Article Contributed By:
J. Patrick O’Neal, M.D.
Seema Csukas, M.D., Ph.D.
Cherie L. Drenzek, DVM, MS
Amanda Feldpausch, MPH
Gregory S. Felzien, M.D., AAHIVS
Brenda Fitzgerald, M.D.
Sandra Fryhofer MD, MACP, FRCP
Julie Gabel, DVM, MPH
Kristina Lam, M.D., MPH

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Regenerative Medicine

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Vol. 87, No. 6, 2016

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Lisa C. Perry-Gilkes, MD FACS is a solo private practice Otolaryngologist, who is currently on the board of the Atlanta Medical Association, Medical Associations of Georgia and the American Academy of Otolaryngology.

Magda Hanafi, MD Dr. Hanafi has had 10 years of training in the specialties of obstetrics and gynecology, infertility, surgery, and laparoscopic surgery. He has published manuscripts covering: fibroid tumors, adenomyosis, minimally invasive surgery (including robotic).

Elizabeth Morgan MD PHD is Director of Morgan Cosmetic Surgery, a plastic surgery practice limited to cosmetic plastic surgery. She is on staff at Northside Hospital.

Ceana Nezhat, MD, is the Fellowship Director at Atlanta Center for Minimally Invasive Surgery and Reproductive Medicine and Director of Medical Education at Northside Hospital. He is upcoming President of the Society of Reproductive Surgeons.

Nikhil Shah, MD, is the Chief of the Minimal Access and Robotic Surgery at Piedmont Health Care. He serves as the President and Founder of the Men's Health and Wellness Center of Atlanta.

Barry Silverman, MD, has practiced cardiology in Sandy Springs for 36 years and is on staff with Northside Cardiology.

Lance Stein, MD, practices transplant hepatology at the Piedmont Transplant Institute. He serves on national committees for the American Association for the Study of Liver Diseases, American College of Gastroenterology and the American Society of Transplantation.

W. Hayes Wilson, MD, is a physician with Piedmont Rheumatology Consultants, PC. He has served as Chair of the Medical & Scientific Committee of the Arthritis Foundation and Chair of the Division of Rheumatology at Piedmont Hospital.

ATLANTA Medicine is the journal of the Medical Association of Atlanta and is published by Sawyer Direct LLC at P.O. Box 49053, Colorado Springs, CO 80949

For subscription and advertising information, call 719.599.7220 or email info@sawyerdirect.com.

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J. Patrick O’Neal, M.D. is Director of Health Protection in the Georgia Department of Public Health. He has oversight responsibility for EMS, Trauma, Injury Prevention, Emergency Preparedness, Epidemiology, the Georgia Public Health Laboratories, Environmental Health, Infectious Diseases, Chronic Diseases, Immunizations, Refugee Health, Public Health Volunteer Programs and the Office of Pharmacy.

Seema Csukas, M.D., Ph.D. is the Medical Director for maternal and child programs in the Georgia Department of Public Health. Before joining Public Health, Dr. Csukas worked as a board-certified primary care pediatrician at Children’s Healthcare of Atlanta. Dr. Csukas earned her bachelor’s degree from Emory University. She received her medical and doctorate degrees from the Medical College of Georgia School of Medicine and School of Graduate Studies.

Cherie L. Drenzek, DVM, MS earned her Biological Sciences degree and her master’s degree in microbiology from Wayne State University. She received her DVM from Michigan State University in 1995; the same year, she entered the Epidemic Intelligence Service program at CDC. Dr. Drenzek has been employed as a Medical Epidemiologist at the Georgia Department of Public Health since 1999 and has served as the State Epidemiologist and Director of the Epidemiology Program since 2011.

Amanda Feldpausch, MPH is the Zika Epidemiology Team Lead and Zoonotic and Vectorborne Disease Epidemiologist at the Georgia Department of Public Health. She is a Returned Peace Corps Volunteer and graduate of Emory University’s Rollins School of Public Health. Amanda manages surveillance of more than 23 zoonotic and vectorborne diseases in the state. She also held leadership roles in the state’s Chikungunya and Ebola responses.

Julie Gabel, DVM, MPH worked as an ICU nurse for 10 years before receiving her DVM from UGA in 1994. After six years in small animal practice, she desired to combine her experience in human and veterinary medicine through a career in public health. She received a master’s in Public Health from Emory University in 2000 and has since been with the Georgia Department of Public Health, where she serves as the State Public Health Veterinarian.

Gregory S. Felzien, M.D., AAHIVS received his MD from the University of Colorado School of Medicine, which was followed by an internship/residency at Vanderbilt University and a fellowship in infectious diseases at the Medical University of South Carolina. He holds board certification in internal medicine and infectious diseases and is certified as an American Academy of HIV specialist. In 2014, Dr. Felzien accepted a medical advisor position within the Georgia Department of Public Health’s Division of Health Protection/IDI-HIV.

Brenda Fitzgerald, M.D. serves as the Commissioner of the Georgia Department of Public Health (DPH) and State Health Officer. A board-certified obstetrician-gynecologist and a fellow in anti-aging medicine, Fitzgerald directs various state public health programs and leads the state’s 18 public health districts and 159 county health departments. Fitzgerald previously served on the board and as president of the Georgia OB-GYN Society.

Sandra Adamson Fryhofer M.D. is a general internist, is Adjunct Associate Professor of Medicine at Emory University School of Medicine and on staff at Piedmont Hospital. Dr. Fryhofer is the American Medical Association (AMA) and the American College of Physicians (ACP) liaison to the Advisory Committee on Immunization Practices (ACIP). She also serves on ACIP vaccine work groups for influenza, pneumococcal, human papilloma virus and zoster vaccines as well as the work group for the adult immunization schedule.

Kristina Lam, M.D., MPH is a medical epidemiologist at the Georgia Department of Public Health in the Healthcare-Associated Infections Program. She received her B.S. from Emory University and her M.D. from Mercer University. She completed an internship in emergency medicine at Emory University and a residency in preventive medicine, and master’s of public health degree at Morehouse School of Medicine. Dr. Lam is board certified in public health and general preventive medicine.

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Having participated as a physician in U.S. healthcare for almost a half-century, I am amazed at the amount of system change that has occurred — especially over the last 10 years. I choose to look at these changes both through the lens of public health as well as the lens of the healthcare provider community, where I practiced as an emergency physician for almost 30 years.

As a guest editor, my current focus is to address the interface of Population Health (through the public health lens) and Population Medicine (through the healthcare provider lens) at a time of dynamic change within our healthcare system.

Although the distinction between Population Health and Population Medicine may seem like “nitpicking” semantics, the differentiation of the two is necessary to address their intersection. Population Health was defined in *Purchasing Population Health: Paying for Results* as “the aggregate health outcome of health-adjusted life expectancy (quantity and quality) of a group of individuals, in an economic framework that balances the relative marginal returns from the multiple determinants of health.”

Simply put, Population Health describes health outcomes of a population within a geographic area. On the other hand, Population Medicine is the more active process of impacting health outcomes within a population that might be geographic or might be a population of a disease entity, such as HIV-positive individuals or individuals with diabetes mellitus.

