onitilo said.

The Cancer Care and Research Center within Marshfield Clinic Research Institute is committed to bringing state of the art cancer treatments to central and northern Wisconsin, ensuring that our rural communities have access to the same technology as urban communities.

In the past four years, the number of available clinical trials through the Cancer Care and Research Center has grown to over 150. This means that our patients have access to some cancer treatments that previously would have been impossible to obtain without lengthy and costly travel. Patients like Rebecca, who has been cancer free for nearly two years due to clinical trials.



It takes a team approach to be able to offer cancer clinical trials at each of the Marshfield Clinic Health System cancer centers.



Charitable gifts through Marshfield Clinic Health System Foundation provide about \$1 million annually to ensure patients at each of our cancer centers has access to clinical trials. To support cancer research, visit marshfieldclinic.org/giving or contact Karen Piel at 715-897-1527.

MAKING HOPE A REALITY

Improving breast cancer screenings

TMIST is a national study to determine whether 2-D or 3-D mammography breast cancer screening is better at reducing advanced cancers. About 230 patients are enrolled through the Cancer Care and Research Center. The study is led by Dr. Kristie Guite and Dr. Adedayo Onitilo.

Dr. Onitilo receives clinical excellence award

Adedayo Onitilo, M.D., Ph.D., Cancer Care and Research Center director, was awarded the 2021 C. Todd Stewart Clinical Excellence Award for his excellence in providing clinical care and enrolling his patients into critical clinical trials.

Using DNA to find the right medicine

Mental health is a huge issue across the nation. Overcoming depression and anxiety requires countless hours of therapy and medication for some. Many patients have had to trial several medicines before they find one that helps them with their depression or anxiety.

For example, escitalopram is a common medicine prescribed for individuals with depression and anxiety. However, this medicine can be less effective for individuals with changes in a certain gene called *CYP2C19*. Scientists believe that some of these changes can cause an individual to clear this drug faster from the body, which can lead to it being less effective for these individuals.



"We can make better medication choices with this information," said Emili Leary, PharmD, research project pharmacist, who is helping to lead the pharmacogenetic initiatives at the Research Institute.

"For years, researchers have found connections between medicines and genes like this," said Scott Hebbring, Ph.D., research scientist at the Center for Precision Medicine Research. "The problem is that not everyone has had a genetic test and even fewer have that genetic test available to their provider who is making these medication recommendations."

Researchers set out many years ago to change that for patients at Marshfield Clinic Health System. Currently, about 3,000 patients at the Health System have completed genetic testing. This genetic information is then placed into the Health System's prescription software. When a provider tries to prescribe a medicine that doesn't work for one of their patients, like escitalopram, the computer sends an alert to the provider and provides advice for alternative medicines.

"This type of information is really helpful when you are sitting with a patient trying to determine which medication to give them," said Barb Theisen, N.P., who has received an alert for a patient. "It allows you to prescribe the right medicine sooner, and made a big difference for my patient."

The *All of Us* Research Program is the latest project currently enrolling participants in the hopes that genetic results can one day be used like this.



Precision medicine research is supported by gifts and endowments through Marshfield Clinic Health System Foundation. To support this research, visit marshfieldclinic.org/giving or contact Karen Piel at 715-897-1527.

MAKING HOPE A REALITY

***All of Us* restarts in-person enrollment**

With restarting in-person enrollment, the *All of Us* Research Program at Marshfield Clinic Health System thrived this year as leaders in retention and enrollment. The program has begun returning genetic results to participants, contributed to new scientific discoveries and has garnered national attention in COVID-19 research.

Improving treatments for myeloid leukemia

Zhi Wen, Ph.D., from the Center for Precision Medicine Research published research that showed combined targeted therapy and immunotherapy may be beneficial for treating secondary acute myeloid leukemia with mutations in chromatin regulator gene ASXL1 and NRAS mutations.



*Scott Hebbring, Ph.D., research scientist at the
Center for Precision Medicine Research*



*Thomas Rose, clinical research coordinator
at the Clinical Research Center*

Research serendipity leads to kidney transplant

Thomas Rose was enrolling a participant into a clinical trial for Bardet-Biedl syndrome (BBS), which is a rare genetic disorder present from birth.

