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Gregory H. Bledsoe, MD, MPH

A Personal Interview with the Arkansas Surgeon General

DIFFERENT PATIENTS ...

Different needs

As a health care provider, you understand that no two patients are alike. That's why the Centers for Disease Control and Prevention recommends specific flu vaccines based on a patient's age and health status.

Everyone over the age of six months needs an annual flu vaccination, especially those who have a higher risk of medical complications due to influenza — including people under the age of 5 or over the age of 50, pregnant women, and people who have certain medical conditions like asthma, diabetes or chronic lung disease. By ensuring that your patients get the right type of vaccine, you can help all Arkansans stay healthy and well this winter. And remember, it's vital that health care workers are also vaccinated.

Influenza Vaccines Approved for Use in the U.S. for the 2015-16 Influenza Season

NAME	MANUFACTURER	AGES	TRIVALENT /QUADRIVALENT
Afluria: Inactivated influenza vaccine	bio/CSL	> 9 years*	Trivalent: 0.5 mL single-dose • Prefilled syringe or multi-dose vial
Fluarix: Inactivated influenza vaccine	GlaxoSmithKline	≥ 3 years	Trivalent and Quadrivalent: 0.5 mL single-dose • Prefilled syringe
FluBlok: Recombinant influenza vaccine	Protein Sciences	≥ 18 years	Trivalent: 0.5 mL single-dose • Single-dose vial
Flucelvax: Inactivated influenza vaccine	Novartis and Diagnostics	≥ 18 years	Trivalent: 0.5 mL single-dose • Prefilled syringe
FluLaval: Inactivated influenza vaccine	GlaxoSmithKline	≥ 3 years	Trivalent and Quadrivalent: 0.5 mL single-dose • Prefilled syringe or multi-dose vial
FluMist: Live attenuated influenza vaccine	MedImmune	2–49 years	Quadrivalent: 0.2 mL single-dose • Prefilled intranasal spray
Fluvirin: Inactivated influenza vaccine	Novartis	≥ 4 years	Trivalen: 0.5 mL single-dose • Prefilled syringe or multi-dose vial
Fluzone: Inactivated influenza vaccine	Sanofi Pasteur	> 6–35 months**	Trivalent: 0.25mL single-dose multi-dose vial
		≥ 6–35 months**	Quadrivalent: 0.25 mL single-dose • Prefilled syringe or multi-dose vial
		≥ 36 months	Trivalent and Quadrivalent: 0.5 mL single-dose Prefilled syringe or multi-dose vial
		18–64 years	Trivalent: 0.1 mL prefilled microinjection system intradermal
Fluzone High-Dose: Inactivated influenza vaccine	Sanofi Pasteur	≥ 65 years	Trivalent: 0.5 mL single-dose • Prefilled syringe

* Afluria is licensed for ages 5 and older, but ACIP recommends that it not be used in children 5 through 8 years because of increased reports of febrile reactions in this age group. If no other age-appropriate, inactivated influenza vaccine is available for a child 5 through 8 who has a medical condition that increases the risk for influenza complications, Afluria can be used. However, providers should first discuss the benefits and risks of vaccination with Afluria with the child's parent or caregiver. Afluria may be used in persons 9 years of age and older.

** For infants and toddlers 6 months through 35 months of age a second dose may be required 1 month later.

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Act 529 – To Extend Prescriptive Authority to Hydrocodone Combination Products if Authorized by a Physician

DAVID WROTEN
EXECUTIVE VICE PRESIDENT

In October of 2014 the DEA re-classified hydrocodone combination products from Schedule III to Schedule II. What this meant for physicians was their prescribing practices had to change….no refills, no call-in prescriptions, etc. But for others, specifically physician assistants (PAs) and advance practice registered nurses (APRNs), it meant they could no longer write prescriptions for these drugs. At least not in Arkansas and the other states that do not allow mid-level providers to prescribe Schedule II drugs.

That really wasn't the DEA's goal. The DEA wanted to reduce the ease with which these drugs were being abused and diverted for illegal use. Eliminating refills was a big part of that. Refills are allowed for Schedule III but not for Schedule II. PAs and APRNs are authorized to prescribe Schedule III but not Schedule II.

The AMS conducted a survey (albeit an "unscientific" survey) of our PA and APRN Interest Group. Members of this group are PAs and APRNs who work exclusively for AMS member physicians. As a result of the survey and conversations with AMS members and leadership, State Representative Steve Magie, MD (former AMS president and board chair), filed and passed House Bill 1136. It became Act 529 of 2015.

Act 529 is very simple in that it allows PAs and APRNs to resume prescribing those hydrocodone combination products that were reclassified, if authorized by their supervising or collaborating physician. The authorization was felt to be important given the nature of the DEA's reclassification and in recognition that we are now dealing with a Schedule II drug product. The Act does not authorize prescribing other Schedule II products.

That was the easy part. It has taken much longer to implement the statute than anyone anticipated. It required several conversations between the medical board, board of nursing, and DEA. There had to be a way to ensure that the "authorization" had been given prior to the DEA granting a Schedule II registration. Finally, that has all been accomplished and both the Arkansas State Medical Board and Arkansas State Board of Nursing have now advised their licensees how to proceed.

For PAs, this requires an addendum to the PA Protocol, signed by both the PA and supervising physician. This is submitted to the medical board and approved by the board chairman. The PA may then provide the signed copy to the DEA to obtain their new registration.

APRNs need to submit a new collaborative practice agreement, authorizing hydrocodone combination prescribing, to the board of nursing.

Once reviewed and approved by the board, the board will notify the DEA that the APRN has met the requirements. Once the DEA has issued the new registration, the APRN must submit a copy to the board. The board has advised that they also need to update their prescriptive protocols to include hydrocodone combination drugs but do not need to submit those to the board unless requested.

The Act also contains a provision that requires both licensing boards to adopt rules governing the prescribing of "dangerous drugs and controlled substances" by PAs and APRNs, that are consistent with the rules governing physicians. It is also important to note that the DEA doesn't issue "limited" registrations/certificates. So while the registration may simply say "Schedule II," Arkansas law continues to prohibit PAs and APRNs from prescribing "other" Schedule II drugs. AMS

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COMMENTARY

Modern Oncology and the Vital Need for Integrated Practice

Years ago, a physician provided total healthcare. The physician was doctor, nurse, social worker and oftentimes, friend. Advances in modern medicine and healthcare delivery deconstructed this system. Now everyone delivers specialized care in their unique niche. For doctors, that has gone so far that one may specialize in a single organ or disease. Patients have suffered because they are no longer viewed as a whole person, but rather a collection of body parts to be fixed. Doctors have become mere body mechanics. How can we re-humanize the delivery of healthcare and establish real and active relationships with the patients and their families?