In this issue of *Atlanta Medicine*, five of my public health colleagues have submitted articles that address the interface of public health and the practice community. These articles demonstrate how the data from Population Health can impact the activities within Population Medicine. As you read their articles, I ask you to consider:

1. The use of academic and public health data on prevalence and incidence of disease to target evidence-based clinical interventions for disease states such as HIV, hepatitis C, diabetes mellitus and various cardiovascular abnormalities.
2. The opportunity that early identification of developmental abnormalities in the Zika-infected infant offers for early intervention and mitigations that may yield improved outcomes for those infants.¹
3. The need to monitor post-Zika infected adults for onset of Guillain-Barre syndrome or other neurologic abnormalities.
4. The opportunity for reducing healthcare-acquired infections and their concomitant costs (both clinically and fiscally) by following evidenced-based infection prevention guidelines and strategies.
5. Adopting the tenets of the Department of Public Health’s “Talk With Me Baby” campaign as you counsel new parents in your practices.

**Forecast for the Future**

Both the public health community and the practice community will benefit by assuming the common goals of improving healthcare to the individual, reducing healthcare costs and facilitating improved outcomes for the population at large. We now have a powerful driver for achieving these common goals. That driver is the “pay for performance” model that is being increasingly adopted by payers in the U.S.

Top-quality performance by providers will generate the greatest reimbursement. These new reimbursement strategies will drive targeted, high-quality care that yields the best possible outcomes.

The most optimal health outcome is the prevention of disease and injury. As payers recognize that the greatest return on investment actually comes with prevention strategies, we should expect increased focus by the payers on prevention.

The crystal ball for seeing the future is opaque to be sure, but it’s beginning to become a bit clearer. Will the relationship between public health (with its historical emphasis on prevention) and the practice community become more of an interdependency rather than an interface, as economic drivers continue to impact healthcare here and worldwide? The question is rhetorical, but the answer may become apparent in the very near future.

References

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The Zika virus is a mosquito-borne flavivirus primarily transmitted to humans by Aedes aegypti mosquitoes, but it can also be transmitted sexually, intrauterine (resulting in congenital infection), intrapartum, via blood transfusion and by laboratory exposure.

Zika virus outbreaks have occurred in countries in tropical Africa, Southeast Asia, the Pacific Islands, and the Americas since the discovery of the virus in Uganda in 1947. In May 2015, the PanAmerican Health Organization (PAHO) issued an alert detailing the first confirmed Zika virus infections attributed to local vector-borne transmission in Brazil. The outbreak spread rapidly throughout most of South and Central America and the Caribbean and was declared a “Public Health Emergency of International Concern” by the World Health Organization in February 2016.1 The Centers for Disease Control and Prevention (CDC) reports that the Zika virus is likely to continue to spread to new areas.2

Zika virus symptoms, which include maculopapular rash, fever, joint pain and/or conjunctivitis, are manifested in approximately 1 out of 5 persons infected with the virus. Others will not experience symptoms or may only have mild symptoms. For the majority of persons infected, symptoms will resolve within a few days to a week.2

In April 2016, evidence confirming the link between Zika infection during pregnancy and severe birth outcomes including microcephaly was confirmed.3 In the U.S., the greatest concern is for pregnant women and/or their sexual partners who have traveled to areas where Zika virus transmission is ongoing.

To understand more about the effects of the Zika virus infection on the fetus, the CDC established the U.S. Zika Pregnancy Registry through collaboration with state, tribal, local and territorial health departments. The Zika Pregnancy Registry will collect information about pregnancy and infant outcomes following laboratory evidence of Zika virus infection during pregnancy. The data will be used to update recommendations for clinical care, to plan for services for pregnant women and families affected by the Zika virus and to improve prevention of Zika virus infection during pregnancy.

The Georgia Department of Public Health’s Epidemiology Program enters data for pregnant women in Georgia into the U.S. Zika Pregnancy Registry. As of Sept. 1, 2016, 671 women from around the country are being followed in the registry, there have been 17 live births reported with birth defects and five pregnancy losses with birth defects.4 It is critical that pregnant women, or women who are planning to become pregnant, receive prevention education regarding travel and safe sex practices to avoid the serious outcomes associated with Zika virus infection during pregnancy.5

To date, Florida is the only state to report locally acquired mosquito-borne Zika virus infections in the continental United States. However, Zika infections have been reported in almost 3,000 travelers returning to the U.S. from countries where Zika virus transmission is active. The CDC maintains a webpage that includes maps and detailed information regarding affected areas at https://www.cdc.gov/zika/geo/active-countries.html.

Zika virus infections have also been confirmed in 24 individuals who had sexual contact with an infected person who acquired the disease while traveling. Because the species...
of mosquitoes (Aedes spp.) that transmit Zika virus can be found in many parts of the U.S., including Georgia, there is a risk that the virus imported into the U.S. by travelers will lead to local mosquito-borne transmission. It is imperative that potential infections in humans are identified quickly so that precautions to minimize exposure to local mosquitoes can be taken.

Astute clinicians are critical to recognition of Zika and other emerging diseases and form the cornerstone of all disease prevention and control efforts. Routine collection of recent travel history from every patient is imperative in this recognition.

Keeping up with rapidly changing travel advisories about Zika-affected areas and diagnostic testing information amid clinical demands is challenging. DPH has recently established a new web tool, the Travel Clinical Assistant, which provides clinical information on travel-related diseases in near real-time for 231 countries, including all Zika-affected areas (http://dph.georgia.gov/TravelClinicalAssistant). In addition, to rapidly detect (and subsequently mitigate) local transmission of Zika, clinicians in areas at risk need to consider that some patients without travel to Zika-affected areas, such as patients with fever, rash, joint pain or conjunctivitis, may also warrant Zika testing.

Healthcare providers evaluating symptomatic persons (male or female) and pregnant women (symptomatic or asymptomatic) who have traveled to areas where Zika virus transmission is ongoing, a suspected case of sexual transmission of Zika, or a suspected local mosquito-borne transmission should report the suspect case immediately to DPH to determine whether Zika testing is indicated and to facilitate appropriate specimen collection.

All Zika testing requests must be approved by DPH Epidemiology at 404-657-2588 (during business hours) or 1-866-PUB-HLTH. The Georgia Public Health Laboratory (GPHL) performs RT-PCR testing on serum, urine, CSF and amniotic fluid as well as MAC-Elisa IgM testing on serum. Special investigations such as pregnancy loss may require that additional specimens be sent to the CDC for testing. These specimens must also be triaged through DPH Epidemiology to receive the necessary approval for submission.

Since January 2016, the Georgia DPH has triaged about 1,600 inquiries from clinicians seeking approval for testing a patient for Zika infection. While as of Sept. 12, 2016, more than 900 Georgia residents have been tested for Zika, only 80 travel-associated infections have been confirmed. In addition to facilitating testing for the Zika virus, DPH works with clinicians and other partners to provide education about Zika virus prevention.

Travelers returning from areas where Zika virus transmission is ongoing should avoid mosquitoes for three weeks after their return regardless of whether or not they have symptoms. Additionally, travelers should be educated about potential sexual transmission of Zika virus and prevention. Current recommendations for the prevention of sexual transmission can be found on the CDC website.

The DPH Zika Epidemiology Team is available Monday through Friday 8 a.m. to 5 p.m. at 404-657-2588 for any Zika-related questions and to triage testing requests/facilitate submission of samples to GPHL, or clinicians may call 1-866-PUB-HLTH 24/7.