Like most clinical trial enrollments, the family started sharing their story. Thomas soon learned the research participant's brother was in need of a kidney transplant.

Through this rare encounter, Thomas decided to see if he was a match to donate his kidney. After some tests, Thomas was able to donate his kidney to the brother in May 2021.

"Had they not been active and engaged in a trial I am involved with, and them sharing their story, I would have never discovered there was a need I could try to help with," Thomas said.

What may seem like a crazy decision to some, for Thomas it was the right thing to do. To him, the whole BBS community is like a family because he works with individuals that have the syndrome quite regularly.

"The BBS community is really small, so it is natural that you get to know people as they participate in the various clinical trials we offer here for BBS," Thomas said. "I was just glad I could help this family."

In his role as a clinical research coordinator for the Clinical Research Center, he often helps those with BBS participate in clinical trials. With BBS being a very rare disease, Marshfield Clinic Health System is the only location in the nation to have a Center of Excellence for Bardet-Biedl Syndrome.



Thomas Rose (left) often enrolls participants into clinical trials for various conditions.



Marshfield Clinic Health System Foundation is grateful for support received for BBS research and patient care. To support BBS or other clinical research, visit marshfieldclinic.org/giving or contact Karen Piel at 715-897-1527.

MAKING HOPE A REALITY

Lack of sleep common in BBS

Investigators from the Clinical Research Center reported in the Orphanet Journal of Rare Diseases on a recent finding that inadequate sleep was common in people with Bardet-Biedl syndrome. Sleep is an important modifiable risk factor for health and well-being. Participants were recruited from the Research Institute's Clinical Registry Investigating Bardet-Biedl Syndrome.

Preventing RSV

RSV is a serious respiratory illness that is common in infants. The Clinical Research Center is enrolling volunteers into a clinical trial that aims to prevent RSV in infants by vaccinating expectant mothers. The clinical trial is led locally by Peter Johnson, M.D., Marshfield Clinic Health System OB-GYN physician.

Finding the most deadly type of cancer, sooner

According to the American Cancer Society, lung cancer is the leading cause of cancer death for both men and women, accounting for almost 22% of all cancer deaths. Lung cancer kills more people each year than colon, breast and prostate cancer combined.

For patients at elevated risk of lung cancer because of long-term heavy cigarette smoking, low-dose CT scans have been a recommended

annual health screening for lung cancer since 2014. This recommendation came after reports of reduced lung cancer deaths in the National Lung Screening Trial.

“The impact of lung cancer screening in real-world health care settings is yet to be understood. There are many questions our research group is trying to address including how best to improve the delivery of lung cancer screening programs and follow-up care,” said Robert Greenlee, Ph.D., M.P.H., senior scientist with the Center for Clinical Epidemiology and Population Health at the Research Institute.

Dr. Greenlee and Project Manager Roxy Eibergen lead a research team that has developed an extensive database for analysis and evaluation of lung cancer screening as part of the National Cancer Institute’s PROSPR (Population-based Research to Optimize the Screening Process) consortium.

PROSPR lung cancer screening studies have already provided valuable reports including predicting positive test results, patient subgroups at risk of low adherence to annual screening and follow-up care, the impact of expanding lung cancer screening eligibility on improved cancer detection, and the effect of the COVID-19 pandemic on lung cancer screenings.

With two years remaining on the initial grant, the research team has provided and analyzed data on more than 2,500 baseline and follow-up lung cancer screenings, which adds to PROSPR’s multisite total of more than 27,000 lung cancer screenings.



Robert Greenlee, Ph.D., M.P.H., senior research scientist with the Center for Clinical Epidemiology and Population Health, is leading a research team to analyze lung cancer screenings.

MAKING HOPE A REALITY

Connect for Cancer Prevention Study

The Connect for Cancer Prevention Study wants to better understand the causes of cancer and how to prevent it. The Center for Clinical Epidemiology and Population Health at the Research Institute will be leading the recruitment and data collection efforts as one of nine health care systems partnering with the National Cancer Institute to enroll 200,000 adults throughout the country for Connect over the next several years.