Oncology care has suffered from fragmentation and poor coordination for years. The only reasonable solution is to integrate specialists into multiprofessional care teams including representatives from medical oncology, surgical oncology, radiation oncology and pathology and other health care professionals. The teams should define and deliver integrated cancer care and supervise research and education of their members. In this new team approach healthcare professionals are given an opportunity to redefine their roles and explore new ways to integrate their activity within multi-professional collaborative practices. It is also important to note that these efforts have been and continue to be a process. It takes time to develop best approaches and best practices. Who does what and when? How can we remove redundancy while leaving in place cross check mechanisms to prevent mistakes and near misses and improve coordination of care? Is a rigid hierarchical structure absolutely necessary for the functioning of a unit? Or, is a dynamic leadership structure that gives multiple individuals the opportunity to lead at different moments of the continuum of care most appropriate?

At the heart of this healthcare delivery initiative are the patients and their families. The principles of respect and dignity, information sharing, participation in decision-making and collaboration between patients, families and providers are the foundations. These principals are implemented through enhanced training of personnel, inclusion of patients and families in the care teams and assessment committees, transparency, and adjustment of the physical healthcare space to make the patient and family experience more comfortable.

In addition, as the number of patients eligible for cancer treatment has increased, new emphasis on safe environment for oncology care became necessary. Ignore these emerging complexities and the reality that medical practice is often slow to implement best practices just due to practical or institutional obstacles, and you have severely compromised the quality of care that your patients receive. This highlights the importance of designing and implementing good quality improvement (QI) projects that should become the norm in this continually changing environment. Whenever we design a QI project we do not want health care providers to make temporary changes to just "pass a test"; we want the new practice to become the new default, the new norm. In order to do this, we have to create an environment that embraces a culture of change, self-examination and improvement driven by a desire to provide patients with the best outcomes and safety.

How can you change your institutional culture? First, initiate a discussion in your institution about the impact of your current practice on patients' outcomes and safety to raise awareness about problem areas. Second, discuss needed changes with all providers and identify areas for improvement. Praise good practices and use a team approach to understand why your performance is suboptimal in the other areas. Rather than blaming individuals or professional groups, identify the flaws in the system and correct misconceptions about best practices. Third, open communication between different professional groups to generate shared understanding of goals and issues, enhance trust and mutual respect and bring people together to collaborate and coordinate different aspects of the project. Identify champions for change in every workgroup to propagate the new ideas in their groups knowing that the ultimate goal is to make every team member an adaptor and champion of the new way of thinking and behaving.

» *How can we re-humanize the delivery of healthcare and establish real and active relationships with the patients and their families?*

Finally, compassion cannot be divided. We cannot be compassionate toward patients and their families and be heartless and callous toward each other. The foundation for a multiprofessional collaborative team is a profound respect and understanding of each other. It is built on the ability of the team members to acknowledge their strengths and weaknesses and the potential to complete each other so the whole team would be bigger than its parts. As team members, physicians become complete healthcare providers again. What they do not know or cannot provide is complemented by another member of the healthcare team. It is the existence of a solid multiprofessional team that allows patients and families to become real partners in their provision of care. It is only when patients and their families cease being objects of our actions and become full partners of our care team that a more humanized era of medical practice can begin.

"Parts of this commentary are from an article originally published by the author in the 2015 *Palliative Care in Oncology Symposium Daily News* (pallonc.org/dn)" AMS

by CASEY L. PENN

Gregory H. Bledsoe, MD, MPH

A Personal Interview with the Arkansas Surgeon General

The Arkansas Medical Society has a long history of working alongside the state's surgeon general to advance and safeguard our state's public health policies. AMS leaders are eager to continue that tradition with Gov. Asa Hutchinson's appointment for the post, Arkansas Surgeon General Gregory H. Bledsoe, MD, MPH.

"AMS is excited to have opportunity to work with Dr. Bledsoe," said AMS Executive Vice President David Wroten. "As a physician, he understands the challenges and frustrations that AMS members face on a day-to-day basis. More importantly, in his position as a thought leader in health policy, he is able to see the opportunities for improving the health of our state and recognizes the important role physicians have in achieving that goal."

Sworn into office in January 2015, Dr. Bledsoe is a board-certified, practicing Emergency medicine physician. An associate professor of Emergency medicine at UAMS, he holds a joint faculty appointment at the College of Public Health and is a graduate of both the College of Medicine and the Emergency medicine Residency Program at UAMS.

Dr. Bledsoe completed further studies at Johns Hopkins Bloomberg School of Public Health. In his travels to more than 50 countries, he has served in many capacities: medical consultant in Beijing, China; emergency medicine in Qatar; instructor and medical consultant for the United States Secret Service; and more.

The chief editor of the textbook *Expedition & Wilderness Medicine (2008,* Cambridge University Press), Dr. Bledsoe's research in mixed martial arts has gained international acclaim and positive peer-review.

Aside from his roles in medicine, the doctor is a husband and father, private pilot, scuba diver, and avid student in Brazilian jiu jitsu. Born in Arkansas, he is an AMS member and the son of fellow physician and AMS member, James Bledsoe, MD, FACS, and state legislator, Sen. Cecile Bledsoe.

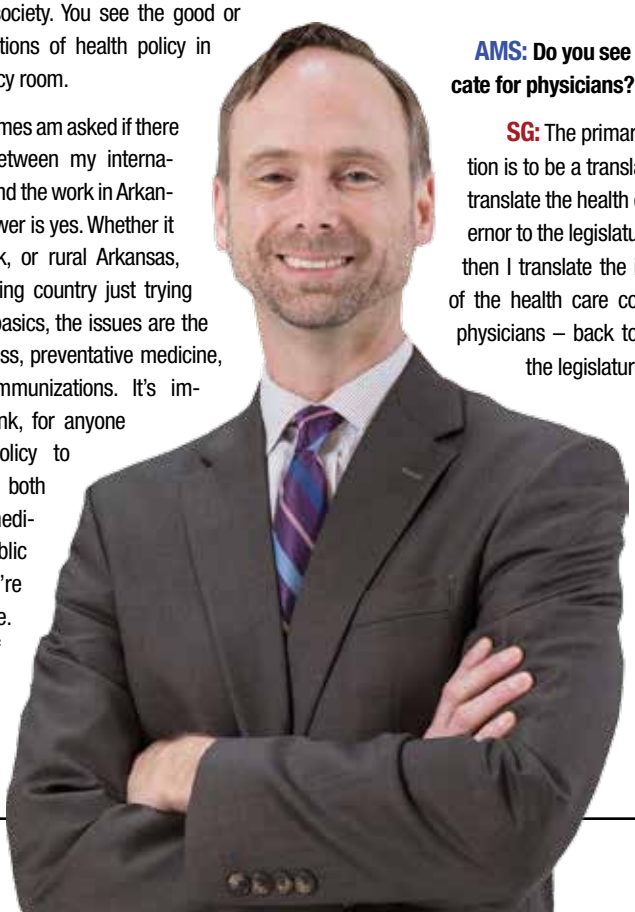
To help acquaint you further with this new leader in health care, *The Journal* asked Dr. Bledsoe to open up to AMS about himself and his new role in Arkansas health care.