References
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The Zika virus has become the latest public health crisis. As more cases are diagnosed, more is learned about the virus, modes of transmission, symptoms and outcomes for pregnant women and congenitally infected infants.

Although no local transmission has been identified in Georgia yet, there are travel-related cases in Georgia including several pregnant women. Healthcare providers need to be informed and remain vigilant about identification and diagnosis of Zika virus infection cases in the patients that they care for.

Ongoing research on the Zika virus continues to expand our knowledge. The Zika virus is currently known to be spread to humans through the bite of an infected mosquito or through sexual contact with an infected individual. Symptoms of the infection may include fever, rash, conjunctivitis and/or arthralgia (joint pain) although not all infected individuals will experience the symptoms. In rare cases, infected individuals may develop Guillain-Barre Syndrome.

Deaths are also rare. Of special concern is the infection in pregnant women because of the resulting adverse pregnancy and birth outcomes that have been well documented.

The most common birth defect associated with congenital Zika virus infection is microcephaly. Other associated findings include intracranial calcifications, microcephaly or other anomalies in the newborn, laboratory testing for Zika virus infection is recommended. Although all newborns need regular medical care, a newborn who tests positive for the Zika virus infection requires more aggressive management.

The Zika-infected infant should have an established medical home. This includes being followed closely by the primary care provider according to the recommended Bright Futures well child periodicity schedule including age-appropriate vaccinations and developmental screenings. Also, coordinating care among the multiple medical specialists and other support services is critical. Congenital Zika infection, like other congenital infections, may not manifest adverse outcomes in the neonatal period. Growth and development should be followed closely with appropriate referrals made as new diagnoses are confirmed.

Regardless of the testing results, the newborn should have a thorough physical examination, including careful measurements of head circumference, weight and length, careful examination of the sensory systems (vision, hearing) and postnatal cranial ultrasound. Because the Zika virus is reported to interrupt brain cell development as well as disrupt existing brain cells, the Zika-infected baby may present with excessive irritability, hypertonia or hypotonia and severe cranial anomalies.

The infant should have a comprehensive ophthalmologic exam before one month of age. Infection may result in ocular anomalies such as hypoplasia of the optic nerve, anomalies of the anterior eye chamber or chorioretinal atrophy.

All babies born in Georgia birthing hospitals are screened for hearing deficits before discharge. In the case of suspected congenital Zika virus infection, the infant should receive a follow-up auditory brainstem response (ABR) hearing test within one month (if the initial screen was done by otoacoustic emissions testing) and even a baby with a pass result on hearing screening should be retested by ABR no later than six months due to potential late onset hearing deficits.
There is no contraindication to breast-feeding and should therefore be encouraged for the nutritional needs of the infant. Depending on the infant’s neurological status however, feeding difficulties such as oromotor dysfunction may need to be addressed.

For babies with congenital anomalies or suspected neurodevelopmental delays, Georgia has a system of care to provide assessments and services through Children First. Children First is a public health program that receives referrals for children with medical conditions or neurodevelopmental delays.

The referral can be made by a healthcare provider, family, teacher or anyone else concerned about the child’s growth and development. Once the referral is made, the family is contacted to begin assessing the child’s needs. The child is then connected to primary care services (if not currently connected) and to early intervention services through Babies Can’t Wait or specialty medical services through Children’s Medical Services based on eligibility.

Zika-infected infants should be referred to Children First. For those infants with a diagnosis of microcephaly or seizure disorder, Children First will be able to connect that infant to early intervention services. The infant may also qualify for Children’s Medical Services if financial criteria are met. For those infants with Zika infection without microcephaly or seizure disorder, Children First will continue to follow them and assess regularly. Children First can also connect the infant and family to other community resources based on the infant’s needs. (See chart.)

There is still much to learn about other potential medical and developmental outcomes for Zika-infected infants beyond the perinatal period, hence the need for ongoing monitoring.

As with all children with special healthcare needs, infants with congenital Zika virus infection and their families need ongoing support to manage the multiple needs of the infant. Regular psychosocial assessments should be considered to assist the family in dealing with the stressors associated with the infant’s care. Financial considerations may also place a burden on the family. Support for the infant and family requires a multidisciplinary approach, which is why the medical home plays such a key role in maximizing the infant’s potential. The long-term outcomes for Zika-infected infants are yet to be determined.

The Georgia Department of Public Health has created a Zika virus awareness campaign with fact sheets available on the Zika virus infection, environmental prevention strategies and personal prevention strategies for men, women and children. These fact sheets are available in English and in Spanish. Other language translations are being considered as needed.1

References:
2. www.brightfutures.aap.org
HIV as a Chronic Disease and Hepatitis C Eradication in Coinfected Individuals

By Gregory S. Felzien, M.D., AAHIVS

The HIV (Human Immunodeficiency Virus) epidemic has changed since being first reported June 5, 1981, when MMWR published five cases of Pneumocystis carinii pneumonia (PCP) among previously healthy young men in Los Angeles.1 Throughout the early epidemic, HIV would be known by several names and descriptions, such as GRID (Gay-Related Immune Deficiency); a disease of homosexual men with multiple sexual partners, people who inject drugs, Haitians and hemophiliacs; Lymphadenopathy Associated Virus, a retrovirus discovered that was thought to be the cause of AIDS; and HTLV-III. The causative agent of Acquired Immune Deficiency Syndrome (AIDS) was subsequently identified in 1984 by Dr. Robert Gallo and his colleagues at the National Cancer Institute with hope that a vaccine against AIDS would be produced within two years. The official declaration in naming the virus that caused AIDS took place in 1986 and would permanently be known as Human Immunodeficiency Virus.

In 1987, the U.S. Food and Drug Administration (FDA) approved the first antiretroviral drug, zidovudine (AZT). Despite this discovery, AIDS became the No. 1 cause of death for U.S. men ages 25 to 44 in 1992, and HIV became the leading cause of death for all Americans ages 25 to 44 in 1994. This was soon followed, in 1995, by the FDA approval of the first protease inhibitor. This ushered in a new era of highly active antiretroviral therapy (HAART), which became the standard of HIV care in 1997 and initiated the shift in perception of HIV from a death sentence into a chronic, treatable disease.2 In addition, this opened up opportunities for treating comorbidities, such as Hepatitis C, that were left untreated in the past for people living with HIV.

Where is the HIV Epidemic Today?

HIV can affect anyone, yet it does not universally affect everyone equally. The underlying commonalities are the risk factors associated with acquiring HIV (see table), yet the HIV epidemic has variability geographically and by age, gender, sexual orientation, race, ethnicity, etc.

The national HIV epidemic as seen today has changed to encompass a greater number of individuals, including those ages 13 to 24, who account for 22 percent of all new HIV diagnoses. Young gay and bisexual men account for 92 percent of all new HIV diagnoses in people aged 13-24 in 2014, and young, African-American gay and bisexual men are more severely affected. Gay and bisexual men accounted for 67 percent of all new HIV diagnoses in 2014. Minority populations, where African Americans made up 12 percent and Hispanic/Latinos 17 percent of the U.S. population, saw 44 percent and 23 percent, respectively, of all new HIV diagnoses in 2014.3

The South has the highest number of people living with HIV, but if population size is taken into account, the Northeast has the highest rate of people living with HIV. In contrast to the Northeast, the South has larger percentages of diagnoses in smaller metropolitan and nonmetropolitan areas.