The Office of Research Computing and Analytics was able to contribute toward the study’s readiness for enrollment launch, including the creation of solutions addressing participant relationship management, targeted recruitment, biospecimen information management, and integrating systems for automated workflows and reporting.



Low-dose CT scans are the recommended screening for patients at high risk for lung cancer.



*Megan Ryan, D.M.D., dentist at
the Menomonie Dental Center*

Dashboard improves dental health

If you have ever been to the dentist, you have likely had a dental sealant applied. Dental sealants are a thin coating that dentists apply on teeth to help protect the enamel of the tooth and prevent decay.

However, every dentist is different. Some will put a needed dental sealant on after a standard appointment, while others will have patients come back later.

Dental sealants were one of many measures the dental quality dashboard created by the Center for Oral and Systemic Health in 2016 helped to monitor for the Family Health Center of Marshfield, Inc. dental centers.

“Seeing the data allowed us to look at our processes and make changes to ensure patients were receiving sealants the same day of treatment planning,” said Megan Ryan, D.M.D., dentist at the Menomonie Dental Center. “Through monitoring the dashboard, we have been able to make a positive change for our patients.”

The Center for Oral and Systemic Health, along with help from key partners in the Office of Research Computing and Analytics and Analytics Center of Excellence, continues to make improvements to the dental quality dashboard to provide additional improvements in dental health for the Family Health Center.

New changes coming include providing data to help make better decisions, where to put resources and help with targeted improvements.

“The dashboard will also provide descriptive, predictive and prescriptive analytics along with sufficient training materials for enhanced adoption by dentists,” said Radha Nagarajan, Ph.D., center director of the Center for Oral and Systemic Health and current lead on the project. “We will also continue our role as a national leader in publicly reporting our data with regional partners through the Wisconsin Collaborative for Healthcare Quality.”



It is common for children to receive dental sealants to protect their teeth.

MAKING HOPE A REALITY

Dental electronic health record implementation

The Center for Oral and Systemic Health is involved in the dental electronic health record implementation efforts at the Family Health Center. This includes the integration of medical to dental electronic health records to facilitate integrated care models that address oral and systemic needs of the rural communities. Recent works by these groups have been highlighted in the Oral Health In America: Advances and Challenges report.

Cost variations of dental procedures

The Center for Oral and Systemic Health is currently funded by Delta Dental of Wisconsin to develop novel statistical and machine learning approaches for assessing cost-variation in dentistry. Such an understanding is expected to facilitate enhanced payor-provider dialogue for improved clinical outcomes while minimizing overall economic burden.

Farmer's Lung precursor to 40-year history

Dean Emanuel, M.D., a cardiologist at Marshfield Clinic Health System, was working with local farmers in the 1960s to better understand a peculiar respiratory illness that was common in the area.

"I have vivid memories of following my father, soon to be diagnosed with Farmer's Lung disease, and Dr. Emanuel as they walked the farm and discussed what might be causing my father's recurring ailment," said Ralph Bredl, a dairy producer in Stratford, Wisconsin.



Martine Bredl-Lueck, dairy farm owner, and Casper Bendixsen, Ph.D., research scientist and director of National Farm Medicine, discuss farm safety.

Little did Ralph know that these conversations about Farmer's Lung would be the beginning of the National Farm Medicine Center, which officially took root in Central Wisconsin 40 years ago in 1981 and went on to study Farmer's Lung for more than 20 years.

"The time dedicated to medicine and agriculture really goes back to the foundations of the Heath System," said Casper Bendixsen, Ph.D., research scientist and director of Farm Medicine.

What started 40 years ago at Farm Medicine as research on Farmer's Lung has blossomed to include child agricultural injury prevention, farmer mental health, injury surveillance and ironically the respiratory system of children raised on dairy farms.

Almost as a nod to Dr. Emanuel's early work, the Wisconsin Infant Study Cohort has found that children raised on dairy farms have stronger immune systems and fewer respiratory problems such as asthma.