AMS: How does being a physician affect the viewpoint that you bring to the table as Gov. Asa Hutchinson's chief health policy advisor?

SG: Two aspects give me a unique perspective: my educational background and my career background. I completed medical school and residency here at UAMS, followed by a fellowship in international emergency medicine and a Master in Public Health [at John Hopkins]. Understanding emergency medicine and having further public health training definitely influences my views.

In my opinion, all health policy funnels down to the emergency department at some point simply because the emergency department is the safety net for our society. You see the good or bad ramifications of health policy in the emergency room.

I sometimes am asked if there is overlap between my international work and the work in Arkansas. The answer is yes. Whether it is Little Rock, or rural Arkansas, or a developing country just trying to build the basics, the issues are the same – access, preventative medicine, sanitation, immunizations. It's important, I think, for anyone in health policy to understand both clinical medicine and public health. They're not the same. Plenty of people read articles on public health policy but lack a practical understanding of how things fit together. That can be a recipe for mistakes.



AMS: As the Arkansas surgeon general, how do you view the Arkansas Medical Society and its role in formulating public policy?

SG: The medical society does a great job representing physicians at the state capitol. It's incredibly important in this time of change for physicians to be engaged, yet it's not really a fair fight because physicians are so busy. They work many hours and put in a lot of continuing education time just to keep up in their specialty. To have any kind of life outside of that is difficult. AMS does a good job of tying physicians in and making them aware of legislation, of meetings that they need to attend, of issues they need to be aware of. My opinion is that good physician leaders in medicine lead to better health care in general for patients, and the improved function of health systems.

AMS: Do you see yourself as an advocate for physicians?

SG: The primary function of my position is to be a translator for the governor. I translate the health care vision of the governor to the legislature and the public, and then I translate the issues and the needs of the health care community – including physicians – back to the governor and to the legislature.

A reporter asked me recently – and I'm paraphrasing – if I felt that having a physician's perspective could at times be a negative thing as I'm looking at the overall health care system. In other words, does being a physician

bias me? I don't see it like that. Many people are clinging to the idea that the problems we've seen in health care are due to physicians having been in charge and so we've got to remove their authority and dial back their "physician-ness," if you will, to keep them from pushing things in a way that is inappropriate. I don't believe that mentality. I would go so far as to say that I haven't found a situation yet in health policy in which being a physician is a negative.

We need clinicians involved in health policy and the reforms that are going on. I believe we won't make good decisions if we're not listening to the people working in the trenches.

So, I'm an advocate for physician involvement. I want to be the voice of the people who are doing the hard work of health care around our state – particularly in rural areas that aren't always remembered at the Capitol. I try to be very sensitive to that.

AMS: What are the big issues that are on the table now and in the near future?

SG: Medicaid reform is the big issue right now. Gov. Hutchinson clearly doesn't want us to get into a debate simply over Medicaid expansion. He wants a broad discussion that covers all Medicaid reform. Our hope is that we can provide savings in the general Medicaid budget that will help offset a significant portion of the cost of the Medicaid expansion. When you look at the budget for the state over the last 10 years, Medicaid has been steadily rising in its percentage of our state budget. When you look at current federal and state spending, we spend about $5 billion on Medicaid. That is astounding.

Telemedicine is another issue that has been hotly debated. Recent legislation, The Telemedicine Act, was a step in the right direction. Regarding telemedicine, there are two extremes that I don't agree with. One is that we should do business the way we've always done it and not even assess new technologies. That's a wrong decision in my opinion. The other is that we take a "Wild West" approach and eliminate all safeguards and just let everyone come in and do anything. That's also a wrong way to go. The correct balance is to roll out these technologies in a systematic way that is safe and is thoroughly assessed.

AMS: In recent years, physicians in Arkansas have been active in the debate over the private option. Now, the governor has appointed a task force to look into a new approach. What does the future hold for the private option?

SG: I see the private option as a good first step toward solving the Medicaid expansion issue, but certainly not our final step. The governor feels the same, but he also is very concerned about the costs of the program.

Gov. Hutchinson wants the care to be there for the people of Arkansas, but he wants that care to be sustainable. The Health Care Legislative Task Force is looking at ways to make it more efficient so people who need the care get the care and people who don't qualify don't make it onto the rolls. In the end, the governor wants a program that takes care of our people and is sustainable so that we don't have to increase funding every few years.

AMS: Gov. Hutchinson announced in October his Healthy Active Arkansas Initiative. Could you explain it briefly?

SG: As part of efforts to lower health care costs in our state – particularly for our taxpayers – and increase the overall health of our citizens, Gov. Hutchinson recently rolled out the Healthy Active Arkansas Initiative. Through Healthy Active Arkansas, we hope to encourage Arkansans to eat more healthy foods and to exercise more. Our hope is that we can develop interest in better health habits and through that,

begin to deal with issues like obesity that factor into so many chronic diseases.

The governor wants this to be more than simply a public service announcement. He is leading by example. He plays full court basketball every week and lives a very active lifestyle. My sport is Brazilian jiu jitzu – the reason you might see me occasionally with a bruise or a black eye *(laughs)* – and I try to train as often as possible.

The goal of Healthy Active Arkansas is to pool resources and to engage the citizens of our state by involving many different stakeholders – including physicians. As I said in the press conference, physicians have long agreed that it's much less expensive to put a fence at the top of the hill than an ambulance at the bottom. Healthy Active Arkansas is one more preventative effort, and we expect good results from it.

AMS: Why did you accept Gov. Hutchinson's offer to become Arkansas surgeon general?

SG: I've spent 15 years practicing medicine and thinking at times how crazy some of the things are that we are asked to do. I've often wondered, as others do, "Why isn't someone doing something about these issues?"

When Gov. Hutchinson offered me the surgeon general position, I just felt like it would have been hypocritical to turn down the opportunity to have a voice in the process. I am passionate about being that voice of practicality and pragmatism in these debates and letting people know what it is like in the field.

AMS: We are all shaped in different ways. What or who influenced you to become the person you are today?