Within the state of Georgia, there is variability throughout regions of the state, but the heart of the epidemic is seen within the Atlanta Metropolitan Area. Georgia was the fifth highest in the nation for the total number of new diagnoses of HIV infection in 2014, with the highest number occurring among males 20-29 years of age. African Americans accounted for 75 percent of new HIV diagnoses and constituted 30.5 percent of the Georgia population while males 13 years or older accounted for 80 percent of new HIV diagnoses. Seventy-five percent of those diagnoses were among men who have sex with men (MSM); in those that reside in the Atlanta Metropolitan Statistical Area, they accounted for 66 percent of new HIV diagnoses.4,5

Recent studies have demonstrated that an American has a 1 in 99 chance of being diagnosed with HIV at some point in...
his or her life, but in Georgia this rate is 1 in 51.6. Overall, gay and bisexual men are most affected by the HIV epidemic in the U.S., with 1 in 6 MSM being diagnosed with HIV in their lifetime, including 1 in 2 black MSM, 1 in 4 Latino MSM, and 1 in 11 white MSM.

HIV Life Expectancy and Hepatitis C Coinfection
In general, a 20-year-old HIV-positive adult on HIV medications in the United States or Canada is expected to live into their early 70s, a life expectancy approaching that of the general population. This has redefined HIV as a chronic disease and has also offered greater opportunity in treating those with other chronic diseases such as Hepatitis C (HCV), which was not considered treatable early in the epidemic.

Per adjusted estimates from the National Viral Hepatitis Roundtable, Georgia has approximately 118,000 individuals living with HCV. In the United States, approximately 20 percent to 30 percent of HIV-infected individuals are coinfected with HCV.

As of Dec. 31, 2014, within the state of Georgia, there are 53,230 individuals living with HIV. Therefore, we would expect that 10,646 to 15,969 of these individuals would be coinfected with HIV and HCV. HIV/HCV-coinfected patients suffer from more liver-related morbidity and mortality than HCV-mono-infected patients.

Newer all-oral agents are currently available, many FDA approved in the HIV/HCV coinfected population. These newer HCV treatment options have cure rates of greater than 90 percent in treatment of naïve patients, demonstrating that oral direct-acting antivirals are highly effective in HIV/HCV-coinfected individuals.

Being a Part of the Solution
The 2020 National HIV/AIDS Strategy goal is to reduce the number of new HIV diagnoses by at least 25 percent as well as eradicate HCV. What is Georgia doing to treat HIV and HIV/HCV coinfected individuals to meet this goal?

Georgia has employed a multidisciplinary team approach in meeting the diverse challenges throughout the state and in meeting these common goals through greater communication, reduced duplication of services and improved overall services for the clients we serve. The diversity of this team includes,

- **Resource Hub**: The CAPUS Project aims to create more efficient systems to prevent HIV, improve HIV testing, linkage to and retention in care and antiretroviral adherence, specifically targeting highest-risk minority populations.
- **Georgia Department of Public Health Specialty Clinic**: This specialty clinic is designed to assist new and expe-
rienced providers with the care and management of challenging cases for people living with HIV/AIDS and their comorbidities, such as Hepatitis C. In addition, it allows for clients to access care within their medical home, via TeleHealth and without the need of travel. This will potentially reduce the anxiety and fear of stigma of going to a new and unfamiliar clinic setting.16

• **Fetal & Infant Mortality Review (FIMR):** The goal of this program is to improve perinatal HIV prevention systems through medical record abstraction and maternal interview in looking at health, social, economic, cultural, safety and education systems that result in a perinatal HIV exposure or transmission.16

• **Office of Telehealth & Telemedicine:** Technology is opening up many new ways for patients to interact with the healthcare system to increase access to services and improve health. At the Georgia Department of Public Health, this technology is vital to reaching all of Georgia in expanding multiple services, including HIV/Hepatitis consultations, pre- and post-exposure prophylaxis advice for HIV prevention, mental health, dental care, nutrition counseling, breastfeeding education and much more without the need of patient transportation.16, 17 Efforts are being made to increase and improve telehealth systems as, according to the Georgia Board for Physician Workforce in 2010, Georgia ranked 39th in the U.S. in adequate distribution of doctors by specialty and geographic location per 100,000 population, with 52.3 percent of all Georgia’s physicians being located in five areas that serve 37 percent of the state’s population.18 As this expansion progresses, there is an increase in billing opportunities through insurance companies to support this growth of telehealth throughout rural communities.19

• **Viral Hepatitis Resources:** Through educational toolkits and expansion of services through the Georgia AIDS Drug Assistance Program (ADAP) pilot HCV program and the GA-DPH specialty clinic, we can reach a greater number of individuals coinfected with HIV and HCV.16 These projects, with the assistance of numerous community partners, allow for educational opportunities, increased assessment and treatment for those coinfected with HIV and HCV.

### Community Partners

Having strong community partners is imperative to delivering the necessary care to the clients we serve by expanding services, reaching common goals and minimizing the duplication of services. This landscape is vastly different based on clinic location and surrounding resources within urban and rural settings. Yet, even in the most rural regions, community partners can be diverse, including healthcare providers, pharmacists, faith- and community-based organizations, advocates, correctional facilities, local law enforcement, legal counsel, food banks, housing, substance abuse and mental health.

Stigma and discrimination continue to affect those living with and/or affected by HIV but may be diminished with strong community support and partnerships with the need to:

“Develop and implement community-based interventions that are designed to mobilize people living with HIV/AIDS and the range of other sympathetic social actors (opinion leaders, clergy, etc.) to address maladaptive self-stigmatizing behaviors and to advocate against discrimination in the wider community.”20

Great strides in HIV and Hepatitis C therapy have been taken in recent years, and a multidisciplinary approach to care offers an opportunity to reach a greater number of individuals in delivering the needed services to these populations throughout the state.
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Preventing the Spread of
ANTIBIOTIC-RESISTANT INFECTIONS

By Kristina Lam, M.D., MPH; Jeanne Negley, MBA; and Cherie L. Drenzek, DVM, MS

Antibiotics are the most commonly prescribed drugs, and although they can be life-saving, the use of antibiotics is not without risks. In addition to side effects and allergic reactions, antibiotics can also alter the normal gut microbiome and cause Clostridium difficile infections, a potentially deadly diarrhea.\(^1\)\(^,\)\(^2\) Inappropriate antibiotic use (including incorrect indication, agent or duration) can also lead to the development of antibiotic resistance and occurrence of infections that can be more difficult and costly to treat.\(^3\)

Approximately 2 million illnesses and 23,000 deaths are related to antibiotic-resistant bacteria each year in the United States. While antibiotic-resistant infections can be community-acquired and/or foodborne, the majority of deaths related to antibiotic resistance are associated with exposure in healthcare facilities, such as hospitals and nursing homes.\(^1\)

An estimated one in seven device- or procedure-associated infections, such as central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI) and surgical site infections (SSI), is caused by resistant bacteria in short-term acute care hospitals. The estimate is even higher, one in four, in long-term acute care hospitals.\(^4\)

The antibiotic-resistant bacteria that are predominantly attributed to healthcare exposure include carbapenem-resistant enterococci (CRE), multidrug-resistant Acinetobacter, extended spectrum beta-lactamase (ESBL) Enterobacteriaceae, Vancomycin-resistant Enterococcus (VRE), multidrug-resistant Pseudomonas aeruginosa and methicillin-resistant Staphylococcus aureus (MRSA). In addition, although it is not widely drug-resistant, Clostridium difficile causes approximately 453,000 infections and 29,000 deaths per year in the United States.\(^5\)

Consistent implementation and adherence to recommended practices can prevent and control the spread of resistant infections. Because antibiotic-resistant bacteria are often the cause of many catheter- and procedure-associated infections, adhering to recommended indications and guidelines for insertion, maintenance and removal of catheters and for pre- and post-operative prophylactic antibiotics can reduce the occurrence of resistant infections.