"Asthma in children is a leading cause of emergency department visits, hospitalizations and missed school days," said Dr. Bendixsen. "We hope to be able to identify the key microbial exposures on farms to be able to offer it to non-farm kids, which may one day help prevent asthma."

Ralph's own grandchildren participated in the Wisconsin Infant Study Cohort. His family is just one of many examples of the impact Farm Medicine has made on families close to agriculture over the last 40 years.

♥ The annual Auction of Champions and other donor gifts provide needed support for many agricultural health and safety programs and initiatives. Visit marshfieldclinic.org/giving or contact Karen Piel at 715-897-1527 to learn how your gifts can support the work of the National Farm Medicine Center.

MAKING HOPE A REALITY

Emergency responders train for farm rescues

Participants from 29 departments across Wisconsin attended the Agricultural Rescue Training Scene Management program Oct. 22-23 at Heiman Holsteins and Heeg Farms, Inc., Marshfield. Farm Medicine partnered with Pittsville Fire and Life Link III Air Medical Transport to practice rescues involving tractor overturns, grain bins, equipment extrication and more. The program received philanthropic support from the Auction of Champions.



Owen Lueck, grandson of Ralph Bredl, continues to support the family's dairy farm in Stratford, Wisconsin.



Romel Garcia-Montilla, M.D., Ph.D., critical care physician (left), and Somto Nwaedozie, M.D., internal medicine resident (right), at Marshfield Clinic Health System

Unlocking data-driven improvements in patient care

An electronic health record is arguably the most important tool a provider uses in patient care. It holds almost every health record a patient has including endless data and information that can be used to improve care.

The Office of Research Computing and Analytics plays an important role in teaching this to residents.

“Each resident that comes to Marshfield Clinic Health System has to perform a quality improvement or research study before graduating,” said Brooke Delgoffe, research programmer analyst in the Office of Research Computing and Analytics. “For most residents, this is their first experience with electronic health record-based research.”

While the goal of all research is to learn, it’s often forgotten how much teaching is part of research. The Office of Research Computing and Analytics teaches residents about the available data, the available tools to help collect data and what can be built to accomplish their goals.

“Each member of the team brings experience from previous projects, which expedites bringing a study through the phases of design to analysis and publication,” said Lynda Kubacki-Meyer, director of the Office of Research Computing and Analytics.

Over the last few years, the Office of Research Computing and Analytics has seen many of the residents return and become mentors to future cohorts of residents or take on their own research studies.

“Without this initiative, it is almost certain that our residents wouldn’t be exposed to the satisfying process of originating new medical knowledge,” said Romel Garcia-Montilla, M.D., Ph.D., critical care physician and resident mentor for the Health System.

By peaking a resident’s curiosity and creating a desire for data-driven improvement, this project is helping to ensure patients receive high quality, innovative care.



The expertise and partnership between the resident mentors, biostatistician, research programmer analysts and resident research facilitator ensure the resident-led research studies are well supported.

MAKING HOPE A REALITY

Connecting systems to improve clinical trials

The Office of Research Computing and Analytics completed an initiative to connect clinical data with TriNetX, a global health research network, in order to increase clinical trial opportunities. To date, TriNetX has presented almost 60 trials to the Research Institute with more than 20 being viable.

Fellowship program continues

Marshfield Clinic Research Institute once again offered a postdoctoral fellowship to an early career scientist aspiring to begin their medical research portfolio. The Postdoctoral Fellowship Training Program was established to provide a launching pad for early career scientists that included mentorship from a researcher.

The background is a solid blue color with a repeating pattern of white virus particles and medical crosses. The virus particles are stylized, with a central circle and several smaller circles around it, connected by lines. The medical crosses are simple, white, and scattered across the background.

SCIENCE AND GRACE

COVID-19 Research

Science and Grace

As I wrote this reflection, it dawned on me that in November 2019 we were ramping up for the most challenging and busy 16 weeks of our working year - flu season. During flu season, we are at full testing capacity helping the U.S. Flu Network understand the effectiveness of the flu vaccine through laboratory testing. However, our “flu season” has now extended for more than two years with no breaks, no lulls and no letting down our guard as we worked tirelessly on the COVID-19 pandemic response.