SG: During my medical training, a number of faculty members spent time investing in me. Growing up, my parents provided great examples. They are still a source of inspiration. The biggest thing my parents did that enabled me to be independent, I think, was that they didn't make any one achievement their top priority. They were disappointed when I didn't apply myself, of course, but they never insisted I reach X rank or do something in particular. They wanted most for me to be a person of strong faith, strong character, with loyalty to family and community. They wanted me to be kind, appropriate, patriotic. That mindset definitely influenced me.

Also, when I was in high school, I wasn't a strong reader, so my parents encouraged me to read by buying me sports books. One of the books I read was Lou Holtz's "The Fighting Spirit" about his championship season at Notre Dame. His book really marked me. In talking about his philosophy of success, he said that so many people would achieve things if they would just stick with it when it got tough and not quit. After reading the book, I began looking at some of the patterns in my own life and realized that I had quit a number of things – the Boy Scouts, learning to play guitar, flying lessons – and I even had a terrible habit of reading 50 pages of a book and then moving on to something else.

After reading Holtz's book, I made a commitment that I would write down everything that I had ever quit and then go back and complete everything on the list. It was a fairly long list of things, but I went back and did them all. I became an Eagle Scout, became a pilot, learned to play guitar, and finished reading all those books. From that point on, I've done my best not to quit things. I think when you learn to hold on, even though you might not have the most talent or the most advantages, you put yourself in a position for opportunity to find you.

AMS: Was there an experience that led you to choose medicine?

SG: My brother is a surgeon. He always wanted to go into medicine. I was different – I considered many professions. The first time I really considered it as a career, my dad had volunteered to do some work in the rural part of Haiti, and our whole family went along. It was an amazing experience for a 16-year-old kid. I worked with my dad in the operating room during our time there. I think this experience really sparked an interest not only in medicine, but also in my earlier career in international health.

AMS: Until now, you haven't held a professional position in Arkansas. How does it feel to be working in your home state?

SG: I love Arkansas. I am grateful to the governor for tapping me for this position. It has been a delight to come back to my home state, to work with someone of the quality of our governor, who is an experienced executive and a great guy. It feels good to work on issues of national importance that are at the forefront of policy and to reconnect with so many old friends here both inside and outside of the medical profession.

It has been fun on a personal level, too. My wife is not originally from Arkansas. She spent most of her childhood in Indiana and Pennsylvania. She has been amazed at the friendliness of the people here, the schools, and the churches. Incidentally, I am very fortunate. I looked all over the world for a smart, fun, sweet, extremely beautiful person, and then when I found her, I married her and now have brought her home.

My wife had just finished her master's in education as a reading specialist when we met. We married in 2004. In 2006, I was recruited by the University of Pittsburgh Medical Center to work on a project in the Middle East in the country of Qatar. My wife and I took the job, and we moved to Qatar when she was six months pregnant. That was a big adventure. My first daughter was born there, and we lived there about 14 months and then came back to the states, moved to Georgia for a few years, then to Alabama. I have three daughters – 8, 6 and 4 – who love karate and soccer. They're fantastic.

My kids have never lived in Arkansas. We've lived all over the place, but I've kept the kids true to the Razorbacks. For them to be able to come home and attend some football games has been a real pleasure. We hope to be here for a long time.

AMS: What do you wish to say to the physicians of Arkansas?

SG: I understand what it is to be a physician today. I'm still practicing. I have worked at large academic centers and in small rural hospitals. I have experienced both sides of clinical practice. I want to tell the physicians of Arkansas to hang in there. You're doing a great job. The governor and I are listening, and we have tremendous respect for you. If you ever need anything, my door is always open. AMS

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Whipple's Disease: Commonly Misdiagnosed Due to Unfamiliarity

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ABSTRACT

We present a patient with chronic weight loss, night sweats, abdominal pain followed by diarrhea with unclear etiology. The patient had palpable axillary lymph nodes also evident on computed tomography (CT) of the chest that led to suspicion of lymphoma and malignancy. The colonoscopy and endoscopy done to rule out colon cancer, and lymphoma showed lymphadenopathy, however, duodenal biopsy showed *Tropheryma whipplei* bacteria, an agent associated with Whipple's disease (WD). Through this case report we want to emphasise that even though WD is rare, it should always be kept in the differential diagnosis in patients presenting with non-specific features like weight loss, arthralgias, diarrhea and abdominal pain, which are the four cardinal features of WD. We will discuss a brief overview of its clinical presentation, diagnosis and treatment in the case report.

INTRODUCTION

WD is a commonly misdiagnosed, chronic multisystem disease with a very rare occurrence. Earlier described as "intestinal lipodystrophy", it is caused by a bacteria named *Tropheryma whipplei*.[1-3] Its presentation is fairly nonspecific. The most common symptoms as seen in up to 90% of WD patients include weight loss, arthralgias, diarrhea and abdominal pain.[4-5] The diagnostic test of choice is a duodenal biopsy which shows PAS-positive, diastase resistant inclusions.[6] Current recommendations for the treatment of Whipple's disease comprise induction therapy with intravenous antibiotics that easily penetrate the blood-brain barrier, followed by a continuation therapy with oral co-trimoxazole.[7,8] Establishing the diagnosis of this rare condition can be challenging for some physicians due to unfamiliarity. Even with constant improvement in the diagnostic tests, there have been many deaths associated with WD due to a long delay before its correct diagnosis. The main purpose of this case report is to strongly emphasise that even though WD is a rare disease, it should always be considered as a differential in nonspecific and variable presentations as we will see in the case report presented that can be easily confused with conditions like lymphoma and malignancy. Through this case report, we will give a brief overview of Whipple disease and current recommendations for its diagnosis and treatment.

CASE PRESENTATION

We present a case of 65-year-old Caucasian man with past medical history significant for chronic obstructive pulmonary disease (Gold 2, stable), otitis externa, hypertension and hyperlipidemia who presented to the hospital with chief complaints of weight loss of 25 pounds, daily night sweats for the past six months and diarrhea that started recently. He also reported arthralgias that were thought to be secondary to his knee/ankle crush injury that occurred several years ago. He reported some mild, white productive cough in the morning without any blood. He had the flu vaccine. He denied any loss of appetite, fevers, nausea, vomiting, diarrhea, constipation, tuberculosis, or sick contacts in the family. He was an alcoholic but not a current smoker (120 pack year history of smoking) and denied any illicit drug use. His home medications were albuterol inhaler, Vicodin, latanoprost 0.005% eye drops, Multivitamins and minerals and Verapamil.

