

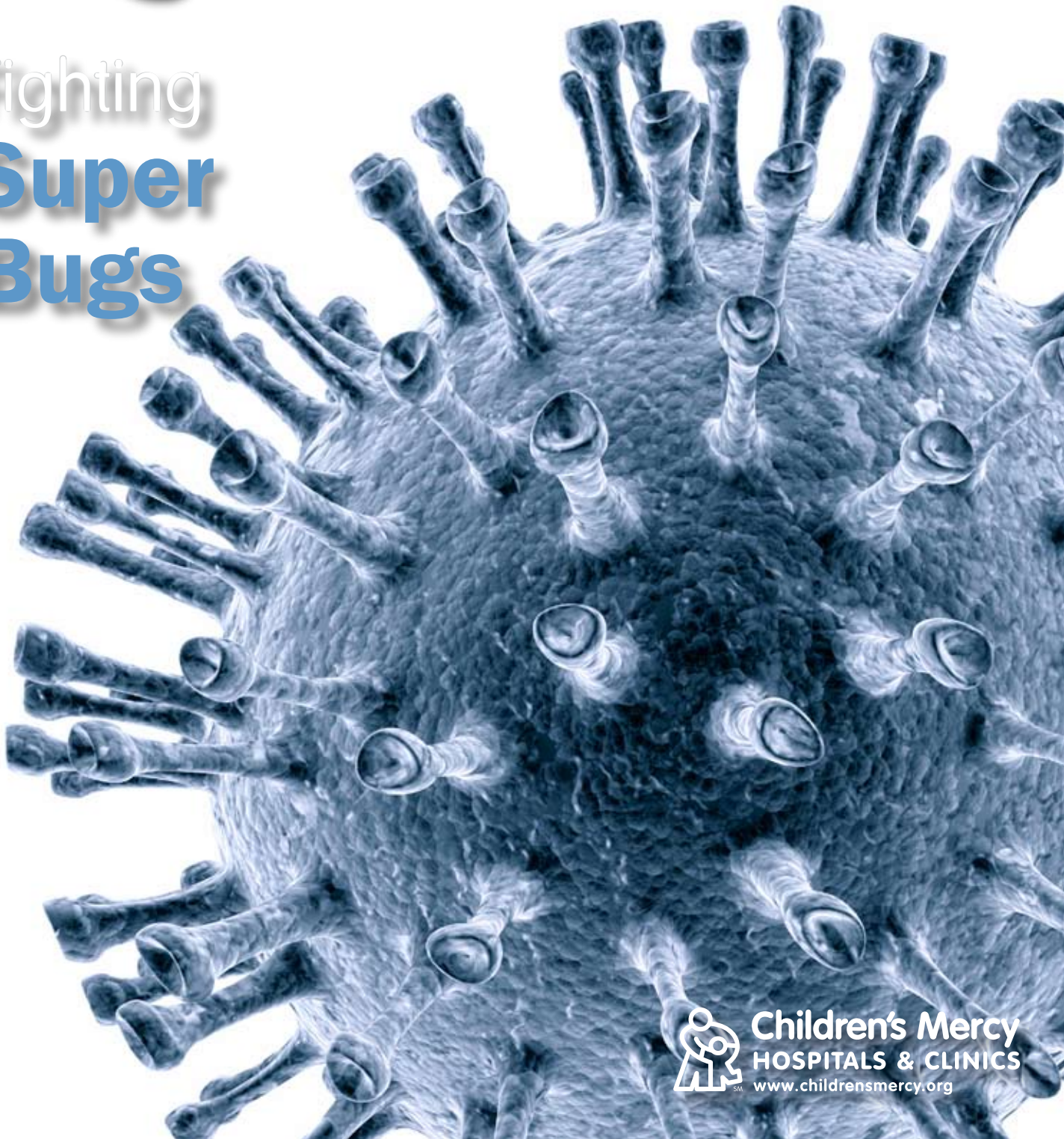
PHYSICIAN'S



November
2008

UPDATE

Fighting
**Super
Bugs**



Children's Mercy
HOSPITALS & CLINICS
www.childrensmercy.org



Jason Newland, MD
Infectious Diseases

QUALITY IMPROVEMENT:

Antibiotic Stewardship Program

Children’s Mercy has stepped to the forefront of children’s hospitals taking on the growing concern regarding antibiotic resistant bacteria with the development of the hospital’s Antimicrobial Stewardship Program.