Science and grace - ironically those things do not always coexist. Grace can be defined as the quality or state of being considerate or thoughtful. Science is often competitive or critical. The pressures of science in a pandemic can bring out the worst in people who are working under duress, keeping long hours with incredible deadlines to produce results that drive public health policy decisions. Such pressures can destroy teams, and yet we have been fortunate to find ourselves surrounded by colleagues who have consistently chosen GRACE.

Instead of being upset over a delayed test result, we are extended gratitude for our tireless work. Instead of being frustrated over a delay in a new project budget, colleagues ask what they can do to help. Strangely, I feel I’ve gotten to know my colleagues in new and more personal ways. We ask each other about family, pets, triumphs and tribulations. Our humility and compassion for one another has deepened despite the perceived impersonal nature of our many Zoom meetings.

As our extended “flu season” encroaches into 2022, I am reminded that this pandemic, that has taken many lives, has also brought people together in ways that perhaps are unapparent. On my team, we have had the joy of babies being born to our team members. We have mutually supported each other through quarantines, through loss of loved ones, through physical separation and through long tiring days. The personal growth we have all experienced is inspiring. The Marshfield Clinic Research Institute human network is vast, and we have all been blessed by meeting new people with different life experiences and viewpoints.

I wish to end this reflection by thanking all of my team members, our colleagues and friends in the Research Institute, Marshfield Clinic Health System, and the broader scientific and local community for choosing grace and for recognizing that grace and science can indeed be friends, if we so choose.



Jennifer Meece, Ph.D.
Director, Integrated Research and Development Laboratory

MAKING HOPE A REALITY

HERO Registry sheds lights on health care workers during COVID-19

The Clinical Research Center participated in the Healthcare Worker Exposure Response & Outcomes (HERO) Registry, which collected information about living and working during the COVID-19 pandemic from first responders and health care workers. This information has been used for various research efforts focused on COVID-19.

National COVID-19 recommendations stem from local research

In November 2020, research conducted at the Research Institute and Vanderbilt University supported national guidelines to reduce COVID-19 transmission.

“We found that transmission of SARS-CoV-2 within households is high, occurs quickly, and can originate from children and adults,” said Hong McLean, Ph.D., principal investigator for the study at the Research Institute. “These findings supported changes in the CDC recommendation for isolation of household contacts.”



The Prospective Assessment of COVID-19 in a Community (PACC) Study is a large research study that enrolled up to 1,500 people in the Marshfield area to better understand COVID-19.

The COVID-19 pandemic has created new opportunities and challenges for researchers, especially those in the Center for Clinical Epidemiology and Population Health who have studied vaccines for nearly two decades.

At the beginning of the pandemic, CDC provided funding for COVID-19 research in the Marshfield area.

“We did not have a vaccine at that time, but there was an urgent need to understand how the virus spreads and the spectrum of illness,” said Edward Belongia, M.D., center director.

COVID-19 vaccine safety research is also a major focus. As part of the CDC-funded Vaccine Safety Datalink (VSD), Jim Donahue, Ph.D., is co-leading a study to monitor COVID-19 vaccine safety in near-real time.

“Each week, we compare the number of observed events, such as heart attack or stroke, with the number expected by chance,” said Dr. Donahue. A safety signal occurs if the number exceeds a certain level, triggering further investigation.

“Overall we have found that COVID-19 vaccines are very safe, but we confirmed that myocarditis (heart inflammation) is a rare complication after mRNA vaccines,” said Dr. Donahue.

Most cases are mild, and a CDC advisory panel concluded that benefit of vaccination greatly outweighs the risk. The Marshfield researchers agree with this conclusion, and they strongly encourage vaccination for children and adults.

MAKING HOPE A REALITY

Improving pandemic response in rural communities

Lack of research in rural communities has impeded the pandemic response. The Center for Oral and Systemic Health, Family Health Centers and University of Wisconsin-Madison are investigating novel analytics approaches to predict COVID-19 surge, discover associations between COVID-19 and chronic conditions, and understand dental patient/provider perceptions of COVID-19.