On presentation, his vital signs were stable. Physical examination was positive for right lower quadrant and left upper quadrant tenderness. His spleen was not palpable. He had a white blood cell count of 7,700 with 84% neutrophils and a lymphocyte count of 800. His basic metabolic panel, urine analysis, urine drug screen, liver function tests, Hepatitis serology and HIV tests were unremarkable. Acute abdominal series showed significant constipation for which medications were adjusted. This was followed up with CT of the chest, abdomen and pelvis, which ruled out diffuse lymphadenopathy. (Figure 1f). Patient underwent a colonoscopy that showed Grade II hemorrhoids and ruled out colon cancer and an EGD that showed normal esophagus and stomach. Duodenal bulb showed evidence of prominent lymphoid tissue for which multiple duodenal biopsies were taken to assess for lymphoma.

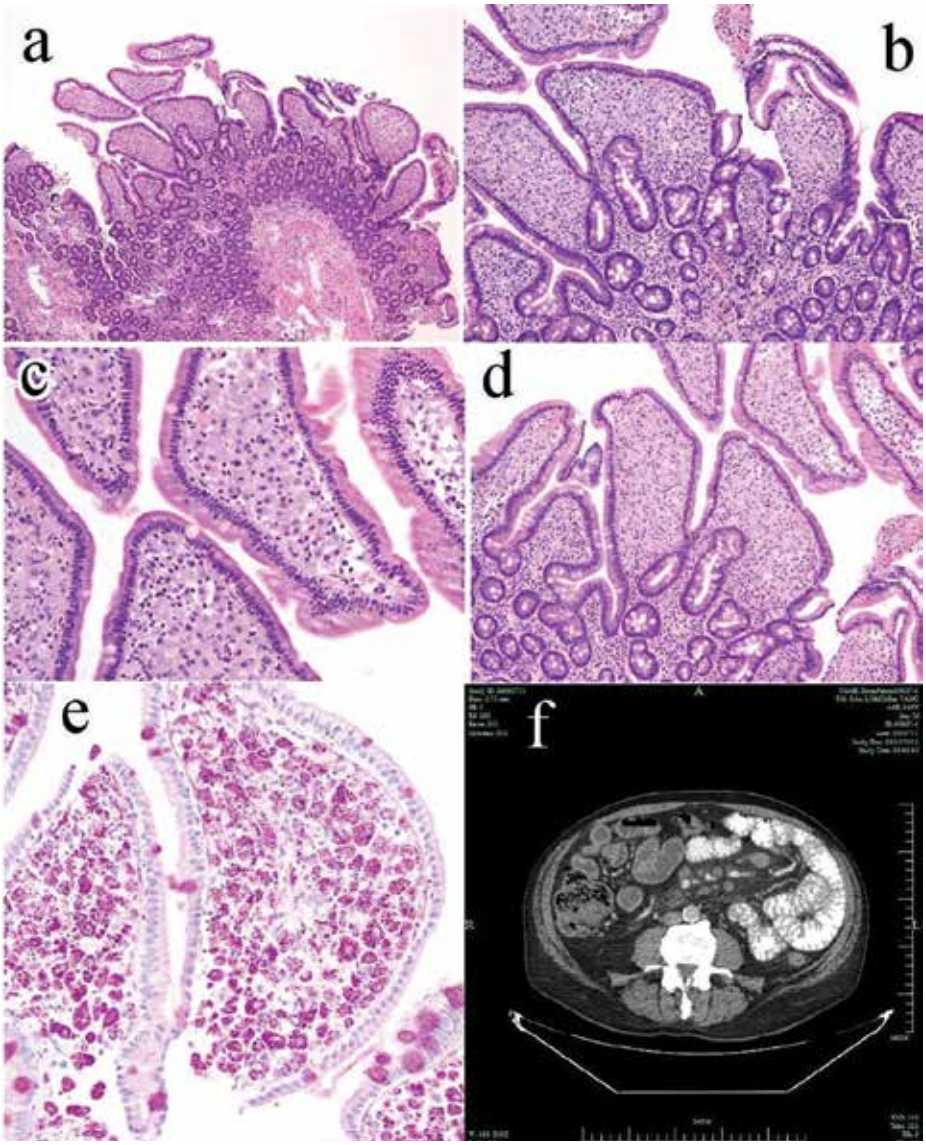
The biopsy results came back positive for *Tropheryma whipplei* (Figure 1e). He was admitted to the hospital and seen by infectious disease specialist. He was allergic to penicillin (hives), so was started on Bactrim and doxycycline/hydroxychloroquine, which he is currently taking without difficulty.

PATIENT FOLLOW UP

General surgery was consulted for a possible lymph node biopsy from a palpable axillary lymphadenopathy seen on CT of the chest to rule out lymphoma. At the time of the consult, the patient had already started his antibiotic regimen for *Tropheryma whipplei* and had no appreciable lymphadenopathy on physical exam. No further follow up or biopsy was needed as he had resolving lymphadenopathy secondary to WD. Gastroenterology followed him in the clinic where he reported resolution of the diarrhea followed by weight gain from 175 lbs to 199.6 lbs in the past four months. The only side effect that he has noticed is that he has had thinning of his hair likely secondary to hydroxychloroquine. He denied any abdominal pain. Plans were made for an endoscopy with duodenal biopsies after completion of one year course of antibiotics to confirm complete eradication of the Whipple's disease. As per infectious disease follow up, he is tolerating his antibiotic regimen of Bactrim, Doxycycline, and Hydroxychloroquine well. He reports compliance with his treatment, resumption of his previous level of activity (limited only by his COPD) and return of his appetite and weight gain. Our plans at this point are to repeat the endoscopy and if resolution of the infection is documented to stop his treatment. If the organisms persist, will need to go longer or consider chronic suppressive doxycycline.

DISCUSSION

WD is a very rare, chronic multisystem disease of infectious etiology. This disease was first described by an eminent pathologist George Hoyt Whipple in 1907 who named it "intestinal lipodystrophy".[1] The infectious etiology has been postulated since it was first described, however, the bacteria were first detected via electron microscopy in 1961 and later confirmed by PCR amplification of the 16S ribosomal RNA (rRNA) in 1991.[2,3,9] This unknown bacterium was named *Tropheryma whipplei* in 1992 followed by its first successful culture in a human fibroblast cell (HEL) in 2000.[10,11]



There is a strong male predilection for WD as in our case. As per the data published by Dobbins in 1987, WD is more common in middle age Caucasian males with predilection of 8:1.[4] WD is characterized by two stages: (a) the prodromal stage, which is marked by nonspecific features like arthralgia and arthritis; (b) the steady-state stage which is mainly manifested by weight loss and/or diarrhea, however, in this stage there is multisystem involvement with the possibility to have various manifestations.[12] The most common symptoms are weight loss, arthralgias, diarrhea and abdominal pain seen in up to 90% of WD patients.[4,5] This is the reason why WD is regarded as a gastrointestinal disease. Systemic features like low grade intermittent fever, cardiac and pulmonary symptoms are present in up to 60% and CNS in up to 30% of WD patients.[4,5] There have been case reports with unexplained weight loss, lymphadenopathy suspicious for lymphoma (as in this case report shown in figure 1f), which was eventually diagnosed as WD.[13,14] We need to have WD in the differential diagnosis for presentations involving the nonspecific features listed above.