“We are trying to make sure the antibiotics we use in our hospital are being used appropriately, and using appropriately means the right dose, for the right duration, and considering whether the patient even needs the antibiotic,” says Jason Newland, MD, Infectious Diseases Specialist, Director of the Antimicrobial Stewardship Program at Children’s Mercy, and Assistant Professor of Pediatrics at UMKC School of Medicine.

Specifically, Children’s Mercy is monitoring the use of broad spectrum antibiotics such as third generation cephalosporins, carbapenems, fluoroquinolones, vancomycin, and linezolid. Children’s Mercy is one of only a handful of children’s hospitals nationwide to implement this type of program.

“We know that the use of antibiotics is linked to development of bacterial resistance. We hope by only using antibiotics when appropriate, we will slow down antibiotic resistance rates,” says Dr. Newland.

Dr. Newland and Infectious Diseases Pharmacist Leslie Stach, PharmD, receive reports of all patients who are hospitalized and are on one of the monitored antibiotics for two days. They review the patient’s chart and then talk to the patient’s physician to discuss the use of the antibiotic, and come up with a consensus for treatment.

After six months, the program had reviewed 1,700 patients and made a recommendation for change in 25

bigger picture. Community physicians play a huge role in that they prescribe most antibiotics, so they are key factor in stewardship, adds Dr. Newland. In addition to case by case discussions with physicians, the Infectious Diseases staff is developing clinical practice guidelines for specific illnesses to help guide clinicians on the correct antibiotics to use.

Educating current residents is also important and the hospital is implementing an antibiotic curriculum

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percent of those cases. The most common recommendation has been to stop using the antibiotic, according to Dr. Newland.

“We have a compliance rate of 85-90 percent, meaning that the physician agreed with our recommendation, so we feel like it has been successful,” says Dr. Newland. Outcomes for all patients reviewed are being tracked to help determine if the course of treatment was effective.

Of course, what goes on in the hospital is only one small part of the

that includes lectures, weekly cases, continuing feedback, and pre- and post tests to assess their abilities to appropriately use antibiotics.

“We are doing our best to use antibiotics appropriately. We still have a lot of research to do to come up with length of treatment for many illnesses that is most effective,” says Dr. Newland. “The longer you use antibiotics, the more likely you are to develop resistance, so we’re trying to use them for as short as possible to effectively treat the infection.”



Children's Mercy:

Fighting the Rise of Super Bugs

The extraordinary ability of so-called “super bugs”—bacteria that develop resistance to commonly-used antibiotics—has led to growing concern that we might run out of options in the fight against infections.

Christopher Harrison, MD, Director of the Infectious Diseases Research Laboratory at Children's Mercy, and Professor of Pediatrics, University of Missouri-Kansas City School of Medicine, is on the frontline of the battle against these bacteria, studying and testing antibiotics and vaccines to determine whether they continue to perform the way they were initially designed to. His laboratory also is on the lookout for new resistant bacterial strains that might come to the Kansas City area.

“Given today's issues with microbial resistance, Children's Mercy is studying new drugs, especially regarding their effects on pathogens that are resistant to standard antibiotics. We also identify strains of bacteria that are emerging as vaccines eliminate the previously common strains. We are part of the national effort to monitor such issues, and share that information with the goal being the improvement of children's health—eventually on a global scale,” says Dr. Harrison.