Help support a new endowment in vaccine safety and education by visiting marshfieldclinic.org/giving or calling Karen Piel, MCHS Foundation, at 715-897-1527.

FOR MEDICAL
RESEARCH



*The team from the Center for Clinical
Epidemiology and Population Health.*



Holly Voll, grants and contracts specialist with the Office of Research Support Services

Combatting COVID-19 one grant at a time

As a grants and contracts specialist, Holly Voll spends a lot of time processing research proposals for projects that take place across Marshfield Clinic Research Institute. Since the COVID-19 pandemic began, this has included many projects related to the virus.

What she did not know was just how close to home her work would hit her.

In late September, Voll lost her stepfather to COVID-19. He was ill for two weeks before going on a ventilator and dying from organ failure.

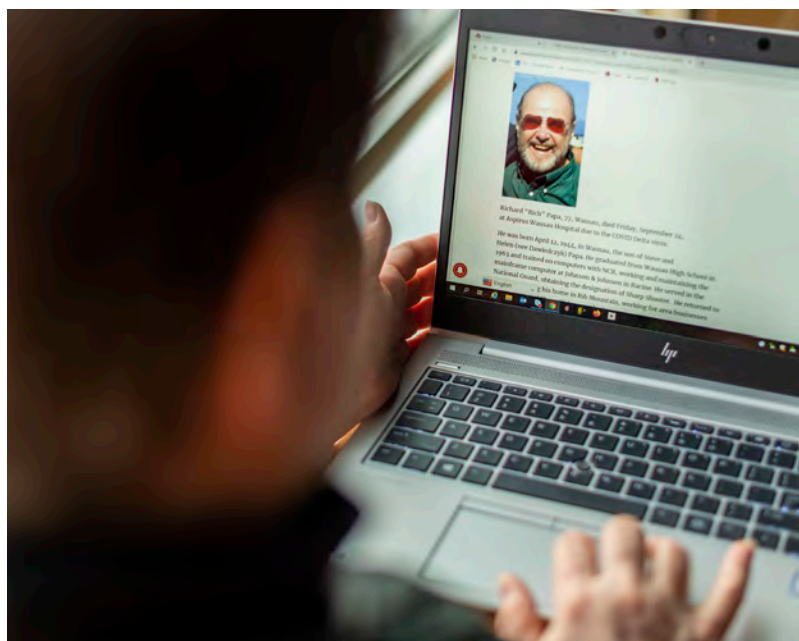
“He chose to be unvaccinated,” Voll said. “My mom, who received the vaccine and tested positive for the virus, had minor cold symptoms but recovered well.”

Voll is encouraged by the many grant-supported projects related to combatting and learning more about COVID-19 that have been awarded to the Research Institute.

These projects include a long-term collaboration with Kaiser Permanente to look for COVID-19 and influenza co-infection. The Integrated Research and Development Laboratory at the Research Institute is also studying the effectiveness of COVID-19 vaccines and virus transmission with funding obtained from governmental and private organizations.

She also helped Marshfield Clinic Health System obtain a communications grant to provide messaging in a variety of languages to community members who may be reluctant to get the vaccine.

“It is my hope that through my role in the grant funding process for projects like these, I can help prevent other deaths from COVID-19 and spare families the difficulties that mine is experiencing,” Voll said.



Holly Voll lost her stepfather in late September due to complications caused by COVID-19.

MAKING HOPE A REALITY

Dairy farmer, firefighter promote vaccine

Farmers and firefighters are among respected voices who can be leaders in encouraging COVID-19 vaccination in rural communities. Farm Medicine worked with Maple Ridge Dairy owner Brian Forrest, a member of the Research Institute's Oversight Board, and Pittsville Fire Chief Jerry Minor to promote vaccinations with short videos.

Measuring COVID-19 vaccine effectiveness

How effective is the COVID-19 vaccine? That has been a common question asked ever since the first vaccine became available. However, the truth is that the answer changes every month depending on several variables.

The Integrated Research and Development Laboratory at the Research Institute continues to support real-time COVID-19 vaccine effectiveness data. It is the sole reference

laboratory in the nation to support several Centers for Disease Control and Prevention (CDC)-led studies.

