Children's Mercy KANSAS CITY

SETTING THE STANDARD FOR PEDIATRIC HEART CARE

THE WARD FAMILY HEART CENTER

At the Ward Family Heart Center at Children's Mercy Kansas City, patients benefit from the expertise of more than 30 board-certified pediatric cardiologists and cardiovascular surgeons. The heart center is setting the standard for groundbreaking efforts to improve treatments, and is diligent about proactively sharing its surgical outcomes with the public. The Fetal Cardiac Program brings potentially lifesaving care to families from the moment of fetal diagnosis, through delivery and beyond. Research efforts are focused on better understanding the causes of congenital heart defects. And Children's Mercy is sharing its home monitoring technology for single-ventricle patients, called CHAMP, with other pediatric cardiology programs to improve national outcomes.

BEST CHILDREN'S HOSPITALS U.S.News & WORLD REPORT CARDIOLOGY & HEART SURGERY 2019–20

A TOP-RANKED PROGRAM

One of the top 20 pediatric cardiology and heart surgery programs in the nation, according to *U.S. News & World Report.*

RECENT PUBLICATIONS

24 RESEARCH PUBLICATIONS

1 CHAPTER/ BOOK

In the four years since the launch, the mortality rate for all babies being monitored via CHAMP has been reduced to 2.5 percent.

VOLUMES 2019

25,449	EKGs
18,642	**ECHOCARDIOGRAM PROCEDURES**
762	Stress lab procedures
18,360	Outpatient visits
512	Cardiac catheterizations
180	Electrophysiology procedures
506	**SURGICAL PROCEDURES**

TRANSLATING RESEARCH INTO IMPROVED CARE

Research conducted in the Ward Family Heart Center at Children's Mercy spans the spectrum of medical research from bench to bedside. Multiple disciplines within the Ward Family Heart Center contribute to translational research in pharmacogenomics, imaging and outcomes research. The team is also collaborating with the Genomic Medicine Center at Children's Mercy to investigate genetic causes of congenital heart disease.

IMPACT OF SLCO1B1 GENOTYPE ON PEDIATRIC SIMVASTATIN PHARMACOKINETICS

Simvastatin (SV) is administered as a lactone prodrug requiring hydrolysis to its active moiety, simvastatin acid (SA), to disrupt hepatic cholesterol biosynthesis. In adults, allelic variation of SLCO1B1 encoding the liver-specific organic anion transporting polypeptide (OATP1B1) drug uptake transporter reduces statin cellular uptake. As a consequence, concentrations at the site of action are lower, compromising efficacy, and circulating plasma concentrations are increased, placing patients at higher risk for adverse events. Expression of OATPs in mice changes during development, raising the question of whether in humans the genotype-phenotype relationship observed in adults is relevant in the developing child.

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Under the leadership of Jonathan Wagner, DO, pediatric cardiologist at Children's Mercy, a study[1] was developed to find the answer to this question.

The study found that the impact of the SLCO1B1 c.521 gene variants on SA PK was marked in the cohort with a decrease in the rate and extent of SA formation when compared to adults. Further investigation of the ontogeny and genetic variation of SA formation is necessary to better understand the dose-exposure relationship for SA in children beyond the SLCO1B1 genotype.

MANAGING CARDIAC PROBLEMS BEFORE BIRTH

At Children's Mercy, the ability to care for babies with complex heart issues begins before birth. Families who are experiencing concerns about the development of their baby's heart during pregnancy visit the Fetal Cardiac Clinic. The clinic is part of the Elizabeth J. Ferrell Fetal Health Center (FHC). Nearly one-third of all FHC patients have a heart diagnosis. The fetal cardiologists, nurses and nurse practitioners help these families through accurate diagnosis and the development of appropriate treatment plans both before and after delivery.

EXPANDING THE REACH OF CHAMP

With the proven success of the Cardiac High Acuity Monitoring Program (better known as CHAMP) app, Children's Mercy is sharing its home monitoring technology for single-ventricle patients with other pediatric cardiology programs across the nation. Today, nine U.S. sites are up and running, which means babies in 17 states are currently being monitored via the CHAMP app technology. To increase accesibility, the app is now platform agnostic and can be downloaded to a families' smartphone. Plus, it's now available in nine languages. For all nine centers combined, including Children's Mercy, the mortality rate for this population has been reduced to 3 percent, down from the nationwide average of 10 to 20 percent.

SOURCES

[1] Impact of SLCO1B1 Genotype on Pediatric Simvastatin Acid Pharmacokinetics. Wagner JB, Abdel-Rahman S, Van Haandel L, Gaedigk A, Gaedigk R, Raghuveer G, Kauffman R, Leeder JS. Journal of Clinical Pharmacology. 2018 Jun; 58(6):823-833. doi: 10.1002/jcph.1080. Epub 2018 Feb 22.