He adds, “A good example is the PCV-7 (Prennar™) vaccine, which was developed to eliminate the seven most commonly invasive strains of pneumococcus (a germ that is

the most common bacterial cause of meningitis, pneumonia, and bloodstream, ear and sinus infections). Pneumococcus serotype 19F was previously one of the most common antibiotic resistant invasive strains. Now that 19F is nearly gone due to PCV-7 vaccine, serotype 19A, a ‘cousin’ to 19F, has emerged to be as virulent as 19F. But a subset of 19A isolates is now also multidrug-resistant. That's a problem.”

Children's Mercy's data show the need for a vaccine that also includes 19A, and just such a vaccine is likely to be released for use in the next year.

To be in the forefront of pediatric vaccine development, Children's Mercy applied for and was designated as a National Institutes of Health (NIH) sponsored Vaccine Trial Experimental Unit (VTEU), serving as a pediatric sub-site to test new vaccines and new uses for existing vaccines.

“The NIH appropriates research funds for novel vaccine projects designed to improve the public health, so Children's Mercy has joined the national research network that looks into difficult vaccine problems, such as researching new small pox vaccines or how to better use existing rotavirus vaccines,” Dr.

Harrison says, adding, "It might sound like a cliché, but we're working for the greater good."

Gregory Kearns, PharmD, PhD, The Marion Merrell Dow/Missouri Endowed Chair in Pediatric Medical Research and Chairman of the Department of Medical Research, concurs and collaborates with Dr. Harrison's scientific focus.

Dr. Kearns says, "Children's Mercy studies treatments for serious bacterial infections. That encompasses studying the immune system, as well as compounds that are not antibiotics in the classic sense, but their elements can be used by the immune system to fight infections. It's a multi-prong attack to treat serious infections."

He further explains that prescribing antibiotics is not a "one size fits all" philosophy.

"Medicine at Children's Mercy is practiced in such a way that there is a prudent use of antibiotics, with an emphasis on getting the dosage correct for patients, understanding that the

"It might sound like a cliché, but we're working for the greater good."

– Dr. Christopher Harrison

treatment has further societal implications," Dr. Kearns says.

For example, when a patient with an infection is under treated with antibiotics, it can give rise to a resistant bug that can be easily transmitted. "Bacteria finds a way to not bind to the drug or it mutates the enzymes that antibiotics disable—essentially genetic rearrangement, so that it stays alive," says Dr. Kearns.

Now the drugs of last resort, which used to be considered high-end, are no longer effective. To that end, Children's Mercy combines experience, knowledge, and ongoing clinical trials to find what will work in the future.

"In medicine, as it relates to antibiotics and their prudent use, we have to be careful to not become of our own worst enemy from trying to do good. With bacteria and resistance, we have to think beyond ourselves, even from the everyday patient encounter, for long-range, societal implications," Dr. Kearns says.

Of the new antibiotics on the market, Children's Mercy is currently conducting a Daptomycin treatment study to determine its safety, especially as it is considered a stronger drug. In addition to that study, two other antibiotics, Ceftobiprole and Doripenem, are being evaluated.

"The goal of these trials is to determine which drugs will be safer, with fewer side effects, as more drugs need to be tested in children for approval by the FDA," says Gina Calarco, RN, BSN, Infectious Diseases Research Coordinator.

With few pediatric institutions conducting this type of research, Children's Mercy will be providing recommendations regarding which antibiotic to use, as well as how much and how often it should be given to a patient, according to Calarco.

"As military strategist Sun Tzu surmised, the key to win the battle is to know your enemy. In terms of why to spend time and money to understand bacteria—the better we know these pathogens, we can use the best, optimal treatment and drive the development of new treatments. And that's why we are doing what we do at Children's Mercy," says Dr. Kearns.

ANTIBIOGRAM PROVIDES INFORMATION FOR ANTIBIOTIC DECISIONS

As bacterial resistance to antibiotics becomes an increasingly important issue, the Children's Mercy antibiogram can be a valuable tool in choosing the appropriate agent for treatment.

"The antibiogram is basically aggregate data of bacterial susceptibility to different antibiotics that we use in the hospital," says Rangaraj Selvarangan, PhD, Director of the Microbiology Laboratory at Children's Mercy.