Improving antibiotic use can also slow the emergence of antibiotic-resistant bacteria, and implementation of antibiotic stewardship programs has been shown to be an effective strategy.\(^4\) The Centers for Disease Control and Prevention (CDC) has identified seven core elements

### Table 1. Core Elements of a Hospital Antibiotic Stewardship Program\(^6\)

<table>
<thead>
<tr>
<th>Leadership Commitment:</th>
<th>A written statement of support from leadership and/or salary support for dedicated time for antibiotic stewardship activities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability:</td>
<td>Appointing a single leader responsible for program outcomes.</td>
</tr>
<tr>
<td>Drug Expertise:</td>
<td>Appointing a single pharmacist leader responsible for working to improve antibiotic use.</td>
</tr>
<tr>
<td>Action:</td>
<td>Implementing at least one recommended action, such as requiring prescribers to document an indication for all antibiotics, using hospital-specific treatment recommendations, requiring clinicians to review the appropriateness of all antibiotics at or after 48 hours from the initial orders, having specific antibiotic agents that need to be approved prior to dispensing, or having a physician or pharmacist review courses of therapy for specified antibiotic agents</td>
</tr>
<tr>
<td>Tracking:</td>
<td>Monitoring antibiotic prescribing and resistance patterns</td>
</tr>
<tr>
<td>Reporting:</td>
<td>Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff</td>
</tr>
<tr>
<td>Education:</td>
<td>Educating clinicians about resistance and optimal prescribing</td>
</tr>
</tbody>
</table>

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of successful antibiotic stewardship programs in acute and long-term care settings (Table 1).6, 7 However, most antibiotics are prescribed in outpatient settings, and outpatient stewardship programs vary in size and scope. The CDC is expected to release outpatient antibiotic stewardship program core elements later this year.

Preventing the spread of resistant bacteria within and between healthcare facilities also plays a large role in containing antibiotic-resistant bacteria. Adherence to hand hygiene, environmental cleaning and personal protective equipment are basic, yet essential, elements of infection control in any healthcare setting. Unless compliance with standard- and transmission-based precautions is 100 percent, there will be risk of further spread, clusters and outbreaks of resistant bacteria.

While many individual healthcare providers, administrators and facilities are doing great work to reduce infections, a key component that is often missing is a coordinated approach to prevention activities across multiple facilities. Often patients are transferred between healthcare facilities without adequate communication about infectious status, and receiving facilities are often unaware of outbreaks occurring in transferring facilities.

The Georgia Department of Public Health (DPH) Healthcare-Associated Infection (HAI) Epidemiology Team is equipped to respond rapidly to clusters and outbreaks, help facilities improve infection prevention practices, facilitate communication between facilities and target resources to prevent spread. However, DPH’s response is dependent on accurate and timely detection and reporting of antibiotic-resistant infections, and we are working to improve collection, access and use of data to implement more prevention efforts across all healthcare settings in the state.

In September 2014, President Obama released an Executive Order for Combating Antibiotic-Resistant Bacteria, and in March 2015, the National Action Plan for Combating Antibiotic-Resistant Bacteria was released. The National Action Plan outlines five goals that aim to reduce the incidence of resistant bacterial infections by 2020 (Table 2).8 To achieve these goals, Congress appropriated $160 million to the CDC for fiscal year 2016, and a substantial portion of the funding has been awarded to all 50 state health departments, including Georgia.

As part of the Combating Antimicrobial Resistant Bacteria (CARB) initiative, Georgia DPH received funding to support additional antimicrobial resistance (AR) and

<table>
<thead>
<tr>
<th>Table 2. Goals of the National Action Plan⁸</th>
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<tbody>
<tr>
<td>1. Slow the emergence of resistant bacteria and prevent the spread of resistant infections.</td>
</tr>
<tr>
<td>2. Strengthen national One-Health surveillance efforts to combat resistance.</td>
</tr>
<tr>
<td>3. Advance development and use of rapid and innovative diagnostic tests for identification and characterization of resistant bacteria.</td>
</tr>
<tr>
<td>4. Accelerate basic and applied research and development for new antibiotics, other therapeutics and vaccines.</td>
</tr>
<tr>
<td>5. Improve international collaboration and capacities for antibiotic-resistance prevention, surveillance, control, and antibiotic research and development.</td>
</tr>
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</table>

MRSA bacteria
healthcare-associated infections (HAI) activities (Table 3). We are expanding HAI surveillance, prevention and response capacity, and adding infrastructure to respond to antimicrobial resistance.

In the near future, we will be calling on all Georgia physicians and healthcare partners to collaborate with us to detect, contain and prevent antibiotic-resistant infections that remain a significant public health threat.

References

<table>
<thead>
<tr>
<th>Healthcare-Associated Infection (HAI)/Antimicrobial Resistance (AR) Activity</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection and Response Infrastructure</td>
<td>• Increased capacity to respond to HAI/AR threats • Improved HAI/AR surveillance • Accelerated detection of resistance in HAI/AR clinical specimens • Improved coordination and implementation of HAI/AR prevention efforts across public health-health care partners</td>
</tr>
<tr>
<td>Coordinated Prevention</td>
<td>• Increased access and use of HAI/AR surveillance data from facilities to direct and inform actions and response • Improved tracking of antimicrobial use to aid in stewardship efforts • Improved use of incidence and epidemiology of HAI/AR pathogens for targeting prevention efforts</td>
</tr>
<tr>
<td>Capacity to detect carbapenem-resistant Enterococcus (CRE) at State Public Health Laboratory</td>
<td>• Increased Georgia Public Health Laboratory (GPHL) capacity to confirm resistance and detect known resistance mechanisms for CRE and carbapenem-resistant Pseudomonas aeruginosa</td>
</tr>
<tr>
<td>Antibiotic-resistant Gonorrhea (GC): Detection and Response</td>
<td>• Increase response to emerging resistant GC threats • Improved coordination of clinical, laboratory and rapid response activities to identify, investigate, treat and interrupt transmission of resistant GC threats • Increased epidemiologic capacity to design effective and efficient prevention and control interventions to mitigate spread of resistant GC threats</td>
</tr>
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</table>

Table 3. Georgia Department of Public Health Enhanced Antimicrobial Resistance Initiatives for 2016-17
There is a profound predictor of health and wellbeing that can be determined by three years of age. That predictor is language.