It is this important work that led to a published article in the New England Journal of Medicine in March that showed mRNA vaccines to be 91% effective after the second dose against SARS-CoV-2, and 81% after the first dose. As the Delta variant took grasp of the U.S., our lab helped show that mRNA vaccine effectiveness dropped to 66% by August 2021.

“While vaccine effectiveness against the delta variant has declined, the vaccine remains very effective against hospitalization. This should provide reassurance to providers and the public of the value of COVID-19 vaccination,” said Jennifer Meece, Ph.D., director of the Research Institute’s Integrated Research and Development Laboratory. “This change in vaccine effectiveness is one of the reasons the CDC is now recommending a booster dose for specific risk groups.”

The Research Institute received a \$22.5 million grant from CDC in July 2020 and an additional grant for nearly \$20 million in June 2021 to play a leading role in a number of COVID-19 studies. The Research Institute now tests about 6,000 samples a week from across the U.S. These studies demonstrated in real world conditions the effectiveness of mRNA vaccines in both symptomatic and asymptomatic COVID-19 infections.



The Integrated Research and Development Laboratory continues to provide COVID-19 tests for more than 6,000 samples that come in from across the U.S. each week.

MAKING HOPE A REALITY

Finding the chemical properties of SARS-CoV-2

Srinivas Sathipati, Ph.D., from the Center for Precision Medicine Research described physicochemical properties of species-specific SARS-CoV-2. These findings could provide key insights into understanding the driving forces during the course of infection and assist in developing effective therapies for COVID-19.



Collin Nikolai, research associate for the Integrated Research and Development Laboratory at the Research Institute

MAKING HOPE A REALITY

Pancreatic cyst surveillance

The Cancer Care and Research Center participated in a study that compared the clinical impact of more frequent versus less frequent pancreatic cyst surveillance programs. Our success in enrolling participants in the study was highlighted in the ECOG-ACRIN Cancer Research Group's study newsletter.

Research Institute participates in trial of FDA-approved heart failure drug

The EMPEROR-Preserved trial showed empagliflozin 10 mg reduced cardiovascular hospitalization due to heart failure by 29% in patients with an ejection fraction of more than 40% compared to a placebo over a median follow-up time of 26.2 months. Researchers from the Clinical Research Center enrolled participants for the trial in 2018 and followed them until the study ended.

Understanding families through genetics

Scott Hebbring, Ph.D., and colleagues from the Center for Precision Medicine Research published a stand-alone application called Electronic Pedigrees, or E-Pedigrees, which combines two validated family prediction algorithms into a single software package for high throughput pedigrees construction.

Periodontal disease and its effects on health

Sanjay Shukla, Ph.D., and colleagues from the Center for Precision Medicine Research identified proteomic, lipidomic, metabolomic and microbiome biomarkers from dental plaques of patients with diabetes and periodontal diseases. These findings may lead to important connections between periodontal disease and other health concerns.

Ethics leadership

Elizabeth Buchanan, Ph.D., Office of Research Support Services director and staff senior research scientist, presented her work on ethics and big data research at a number of conferences and venues this year. This included the National Cancer Institute's Central Institutional Review Board, Singapore Research Ethics Conference, 3I, and the Association for the Accreditation of Human Research Protections Programs (AAHRPP) Annual Conference. Dr. Buchanan also began serving as Coordinator of Medical Ethics for the Marshfield Clinic Health System Ethics Committee.

Finance system replacement

The Office of Research Computing and Analytics played an important role in the replacement of the finance system for Marshfield Clinic Health System. Extensive database changes were required to accommodate changes needed for applications and reports needed by the Research Institute.

Genetics of colorectal cancer

Tonia Carter, Ph.D., and colleagues from the Center for Precision Medicine Research developed a ColoTypes score to identify different subtypes of colorectal cancer using genetics. These findings may be used in future research to help find and improve treatments for colorectal cancer.

Roll bar rebate saves Wisconsin farmer more than money

Caleb Orebaugh, 34, of Holmen, Wisconsin, became the first reported participant in the Wisconsin Rollover Protection Structure (ROPS) Rebate Program to survive a tractor overturn with a ROPS installed through the program. Since 2013, Farm Medicine has retrofitted nearly 350 tractors across Wisconsin.