"The main purpose of the antibiogram is to provide useful information to clinicians in the selection of the most appropriate agents for initial empiric antibiotic therapy."

The Children's Mercy antibiogram is produced on a yearly basis and provides data based on the different bacteria seen by the hospital laboratory. Using guidelines from the Clinical Laboratory Standards Institute, bacterial samples are taken from patients and tested against antibiotics to determine susceptibility.

"The antibiogram basically gives physicians a summary of the bacteria isolated in the previous year from clinical specimens and their antimicrobial susceptibility profile," says Dr. Selvarangan. "And we update them year after year because the bacteria tend to become more resistant as years go by."

Cumulative data is also available to monitor resistance data from year to year. Children's Mercy antibiograms for the past several years are available on the hospital's Web site at www.childrensmercy.org/antibiograms.



CLINICAL HIGHLIGHT: DISPELLING THE MYTH OF MRSA

Coined by the media as a “super bug,” methicillin-resistant *Staphylococcus aureus* (MRSA) has been portrayed as an old foe with new fangs: a pathogen combining virulence, resistance and an ability to disseminate at large.

“The media over-sensationalizes this organism. Nevertheless, methicillin-resistant *Staphylococcus aureus* infections can be serious and may lead to medical complications,” explains Jason Newland, MD, Director

“It’s understandable that parents and physicians are concerned; however, 99 percent of MRSA infections are not serious—it’s the one percent you hear about in the news,” emphasizes Robyn Livingston, MD, Director of the Infection Control and Prevention Program at Children’s Mercy, and Assistant Professor of Pediatrics, University of Missouri-Kansas City School of Medicine.

To monitor colonization, Dr. Livingston is performing a research

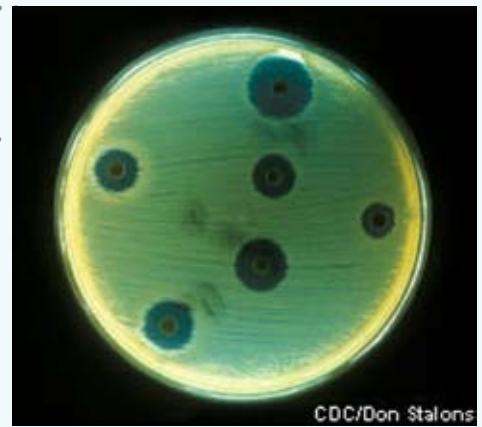
study in which active surveillance cultures for MRSA are collected from children when admitted to the Pediatric Intensive Care Unit (PICU) and then weekly thereafter until hospital discharge. This data will allow evaluation of baseline rates, hospital acquisition,

and identify MRSA disease.

Currently, for the hospitalized child with MRSA infection, all personnel entering the patient’s private room are required to wear a gown and gloves and hand hygiene is reinforced. A focused hand hygiene program which documents health care worker compliance has shown improvements in the last year with nearly 90 percent of those anonymously surveyed performing hand hygiene appropriately.

Clindamycin remains the mainstay for treatment of the stable hospitalized child with MRSA infection and vancomycin is reserved for the critically ill patient. And research is a critical focus for Children’s Mercy.

“We are studying the newest drugs



available, as clindamycin resistance is now found at a rate of 12 percent for all *S. aureus* and there is concern that reduced susceptibility to vancomycin may be on the horizon,” says Dr. Newland.

Additionally, Dr. Newland mentioned that two new drugs, ceftobiprole and daptomycin, are currently being studied.

He says, “The antimicrobial stewardship program which monitors antimicrobial usage of 17 key antimicrobials that are commonly used, may be instrumental in slowing the rate of resistance, and preventing it if possible. Appropriate use of vancomycin and linezolid are emphasized and clinical practice guidelines for treatment of common infections such as community-acquired pneumonia were developed.”