Babies need food to sustain them and help them grow healthy and strong. Similarly, language is nutrition for the brain. The brains of very young children, even before they are born, are stimulated by hearing words. Early childhood language exposure sets the stage for cognitive ability, literacy, school readiness and ultimately educational achievement. The quality and quantity of words that infants and children hear will enhance their vocabulary and impact their school performance, IQ, and life trajectory.1

Early childhood is of critical importance because a child’s vocabulary at the age of three is a key predictor of school readiness at kindergarten and third grade reading comprehension. In turn, reading proficiency at third grade is a powerful predictor of subsequent academic success.3 Third grade is also a time when children shift from learning how to read to reading to learn.1,3 If they cannot read at grade level by third grade, they often fall further and further behind.

The problem in Georgia is that almost 70 percent of our children don’t read at grade level by third grade.4 America’s Health Rankings 20151 puts Georgia near the bottom, 40 out of 50, in a state-by-state ranking of the nation’s health. The rankings include a comprehensive set of behaviors, community and environmental conditions, policies and clinical care data. Georgia ranks 42 for children in poverty, 47 for high school graduation rate, 46 for lack of health insurance and 45 for unemployment.

A study done in 1995 by Hart and Risley at the University of Kansas looked at 42 families from several different socioeconomic backgrounds for the way parents and children interacted daily and the effect it had on language and vocabulary development. The researchers noted what parents and children talked about, how much the children were praised and whether conversations were positive or negative. The study revealed significant disparities between the number of words spoken in high-income families and families on welfare. Children from low-income families heard approximately 600 words an hour compared to 2000 words an hour heard by children in the higher income families. By the age of three years, that’s a 30 million word gap.3

This study wasn’t about race, it wasn’t about gender, all of the children were well-cared for - the critical component was language. Whether it is spoken word or language
built on symbols and gestures such as sign language, language is language. Christine Yoshinaga-Itano, PhD, is a professor of Speech, Language and Cognitive Science at the University of Colorado Boulder and says, “Vocabulary development is the most significant predictor of literacy for children who are deaf or hard of hearing – just as it is for children with normal hearing.”

Another critical component of language is the interactions children have with their family or caretakers. The back and forth interactions between a parent talking to their baby and their baby “talking” back through babble and coos are known as serve and return interactions and are critical to brain development. When caregivers are sensitive and responsive to a baby’s expressions and needs, they create an environment rich in meaningful interactions, without which the brain doesn’t receive the positive stimulation it needs for healthy development of communication and social skills.2

The Georgia Department of Public Health sees language nutrition in early childhood development as a public health priority and an opportunity to change the outcomes for millions of Georgia children. But it is not something Public Health – or any single agency or organization – can achieve on its own.

The Georgia Brain Trust for Babies was established to increase language nutrition and improve outcomes for all Georgia children, particularly those at greatest risk. It is guided collectively by community leaders and leaders from the Georgia Department of Public Health, the Georgia Department of Education, Emory University’s School of Nursing and Department of Pediatrics, the Marcus Autism Center at Children’s Healthcare of Atlanta, the Atlanta Speech School’s Rollins Center for Language and Literacy, and Get Georgia Reading – the state’s campaign for grade level reading. Within the Georgia Brain Trust for Babies, there are campaigns tailored to meet the needs of specific populations of children.

The Hundred Babies campaign is focused on those children who are deaf or hard of hearing. The goal is to identify those children by one month of life, diagnose by three months, and have them in remediation by six months. Visual language – sign language – develops the same area of the brain as spoken language and is just as effective in developing neural circuits. The key is repeated stimulation in a positive environment.

Talk With Me Baby includes campaigns to increase language aimed directly at parents and caretakers. Training for WIC (Women, Infants and Children Food and
Nutrition Service) nutritionists and nurses has occurred in all 159 Georgia counties to encourage parents to talk with their babies more. WIC reaches those families under 185 percent of the Federal Poverty Level and in Georgia that translates to about 50 percent of the families babies are born into each year (2015 Georgia WIC Participation Summary). Talk with Me Baby provides the tools to promote language acquisition in that population.

Public Health nurses, OB, NICU and pediatric nurses throughout the state still need to be trained about Talk With Me Baby. The Emory School of Nursing and Marcus Autism Center have developed a rigorous curriculum for these professionals and it is currently being offered and evaluated in the metro Atlanta area. Trainings will soon be offered to foster parents and caseworkers in the Division of Family and Children Services. The Atlanta Speech School is developing a curriculum for teachers in early care and learning centers. We are working with birthing hospitals so when a women delivers a baby, she is surrounded by staff who are trained in language nutrition and in an environment that is language-rich.

As physicians and health care professionals you play a huge role in the lives of your patients and can help spread the message of Talk With Me Baby. Share with your patients the importance of language nutrition in early brain development – before and after birth - and reinforce the need for positive, back and forth interactions with young children. The Brain Trust for Babies and Talk With Me Baby are important steps forward for Georgia, but even more public-private partnerships are needed to promote early brain development through language nutrition. The good news is that the 30 million word gap can be bridged and together we can have an impact on the lives of Georgia’s children and on the overall health of our population.

References:
On Feb 1, 2016, President Obama announced “Moonshot,” a new billion-dollar national initiative “to eliminate cancer as we know it.” In his announcement, the President predicted 1.6 million new cancer cases and 600,000 deaths in the United States in 2016. He discussed recent advances in cancer treatment, including using immunotherapy to activate the immune system against cancer.1

The details of this initiative also revealed cutting-edge research opportunities in cancer vaccine development. The human papilloma virus (HPV) vaccine was specifically mentioned as an example of future success in preventing cervical and other cancers. These are laudable goals, but current trends in HPV vaccine coverage suggest many are missing this cancer-preventing opportunity.2

The HPV Virus and Cancer

HPV, the human papilloma virus, is linked to cervical, vulvar and vaginal cancer in females, penile cancer in males, and both anal and oropharyngeal cancer in both genders.3,4 There are more than 100 different types of HPV virus strains identified. At least 40 of these types can infect the genital area. There are low-risk and high-risk types. The low-risk types include types 6 and 11 that cause genital warts and recurrent respiratory papillomatosis.1 The high-risk types are linked to cancer: cervical, vulvar and vaginal cancer in females, penile cancer in males, and both anal and oropharyngeal cancer in both genders. High-risk HPV strains include types 16, 18, 31, 33, 45, 52 and 58, which are included in some or all of the available vaccines.3

Differences in Coverage

There are three HPV vaccines currently available: a bivalent vaccine, 2vHPV vaccine (covers 16, 18) brand name Cervarix made by GSK and FDA approved in 2009;5 a quadrivalent vaccine, 4vHPV vaccine (covers 6, 11, 16, 18), brand name Gardasil by Merck and FDA approved in 2006; and a nonavalent vaccine, 9vHPV vaccine (covers 6, 11, 16, 18 plus 31, 33, 45, 52, 58), brand name Gardasil 9, also made by Merck and FDA approved in December 2014.