The diagnostic test of choice is a duodenoscopy with biopsy (>5 biopsies from both proximal and distal duodenum).[6] Any patient with clinical features suspicious for WD must have a duodenal biopsy as the typical morphological changes of the duodenal mucosa with lymphectasia are rarely seen macroscopically during endoscopy.[15] The characteristic endoscopic description is the presence of pale yellow shaggy mucosa alternating with an erythematous, erosive, or mildly friable mucosa in the postbulbar region of the duodenum.[15,16] However, a whitish-yellow plaques can be seen in a patchy distribution which is the reason for multiple biopsies.[15] The typical histological presentation of WD is the infiltration of the lamina propria by foamy macrophages containing numerous PAS-positive, diastase resistant, Ziehl-Nielsen negative and silver-positive inclusions as shown in our patient in Figure 1a-f.[15-17] Also, the infiltration of the bowel wall leads to widening and flattening of intestinal villi.[17] Intestinal lymphatic obstruction leads to yellow lipid deposits, the reason why Whipple named WD as "intestinal lipodystrophy" in 1907.[17]

PAS positive macrophages are confirmed by PCR and/or immunohistochemistry, requiring one test to be positive for confirmation.[6,16] A negative PAS are also followed with these tests and can still be confirmed as WD only if both PCR/IHC tests are positive.[16]

WD had a poor outcome before advent of antibiotics by Paulley in 1952.[18] Since then tetracycline was used as a first line treatment until a long term follow up in 88 patients showed high relapse rate following tetracycline treatment, especially CNS relapse in up to 28% WD patients.[19] Considering that CNS relapse has a poor prognosis, the first line antibiotic was switched to TMP-SMZ as it has better blood-brain barrier penetration.[19] Currently, the treatment starts with 2 weeks parenteral course of Ceftriaxone (2 gm twice daily) followed by TMP-SMZ (160/800 mg) orally for 1-2 years as a shorter course may lead to relapse.[7,8]

There should be an improvement in clinical symptoms within two weeks of treatment initiation. Further follow up strategies include endoscopic assessment that shows improvement in the duodenal mucosa within the first few weeks of antibiotic initiation, however, the PAS-positive inclusions in the macrophages have been shown to persist for many years.[20] Also, an increase in PAS-positive material after a previous resolution can serve as the first indicator of a relapse.[20]

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Is a Diabetes Epidemic Preventable?

BY ELDRINA EASTERLY

Diabetes is expected to affect one in three American adults by 2050 unless we take steps to prevent it.[1] There are more than eight million Americans with undiagnosed diabetes.[1] Health care professionals play a key role in preventing, controlling and managing diabetes and prediabetes through identifying, implementing and evaluating effective interventions.

A person with prediabetes' has a higher than normal blood sugar level that puts him or her at higher risk for type 2 diabetes, heart disease and stroke. Without treatment and lifestyle changes, as many as one third of persons with prediabetes will develop type 2 diabetes within five years, according to the Centers for Disease Control and Prevention (CDC). In the average primary care practice, about one third of patients over age 18 and half over age 65 have prediabetes. However, only 10 percent of these patients are aware of that fact. While type 2 diabetes is associated with aging, obesity, family history and race, it is increasingly diagnosed in children and teenagers. It is now the third most prevalent severe, chronic childhood disease in the United States.

ECONOMIC IMPACT

The nation's total cost for diagnosed diabetes, according to the American Diabetes Association, is estimated at $245 billion—a 41 percent increase from 2007-2012. Of that amount, $176 billion is direct medical costs and $69 billion is indirect costs such as disability, work loss and premature death.

In Arkansas, direct medical costs exceed $1.67 billion and indirect costs are nearly $1 billion. Persons with diabetes spend more than two times more on health care costs than nondiabetics, incurring about $14,000 per year. More than half of that cost is for direct diabetes care.

ARKANSAS' DIABETES EPIDEMIC

Arkansas' prevalence of diabetes has been higher than the national average for the past 15 years and the epidemic has no signs of slowing.

- From 1999 to 2008, there was a 44 percent increase in diabetes prevalence. Diabetes is the sixth leading cause of death among all Arkansans; the fourth leading cause of death among African-Americans in 2006.[2]
- Since 2000, there has been an 8-percent increase in the number of hospital discharges with a primary diagnosis of diabetes.[2]
- High blood pressure and high cholesterol are more than twice as prevalent among persons with diabetes; coronary heart disease with angina is more than four times more prevalent.[2]

RISK FACTORS

The first steps toward preventing prediabetes and type 2 diabetes are to assess patient risk for developing the disease and provide patient educational tools and other resources. Even small steps can make a big difference in changing and managing diabetes and prediabetes risk.

These characteristics increase diabetes risk:[3,4]

- Overweight with a BMI > 25
- Age 45 and older
- High A1C level of 5.7 to 6.4 percent
- History of gestational diabetes
- High blood pressure ≥140/90mmHg
- Low HDL cholesterol level (35 mg/dL or lower) and/or a high triglyceride level (> 250mg/dL)
- Family background that is African-American, Alaskan native, American Indian, Asian-American, Hispanic/Latino or Pacific Islander-American
- Sedentary lifestyle
- Unhealthy eating habits
- Family history of diabetes
- Polycystic ovary syndrome (PCOS)

If a patient has one or more of these characteristics, counsel him or her about the importance of preventing prediabetes. Contact high-risk patients before they become overdue for follow-up care.

AFMC DIABETES INITIATIVES

AFMC is working with the Arkansas Department of Health and the CDC to help practices identify, monitor and educate patients who are at risk for diabetes or have prediabetes. The work involves engaging clinicians and establishing workflows for patient care. The AFMC team provides coaching and training to help staff utilize their electronic health record's (EHR) reporting features to identify and track at-risk patients and incorporate team-based care for chronic disease patients. Through the use of clinical decision support rules and registry reports, clinicians can identify patients for prediabetes screening, establish patient reminders for follow-up, monitor lab results and track use of patient education materials.

An AFMC HealthIT outreach specialist meets with the clinic twice monthly, once onsite and once virtually. The office staff and clinicians are provided a prediabetes checklist (including patient questions and action items) to be used as a training tool while incorporating the new workflows.