Dr. Sheldon Kaplan, Texas Children’s Hospital ID chief and noted MRSA researcher (third from left), discusses treatment of MRSA infection with Dr. Robyn Livingston, Dr. Jason Newland and Dr. Mary Anne Jackson during his visiting professorship in October.

of the Antibiotic Stewardship Program at Children’s Mercy, and Assistant Professor of Pediatrics, University of Missouri-Kansas City School of Medicine.

The recent publicity has stemmed from data indicating that while most infections previously occurred in hospitals or other health care settings, MRSA has spread to the community and is seen in those without risk factors, with skin/soft tissue infections being the most common type of infection encountered. In fact, a 2006 article in the *New England Journal of Medicine* identified the Kansas City urban community as having one of the highest prevalence rates for MRSA in the country.

PREVENTION TIPS FOR YOUR PATIENTS:

- Keep hands clean by washing thoroughly with soap and water or using an alcohol-based hand sanitizer.
- Keep cuts and scrapes clean and covered with a bandage until healed.
- Avoid contact with other people’s wounds and bandages.
- Keep kids at home if a draining wound cannot be consistently covered.
- Practice respiratory etiquette like covering coughs.
- Avoid sharing personal items such as towels.

GETTING THE MOST FROM YOUR **CURBSIDE CONSULTATION**

If you are looking for concise, practical, evidence-based advice for your infectious disease questions, the Children's Mercy Infectious Diseases (ID) section can provide guidance on these questions with "curbside consultations." These informal, yet detailed discussions are an integral part of the Infectious Diseases section's culture and can provide great value to you and your practice.

"Our curbside consultations offer expert advice as well as up-to-date medical knowledge on tough clinical questions commonly associated with infectious disease," says Mary Anne Jackson, MD, Section Chief, Infectious Diseases; Director, Infectious Diseases Fellowship Program; Professor of Pediatrics, University of Missouri-Kansas City School of Medicine.

In fact, Children's Mercy's curbside consultations provide user-friendly information basic enough for residents, while also incorporating expertise that even high-volume primary care physicians appreciate.

For optimal curbside consults, Dr. Jackson recommends well-formatted questions, with the patient's chart and relevant information available for discussion. She also suggests framing the questions—for example, "How do you treat croup?" versus "Is oral dexamethasone indicated in the patient with barking cough?"

"Our role is to get to the right question so that we can give the best answer for patient care," explains Dr. Jackson. "The advantages of our curbside consults include quick access to one of our infectious disease physicians, current medical information, and prompt scheduling of formal consultation when necessary."

For a formal consult, the following criteria should be considered:

- Two or more confounding variables in the patient's history
- Complicated treatment strategy
- Presence of underlying disease
- Unusual pathogen in an unusual location
- Multiple phone calls are required for the same patient
- Difference in diagnosis or treatment plans between colleagues

Physicians can call for a curbside consultation 24 hours a day, year round. Each Infectious Diseases section faculty member is assigned to manage phone calls daily, with the inpatient attending handling after-hours calls.

"Our goal is to make communication easy, seamless, timely, and most of all, helpful with treatment. Patient care is our priority, so our system of handling curbside consultations is all about being a resource for outside physicians," says Dr. Jackson.

NEED A CURBSIDE CONSULTATION?

Call 1.800.GO.MERCY (1.800.466.3729)

TOP TEN CURBSIDE CONSULT TOPICS

- 1) Patient Scenarios (e.g., outbreak of pink eye)
- 2) Vaccines
 - New
 - Potential for future
 - Seasonal
- 3) Pathogens / Rare Organisms
- 4) Treatment
- 5) Animal and Pet Disease Exposures
- 6) Exposure to Communicable Diseases (e.g., chicken pox)
- 7) Infection Control
- 8) Interpreting Results
- 9) Microbial Antibiotics Used for Prevention
- 10) Travel



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A PATIENT'S STORY

Gage Cameron
 2 years

Karen Cameron, a nurse practitioner, realized that something was wrong with her son Gage from the time he was 5 months old. Despite being on multiple types of antibiotics, Gage was routinely getting sinus infections and RSV which required hospitalization.