All three HPV vaccines, the 2valent (v), the 4v, and the new 9 valent vaccine, provide cancer protection against HPV types 16 and 18, which cause about 64 percent of HPV-related cancers overall (an estimated 21,300 cases of cancer each year). The cancer-causing potential of these two strains (16, 18) is similar for males and females. Types 16 and 18 cause 63 percent of all HPV-related cancers in males and 65 percent of all HPV-related cancers in females as well as 66 percent of all cervical cancers.8

The 4v and 9v vaccines also protect against types 6 and 11, which cause 90 percent of all cases of anogenital warts.8 The newer 9v vaccine covers five additional strains, which are linked to 10 percent of HPV-related cancers overall (about 3,400 cancer cases each year) but with important gender differences.4 The five additional strains are linked to 14 percent of HPV-related cancers in females, including 15 percent of cervical cancers, but only 4 percent of HPV-related cancers in males.8 Thus, the 9v vaccine provides triple additional protection for females.

HPV Vaccination Recommendations

ACIP recommends adolescents begin the HPV vaccine series routinely starting at age 11 or 12. Catch up vaccination should continue through age 26 for all females, through age 21 for all males, and through age 26 for immunocompromised males, including those with HIV and for men who have sex with men. Any of the three vaccines can be used to start, continue or complete the series for females, but only the 4v and 9v vaccines are options for males.8

At the February 2016 ACIP meeting, Merck, maker of both the 4v and 9v HPV vaccines, announced production and distribution of the HPV 4v vaccine will halt at the end of 2016. Many physicians (and parents) may wonder about additional vaccination with HPV 9. If a child has already completed a bivalent or quadrivalent vaccination series, should they receive additional vaccination with the 9v HPV vaccine? That’s a good question, but it is NOT answered or addressed in the 2016 ACIP Adult Immunization schedule or its footnotes. However, guidance on the ACIP website does clarify: “There is NO ACIP recommendation for additional 9-v HPV vaccine doses” for anyone that’s already completed bivalent or quadrivalent vaccination series. However, studies show no serious safety concerns with additional nine valent vaccination other than higher rates of injection site swelling and redness.9 So the decision for additional vaccination is in the physician’s and parents’ hands.

Dispelling HPV Vaccine Myths

The HPV virus is sexually transmitted, with an estimated 6.2 million new infections (pre-HPV vaccine era) each year.1 HPV vaccines are prophylactic vaccines, which means they must be given before exposure to the virus strain to be effective.2 Stud-
ies show that immune response to the vaccine is best when given at younger ages. That’s why it is recommended to be given at age 11-12 (but can be given as early as age 9). HPV vaccines are cancer-preventing vaccines, not “sex vaccines.” A recent study in Pediatrics confirmed that HPV vaccination was not associated with riskier sexual behaviors: vaccination will not cause your children to have sex.

Most of us hope that our children will have marital sex and give us grandchildren. Although we can help shape our own children’s behaviors, we don’t know and cannot control the past behaviors of the person they choose to marry. (The number of lifetime and recent sexual partners is the most consistent predictor of HPV infection.) So think of this vaccine as cancer protection insurance for your child.

You can’t get an HPV infection from the vaccine. The vaccine does not contain any viral DNA whatsoever, so there is no way to become infected with the virus by getting the vaccine.

You don’t need a pregnancy test before getting the vaccine, but the vaccine should NOT be given to women who are pregnant or are planning to get pregnant soon. ACIP says the vaccine may be given to nursing moms.

The vaccine is not meant to be a treatment for HPV infection, and women must still get regular cervical cancer screening beginning at age 21.

New Evidence the Vaccine Seems to be Working

A study recently published in the journal Pediatrics and spearheaded by Dr. Laurie Markowitz demonstrates the effectiveness of the vaccine. HPV infection rates among 14- to 19-year-old girls for the four HPV types covered in the 4v HPV vaccine dropped 63 percent from 11.4 percent in 2006 (pre-vaccine era) to 4.3 percent in 2009-2012 (post-vaccine).

Unfortunately, findings from the most recent National Health Interview Survey (NHIS) in 2014 revealed disappointing HPV vaccination coverage rates for adults age 19-26. Only 40.2 percent of females and 8.2 percent of males had received at least one HPV vaccine dose. Much greater protection could be achieved if all kids were vaccinated with this cancer-preventing vaccine.

Limited Opportunity

This is a prophylactic vaccine. Don’t let your kids or patients miss the window of opportunity for protection. Don’t underestimate the power of your recommendation. A recent study showed that women age 19-26 were overwhelmingly more likely to receive a HPV vaccination if it was recommended by their physician. Encourage your patients, your family members and your friends to make sure their kids get vaccinated against HPV. These cancers can be eliminated if all kids receive this cancer-preventing vaccine.

Note: Dr. Fryhofer is the American Medical Association (AMA) and the American College of Physicians (ACP) liaison to ACIP, the Advisory Committee on Immunization Practices. She also serves on ACIP vaccine work groups for influenza, pneumococcal, human papilloma virus and zoster vaccines as well as the work group for the adult immunization schedule.

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4. FDA License of Quadrivalent Human Papillomavirus Vaccine (HPV4, Gardasil) for Use in Males and Guidance from the Advisory Committee on Immunization Practises (ACIP), MMWR, May 28, 2010 / 59(20):630-632.
A device resembling a tiny parachute is actually an innovative, one-time procedure that reduces the risk of stroke in people who have atrial fibrillation (AFib). Known as the WATCHMAN, the device is designed to keep harmful blood clots from entering a patient’s bloodstream, which could potentially cause a stroke. It can also reduce the long-term risk of bleeding associated with use of blood thinning medications. WellStar Kennestone Hospital is one of the first to offer the treatment publicly in Georgia.

According to Amar Patel, M.D., co-medical Director of WellStar Health System’s Structural Heart and Valve Program, about 15 percent to 20 percent of strokes are Afib related, and these types of strokes are more frequently fatal or disabling. “When a person has Afib, the main reason for stroke is that blood clots that have formed in the left atrial appendage of the heart then break off and enter the blood stream. The clot’s first stop off the aorta is the great vessels to the brain. When the clot ends up here, this leads to a stroke due to a blocked artery. This mechanism is distinctly different from strokes caused by blood clotting disorders, high blood pressure or blockages in the head or neck arteries,” he says. “About 90 percent of Afib-related strokes are caused by clots that originated in the left atrial appendage, which is a tissue structure of unclear importance.”

Most patients with AFib rely on blood-thinning medications such as warfarin to prevent blood clots from forming. However, long-term use of these anticoagulants comes with its own risk for problems like gastro-intestinal or intracranial bleeding, or bleeding from work-related accidents or falls. “We can estimate the risk of bleeding for people who have conditions such as high blood pressure or abnormal liver or kidney function,” Patel says. “But for
some people with AFib who are taking anticoagulants, there is not only a high risk of stroke but also a greater risk of life-threatening bleeds.”

The WATCHMAN device is a highly effective treatment option as an alternative to long-term anticoagulation for people who are at risk for stroke due to AFib and who are not good long-term candidates for blood thinning.

How WATCHMAN works
WATCHMAN closes off the left atrial appendage, preventing blood clots from migrating out of it. The procedure is performed under general anesthesia in the following manner:

- Using a standard percutaneous technique, a guide wire and vessel dilator are inserted in the femoral vein.

- The implant procedure is performed with fluoroscopy and transesophageal echocardiography (TEE). The interatrial septum is crossed using a standard transseptal access system.

- The access sheath is advanced over the guide wire into the left atrium and then navigated into the distal portion of the left atrial appendage over a pigtail catheter.