AFMC's prediabetes initiative utilizes evidence-based education materials and assists community-based efforts. By utilizing the "Plan-Do-Study-Act" improvement process, the AFMC team shares best practices on documenting in the EHR, analyzes progress, identifies areas for improvement through EHR reporting and ensures the practice has policies for treating prediabetic patients.

In addition to the clinical side of patient care, it is important to provide patient education on prediabetes and reinforce the importance of open communication between patient and practitioner. Patient empowerment and involvement play a critical role in improving health outcomes. Practitioners should counsel patients about prediabetes treatment options and make referrals to prevention programs and community support groups. It is important for practitioners to explain that prediabetes can be reversed with good self management.

AFMC provides patient self-management tools to clinics in the form of handouts, posters and downloadable files. These materials can be made available to patients through a patient portal or practice website. A patient portal is an excellent way to engage patients and facilitate direct communication between patient and provider. Patients can test and monitor their glucose levels and enter this information on the portal to provide timely updates for clinicians. Patient portals are becoming an increasingly important tool for patients to ask questions between visits, review lab results and download patient education materials.

Partnering with and referring patients to community-based programs, such as the National Diabetes Prevention Program (DPP) led by the CDC, offers proven intervention through improving diet, increasing physical activity and achieving moderate weight loss. The yearlong structured program combines in-person and online or distance learning facilated by a trained lifestyle coach utilizing CDC's approved curriculum.

Y-USA has partnered with the CDC to offer diabetes prevention programs at YMCAs throughout the country. The first YMCA DPP site opened in June in Northwest Arkansas and provides an excellent community resource to engage at-risk and prediabetes patients. Physicians may refer patients to the program regardless of age, income or background.

AFMC is also working with quality improvement (QI) initiatives in clinics across Arkansas to "train the trainer" on the "Everyone with Diabetes Counts/Health for Life" effort. To date, AFMC has trained 14 lead trainers and 33 peer educators. The Improve Access to Diabetes Self-Management Education (DSME) workshops are improving access to self-management workshops for Medicare beneficiaries with diabetes (focusing on minority and rural population health disparities), and improving clinical care and outcomes for diabetes patients.

With modest weight loss and physical activity, people with prediabetes can delay or prevent type 2 diabetes. Prevent Diabetes STAT: Screen, Test, Act – Today™ is a joint collaboration between the American Medical Association and the CDC. It provides urgent action for physicians and other providers to screen and refer high-risk patients to community diabetes-prevention programs.

Through a team effort, including community organizations, private insurers, employers, health care organizations, faith-based organizations and government agencies, type 2 diabetes and prediabetes can be dramatically reduced. ▲

Ms. Easterly is outreach manager, AFMC HealthIT.

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CASE STUDY

Emergency Preparedness for Arkansas Red Counties

By Alesia Ferguson PhD, MS, MPH[1]; Rupa Sharma, MSPH, MSc.[2]; and Michelle R. Smith, PhD, MPH[3]

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ABSTRACT

Disasters typically strike quickly and without warning. For optimum preparedness, it is important to assess the existing resources and barriers in the community and based on that, develop an effective plan to respond to disasters. In 2013, an investigation of the Arkansas Red Counties, counties with lowest life expectancies, was conducted to provide information on over 32 core indicators affecting community emergency preparedness. Findings indicate that these Red Counties have significant percentages of poor, elderly and disabled populations and history of disasters. Recommendations have been provided here regarding emergency and medical needs of these counties prior to and during disasters.

INTRODUCTION

Disasters that occur without warning can force people to evacuate their neighborhood or confine them to their homes. Arkansas has experienced many types of disasters in the past including tornadoes, ice storms, floods, earthquakes, food-borne outbreaks, wildfires, hazardous material incidents, and other public health emergencies. The impact of a disaster may be particularly difficult for vulnerable populations including those who are physically and/or mentally challenged, do not speak English, geographically or culturally isolated, frail elderly, pregnant women, or children.

During disaster, it is critical for the communities to have an optimum level of preparedness to ensure safety of the life and property. It is important to assess the existing community resources and barriers and based on that develop an effective plan to respond to the natural disasters or other types of emergencies. It is essential for local and state emergency officials, medical personnel, and community members to utilize optimal resources and work together to coordinate emergency preparedness and response.

The 17 counties investigated were pre-designated as 'Red Counties', following a legislative mandate, as they fell 6-10 years behind in life expectancy compared to Benton County with the highest life expectancy. These Red Counties were: Fulton, Mississippi, Jackson, Poinsett, Crittenden, St. Francis, Woodruff, Phillips, Monroe, Lee, Desha, Polk, Dallas, Little River, Chicot, Union, and Ouachita (Figure 1).

In 2013, the Arkansas Department of Health (ADH) Office of Minority Health and Health Disparities, ADH Office Emergency Preparedness and the UAMS College of Public Health conducted an assessment of Red Counties based on a total of 32 indicators including demographics, health, and local community indicators by county. Using results of 11 core indicators, the 17 Red Counties were also ranked to identify counties with greatest need for emergency preparedness. A review of the historical nature of natural disasters was also conducted to help understand potential disaster threats in each county.

RESULTS

Elderly and Population Living Below Poverty Level: Benton County had a large population

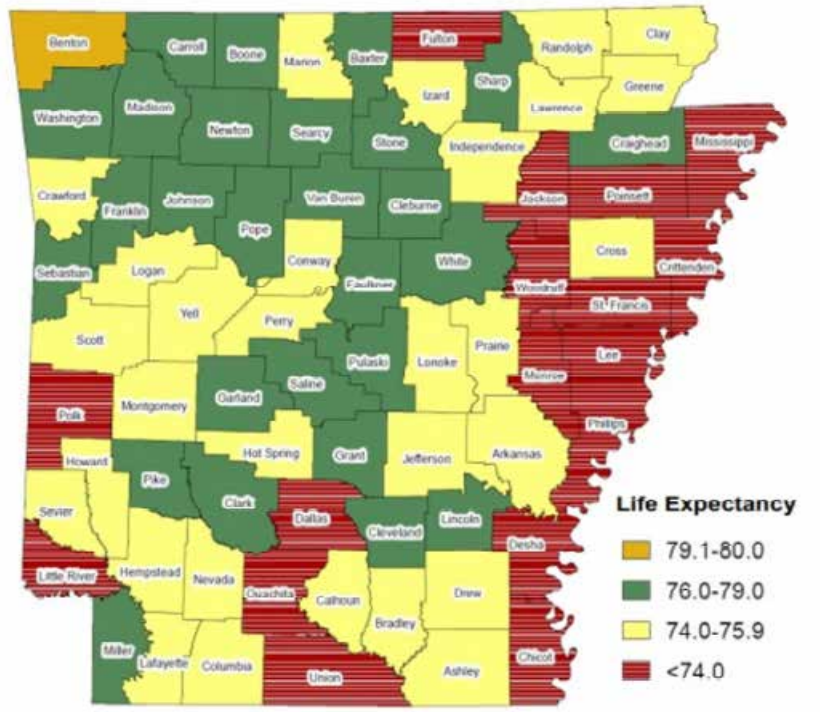


Figure 1: *2008 Life Expectancy at Birth in Accordance with Arkansas Act 790 and Act 798*
State Average Life expectancy = 76.0;
Maximum = 79.8 (Benton County); Minimum = 69.8 (Phillips County)