THE IMPORTANCE OF OUTCOMES TRANSPARENCY

Children's Mercy was one of the first pediatric cardiac surgery programs in the nation to proactively share surgical outcomes with the public via the Society of Thoracic Surgeons' (STS) website. This level of transparency is critical to quality improvement for patients, families and staff, and for pediatric heart surgery programs nationwide.

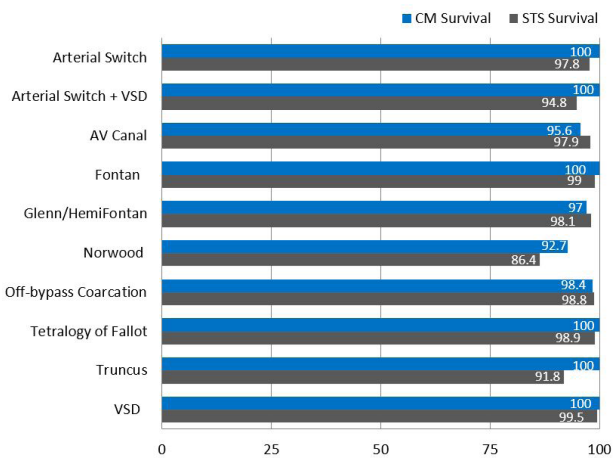
Patients benefit from the expertise of more than 30 board-certified pediatric cardiologists and cardiovascular surgeons.

FOUR-YEAR RISK STRATIFIED OUTCOMES BY STAT SCORE

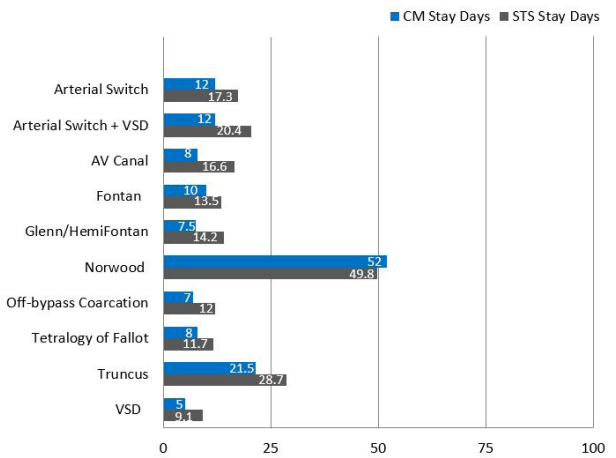
STAT* Category	Number of cases	CM Survival	STS Survival
1 (least complex)	402	**99.8%**	99.6%
2	407	**99.3%**	98.6%
3	139	**98.6%**	97.8%
4	264	**93.9%**	93.9%
5 (most complex)	76	**86.8%**	86.6%

***Bold** = Greater than or equal to STS national average*
** Society of Thoracic Surgeons - EACTS Congenital Heart Surgery Mortality Categories*
Children's Mercy, 2019

FOUR-YEAR OUTCOMES BY STS BENCHMARK OPERATION



FOUR-YEAR MEDIAN POST-OPERATIVE LENGTH OF STAY BY STS BENCHMARK



** Society of Thoracic Surgeons - EACTS Congenital Heart Surgery Mortality Categories*
Children's Mercy, 2019

CHILDREN'S MERCY RESEARCH INSTITUTE

The Children's Mercy Research Institute (CMRI) at Children's Mercy Kansas City is an integrated research environment where no boundaries exist between science and medicine. Here physicians, scientists, academic colleagues and philanthropic partners are collaborating to change the future for children. CMRI areas of emphasis provide the supportive structure for all research conducted at Children's Mercy. Research may fall under one of more of these areas and include Genomics, Precision Therapeutics, Population Health and Health Care Innovation. To enhance its research endeavors, a new building, future home to the CMRI, is under construction. The institute has been carefully designed so research and clinical care work as cross-functional teams, aligned together, to find answers to pediatric medicine's most challenging questions.

WARD FAMILY HEART CENTER OUTREACH

The Ward Family Heart Center at Children's Mercy is committed to providing high-quality outpatient cardiac care close to home for patients in its 150-county service area, including all of Kansas and western and southern Missouri. These outreach clinics provide thousands of patients the opportunity to receive the advanced care they need in their own communities.

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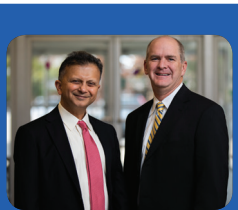
**Joining in Summer 2020*



LEARN MORE ABOUT THE WARD FAMILY HEART CENTER.
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Children's Mercy KANSAS CITY
UMKC School of Medicine

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