- WATCHMAN is then deployed and released in the left atrial appendage.

- Heart tissue then grows over the implant and the left atrial appendage is permanently sealed.

“The risks of this implanted device are relatively low compared to long-term anticoagulant use,” said Patel. “And it confers the same amount of benefit for stroke reduction in a patient as being on a blood thinner.”

Candidacy for the WATCHMAN procedure
“Unfortunately, not every patient who has AFib is a good candidate for the WATCHMAN device,” Patel says. “This is because everyone’s left atrial appendage is formed differently — there are at least 20 different configurations. We are able to determine if a person is a candidate for the implant based on his or her left atrial appendage anatomy.”

Additionally, there are some people who cannot tolerate being on anticoagulation medications and, because of that, may have already formed blood clots in the appendage.

“In these cases, the clots would be discovered when we perform a TEE,” he says. “We would not use the device because of the possibility of knocking the clots loose during the procedure and sending them into the patient’s circulation.”

Recovery and outcomes
Patients who receive the WATCHMAN implant typically remain on blood-thinning medication for 45 days after the procedure, at which time another TEE is used to confirm endothelialization. Patel says that once endothelialization is confirmed, the patient will then switch to a six-month regimen of aspirin and Plavix (clopidogrel) to ensure that healing continues properly and that no blood clots develop on the device.

“We follow this protocol to make sure that the WATCHMAN device is well seated and there are no leaks surrounding it,” he says. “Data show that 99 percent of patients who receive the implant are completely off anticoagulant therapy after a year.”

Patel and his team began performing the WATCHMAN procedure at WellStar Kennestone in June 2016 and he says that patient volume is increasing.

“We’re just starting to scratch the surface of letting cardiologists and other physicians know that this procedure is available as a preventive measure for their patients with AFib,” he says. “We monitor all of our patients through our Structural Heart and Valve Program and, so far, all of them are very happy with the procedure. It’s such a rewarding experience to tell someone they will be able to come off anticoagulant therapy and still maintain a reduced risk of stroke. Their happiness and relief in coming off of anticoagulation is just amazing.”

For more information about the WATCHMAN procedure at WellStar Kennestone Hospital, call 770-590-4180

About WATCHMAN
The WATCHMAN implant offers a groundbreaking alternative to daily blood thinners for reducing non-valvular AFib stroke risk. To date, the device has undergone more than 10 years of clinical testing, thousands of patients have participated in research studies, and more than 15,000 implantations of the device have occurred.

Benefits include:
- Doesn’t require open heart surgery
- Typical implant procedure time is less than 60 minutes
- Average hospital length of stay for patients is 24 hours
- Most patients can stop taking blood thinners 45 days after the procedure
Does regenerative medicine hold the keys to rebuilding damaged organs, tissue and muscle? *Atlanta Medicine* recently spoke with some Atlanta area researchers about the promise regenerative medicine holds for the future of medicine.

According to Arshed A. Quyyumi, M.D., a professor of medicine in Emory University School of Medicine’s Division of Cardiology, stem cell therapy may offer hope to people with cardiovascular disease in two ways: by treating people with heart disease and by providing evidence to researchers that may help them learn more about the body’s regenerative capacity. He says that progenitor cells, the early descendants of stem cells that have the ability to form different types of tissues and organs, may yield the most valuable information in the study of stem cell therapy as treatment for heart disease.

“The number of progenitor cells in a person’s body are reflective of their ability to heal and regenerate. They reflect the health of the reparative system in our bodies,” he says. “We have learned that people with low numbers of progenitor cells are less likely to heal, regenerate and repair. For people with heart disease, this means that they are more likely to succumb to their condition if their level of progenitor cells is low.”

Quyyumi adds that comparable studies conducted around the world have provided similar results.

“It’s not a small observation,” he says. “These studies of progenitor cells have all produced the same result in terms of predictive capacity.”

As for the treatment aspect, Quyyumi says that stem cell therapy offers promise for people with irreparable heart damage. Various stem cells, which are injected into the patient, are harvested either from the patient’s own bone marrow or from a donor.

“People who are participating in this research are those who have advanced disease, blockages or heart failure, for whom the usual treatment options have either been exhausted, haven’t worked or can’t be performed,” he says.

So far, results have been encouraging.

“Some clinical trials show that stem cell therapy has improved heart function in patients and that they are living longer,” says Quyyumi. “Ultimately, we hope that stem cell therapy, in some form, will be available as a choice of treatment down the line for people.
“Recent clinical evidence shows that stem cell therapy is on the cusp of working very effectively across a broad range of applications.”

Todd McAllister, Ph.D.

Public Bank of Renewable Stem Cells Offers Promise

Recent clinical evidence shows that stem cell therapy is on the cusp of working very effectively across a broad range of applications, says Todd McAllister, Ph.D., executive director of the Amnion Foundation. McAllister and his colleagues, including Nicolas A. Chronos, M.D., managing partner of Cardiology Care Clinics, are collaboratively researching the value of amnion stem cells, found in the placenta and the amniotic fluid surrounding a fetus, in the development of regenerative medicine treatments and technologies.

“The reality is that current stem cell therapies aren’t performing up to the high expectations we had. Stem cells have been so hyped that now there is an expectation that we can inject stem cells after a heart attack, for example, and have the patient run a marathon the next day. We aren’t there yet,” McAllister says. “Most clinical studies use one of two basic approaches for stem cell therapy – harvesting cells from the patient’s own fat or bone marrow [autologous] or using cells from a master donor [allogenic].”

Both models have potential limitations, he adds. “The autologous model often uses cells taken from older, sicker patients, which may lack the regenerative capacity to cure the patient. The allogeneic model has the advantage of providing younger, healthier cells off the shelf, but immune or inflammatory responses to these cells may limit their long-term survival in the recipient.”

Dr. McAllister says that the Amnion Foundation is seeking to bridge the gap between the two models by building a bank of thousands of donors of powerful young stem cells, from which there will be perfect immunological matches for every person who needs them.

“Our objective is to extend upon the successes that have been documented with cord blood banking for blood cancers, in which the cells injected have a greater survival rate without a graft vs. host response,” McAllister explains. “While this seems an obvious extension, this public banking model is novel for treatments beyond diseases of the blood.”

Chronos says that the way stem cells work is not totally clear. “We aren’t sure if stem cells work because they engraft into damaged tissues and then can turn into functional cells, or if they simply produce growth factors or other repair signals at the site of damage,” he says. “What we do know is that, as we age, there may be a reduced number of stem cells in our bodies, and they may not work as well once disease has formed.”

Forming a bank of amnion stem cells, available to the public, makes a tremendous amount of sense, says Chronos.

“One of the beauties of harvesting amnion stem cells is that they don’t pose an ethical dilemma to harvest. They are literally being thrown away after a baby is born,” he says. “These amnion cells are also incredibly multipotent, meaning that they can develop into almost any cell type. While we tend to think that all stem cells have this power, most have relatively narrow pathways that they can differentiate down.

“Amnion cells may be so young in their lineage that they can actually be driven, in the right environment, to rebuild any organ you want to treat,” he says. “This characteristic, coupled with immunological matching in the public banking model, may finally help realize the full potential of stem cell therapies.”

For more information about Amnion Foundation, visit www.amnionfoundation.org.
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