CM&R released four times in 2021

Four issues of the Clinical Medicine & Research (CM&R) journal were released in 2021, featuring 29 original articles. CM&R is an indexed, peer-reviewed, medical research journal owned and published by Marshfield Clinic Health System, and edited within Marshfield Clinic Research Institute.

National Children's Center turns 25

The National Children's Center for Rural and Agricultural Health and Safety, the largest program within Farm Medicine, marks 25 years in 2022. It is the only National Institute for Occupational Safety and Health-funded agricultural center focused on preventing traumatic injuries among children who work, live or play on farms. It was established in 1997 with a five-year competitive grant and has successfully renewed since.

Tick-borne disease diagnostics

The Integrated Research and Development Laboratory has been an active partner with Marshfield Labs on improving Lyme disease diagnostics through participation in joint industry FDA clinical trials. Given our Midwest epicenter location for Lyme, improved diagnostics will greatly aid providers and patients in management of this serious tick-borne disease.

Addressing antibiotic resistance

The Integrated Research and Development Laboratory has expanded work with Marshfield Labs, UW-Madison, Marquette University and other research groups on surveillance programs evaluating regional antibiotic resistance in bacteria. Our partnership with industry in evaluating test methods for novel antibiotics is an important contribution in addressing the global emergence of resistance.

RE-POWER weight management trial

Ten Marshfield Clinic Health System centers completed participation in the RE-POWER trial through the Center for Clinical Epidemiology and Population Health that compared weight management therapies in rural primary care patients. Study findings appeared in the Journal of the American Medical Association and indicated group-based clinical counseling resulted in the most weight loss over two years.



Thank you to the many individuals, businesses and organizations that provide charitable gifts in support of Marshfield Clinic Research Institute. To learn how you can support the Research Institute, visit marshfieldclinic.org/giving or contact Karen Piel, Marshfield Clinic Health System Foundation liaison to the Research Institute at 715-897-1527 or piel.karen@marshfieldclinic.org.

BY THE NUMBERS

Rural roots

60 clinical locations in 40 communities

713,947 people in the 33 counties we serve

45% of the population are our patients

Investigators and staff

40+ Ph.D. and M.D. scientists

150+ physician researchers

200+ research and support staff

Research environment

9 hospitals

60 clinical locations

10 dental clinics

1,400+ providers

12,000+ employees

322,000+ unique patients

Projects and publications

339 new and continuing research studies

15 active foundation-funded projects

\$49,000 grants and contracts awarded

71 active clinical trials

92 original research papers published *(In medical and scientific journals. Excludes case reports, editorials (8), published abstracts (28), books (2) and letters (2)).*

COVID-19 research

25 studies initiated or expanded *(More than \$94 million)*

38 grants received *(More than \$31 million)*

27 original research papers published related to COVID-19 *(In medical and scientific journals. Excludes case reports, editorials (2), published abstracts (2), books and letters.)*

7 vaccine safety and effectiveness studies

375,000+ COVID-19 tests run for vaccine effectiveness research

Financial overview

\$49,000 in rural hospital improvements *(Small Rural Hospital Improvement Program Grants)*

\$3.5 million in clinical trial funding

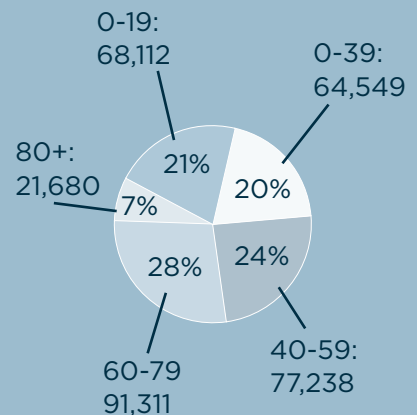
\$50.2 million in federal funding

\$51.5 million in externally-funded projects *(includes state, private and federal)*

Marshfield Clinic Health System patient population

Ages:

• Total: 322,890





Marshfield Clinic Health System

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