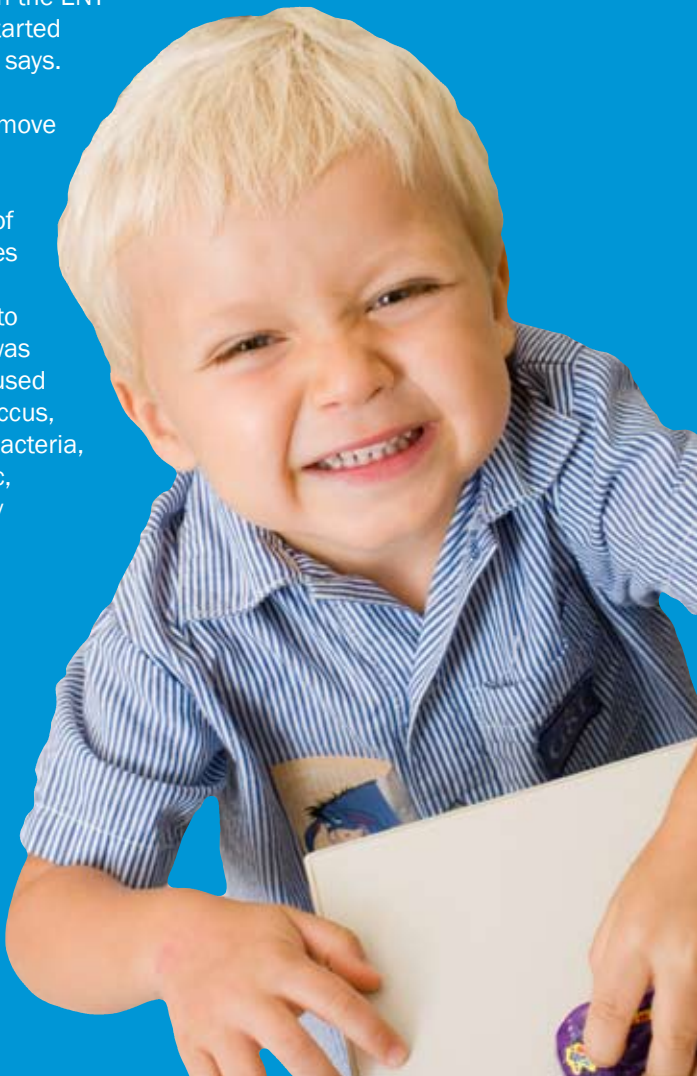
However, the tide turned for Gage during a hospital stay at Children's Mercy South.

"I spoke with an attending that truly listened and referred us to Dr. Julie Wei in the ENT Clinic. That's when things started looking up for Gage," Karen says.

Gage required surgery to remove his adenoids and insert ear tubes, but it could not be performed due to the level of infection. Infectious Diseases Section Chief Mary Anne Jackson, MD, was called in to consult on the case. Gage was diagnosed with sinusitis caused by Serotype 19A pneumococcus, a strain of highly resistant bacteria, but the only viable antibiotic, Levofloxacin, is not routinely recommended in children.

Gage was treated with Levofloxacin, then went into surgery, and within a week his condition improved immediately.

"Gage is a whole new kid now—he is active and energetic. We could not ask for better care than what Gage receives at Children's Mercy," says Karen.



HOW TO REFER

For Transport, Inpatient Admission or for Consult
 1-800 GO MERCY
 (1-800-466-3729)

Call this number 24 hours a day to mobilize the in-house neonatal or pediatric transport teams, consult with a specialist, or admit a patient directly to Children's Mercy Hospital or Children's Mercy South.

For Specialty Clinic Appointments
 (816) 234-3700 or
 toll free 1-800 800-7300

Nurses with our Physician Appointment line can assist you with scheduling clinic appointments for Children's Mercy Hospital, Children's Mercy South and Children's Mercy Northland.

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