(221,339) compared to a much smaller average population of the 17 Red Counties (21,327), according to the US 2010 Census.[1] Crittenden County had the highest population of 50,000 and Woodruff County had the smallest population of 7,260. Benton County's population under 5 years of age was relatively high at 18.1%, while the 17 Red County average was much lower at 6.5%, potentially indicating migration of younger Red County residents to other Arkansas counties or states. It is important to consider the needs of the elderly population (>65 years of age) during a disaster especially the elderly individuals who live alone. Benton County had an elderly population of 11.7% while the Red Counties had a higher average of 16.7 %.[1] Socioeconomic status is also an important consideration for emergency and disaster preparedness affecting an individual's ability to evacuate to another location, to purchase needed supplies (e.g., flashlights, batteries, radio, food, safe heating supplies), and to sustain themselves long-term (i.e., monetary resources for housing and food). Benton County's median household income was $49,064, substantially higher than the 17 Red Counties' average of $31,048. Only 11.3% of the Benton County population lived below poverty level compared to the 24.5% of the Red County average.[1] Language other than English was not a significant consideration for the Red Counties. Polk County had the largest Latino population of 6.2% located to the west of Little Rock, near the Oklahoma border. Emergency response materials (print, traditional media, and social media) available in English and Spanish should still be considered for these areas.

Disability Status and Dialysis Summary: In Benton County, the percentages of population with disabilities (non-institutionalized over 5 years) related to sensory, physical, mental, self-care, and disability of going out of the home alone were 19.8%, 3.9%, 8.7%, 4.6%, 2.4% and 6.2%, respectively (US Census 2000)[1]. The Red Counties in contrast had higher percentages of disabilities, i.e., 27.9%, 5.9%, 7.3%, 4.4, 2.4%, 8.4% for the respective categories. The higher prevalence of these disabilities underscore the need for further assessment of medical and care needs of Red County residents for emergency preparedness.

Access to Care and Transportation: County residents' access to care is an important consideration, prior to, during, and after a disaster. Among the 18 years and older population of Red Counties, an average of 23.7% had no insurance coverage and 14.7% had no personal doctors. Little River and Polk counties, among the Red Counties, had the highest percentages of residents with no insurance coverage (42.2%) and no personal doctor (22.0%).[3] These percentages may change with the introduction of the new health care act.

County Ranking in Order of Need: Following the assessment of 11 of the 32 core indicators, the 17 Red Counties were ranked for emergency preparedness need (1st being the worst), as shown in Table 1. The ranking method involved assigning score to the value of each of the 11 indicators for each county. Scores were then added to get a 'total' for each Red County. The highest total indicated the highest need for preparedness for that particular county. The indicators covered median household income, poverty level, lack of access to a car, disabilities, dialysis, no insurance, and no personal physician. First being the county for highest need for preparedness, the top five Red Counties included *Lee, Woodruff, Chicot, St. Francis, and Monroe.* When the indicators for no health insurance and no personal doctor were excluded, the order of top five counties included *Lee, Chicot, Woodruff, Phillips, and St. Francis.*

Historical Findings on Natural Disasters

It is important for each county to have the ability to tailor preparedness plans based on likelihood of occurrence of varied natural disasters. Red County averages for natural disasters included 14 earthquakes from 1969 to 2012, 57 thunderstorm winds, 28 floods and flash floods, 9 tornadoes, and 12 hail and lightening from 2000-2013.[4] Poinsett County had the record for highest number of recorded earthquakes (139), Jackson County for thunderstorm winds (88), Woodruff County for floods and flash

Table 1: Counties Ranked Based on 11 Core Indicators, Highest Score Indicating Highest Need

Red County	Median income	Below poverty level	No access to a car	Disability of self-care	Mental disability	Physical disability	Sensory disability	Unable to go outside	On dialysis	No insurance	No personal doctor	Total
Benton	0	0	1	1	0	1	1	0	2	2	10	18
Fulton	4	2	1	5	5	9	6	10	1	2	2	47
Dallas	6	1	7	5	8	8	8	2	3	1	2	51
Little River	1	1	3	5	5	7	10	1	1	10	9	53
Monroe	8	6	8	4	7	8	10	2	6	4	2	65
Polk	5	3	1	1	1	1	1	1	2	7	1	24
St. Francis	9	9	7	7	5	6	5	2	6	4	7	67
Desha	6	6	7	7	4	6	5	4	6	3	1	55
Union	1	4	4	5	9	6	7	1	6	2	6	51
Lee	10	8	10	10	5	9	9	4	10	4	10	89
Crittenden	3	8	6	4	2	3	2	1	7	4	9	49
Chicot	10	10	7	10	5	8	9	4	4	1	2	70
Jackson	5	6	4	9	6	10	6	2	3	4	7	62
Woodruff	8	5	8	9	6	10	9	2	5	5	9	76
Ouachita	4	3	4	8	10	7	7	2	5	3	4	57
Mississippi	4	6	6	7	5	7	8	2	4	3	6	58
Poinsett	5	6	4	7	7	10	9	3	4	3	7	65
Phillips	8	10	8	7	5	6	5	3	6	4	1	63

floods (96), Union County for tornadoes (17), and Polk County for hail and lightening (99). A large number of severe weather systems travel from Texas northeast across Arkansas and Polk County sits right next to the Texas border. Dallas and Union Counties are located in the Southern path of tornadoes. Dallas County experienced 19 tornadoes during the study period. A closer look at the location of the New Madres Fault might give some explanation of the higher number of recorded earthquakes in Poinsett County. Poinsett county and surrounding counties should prepare for earthquakes and other subsequent disasters (e.g., flood event along the Arkansas River). Natural gas drilling locations should be investigated for further explanation of smaller magnitude earthquakes in Poinsett and other counties. The potential for other types of disasters (i.e., chemical) can also be investigated to help communities better prepare.

Conclusion and Recommendations

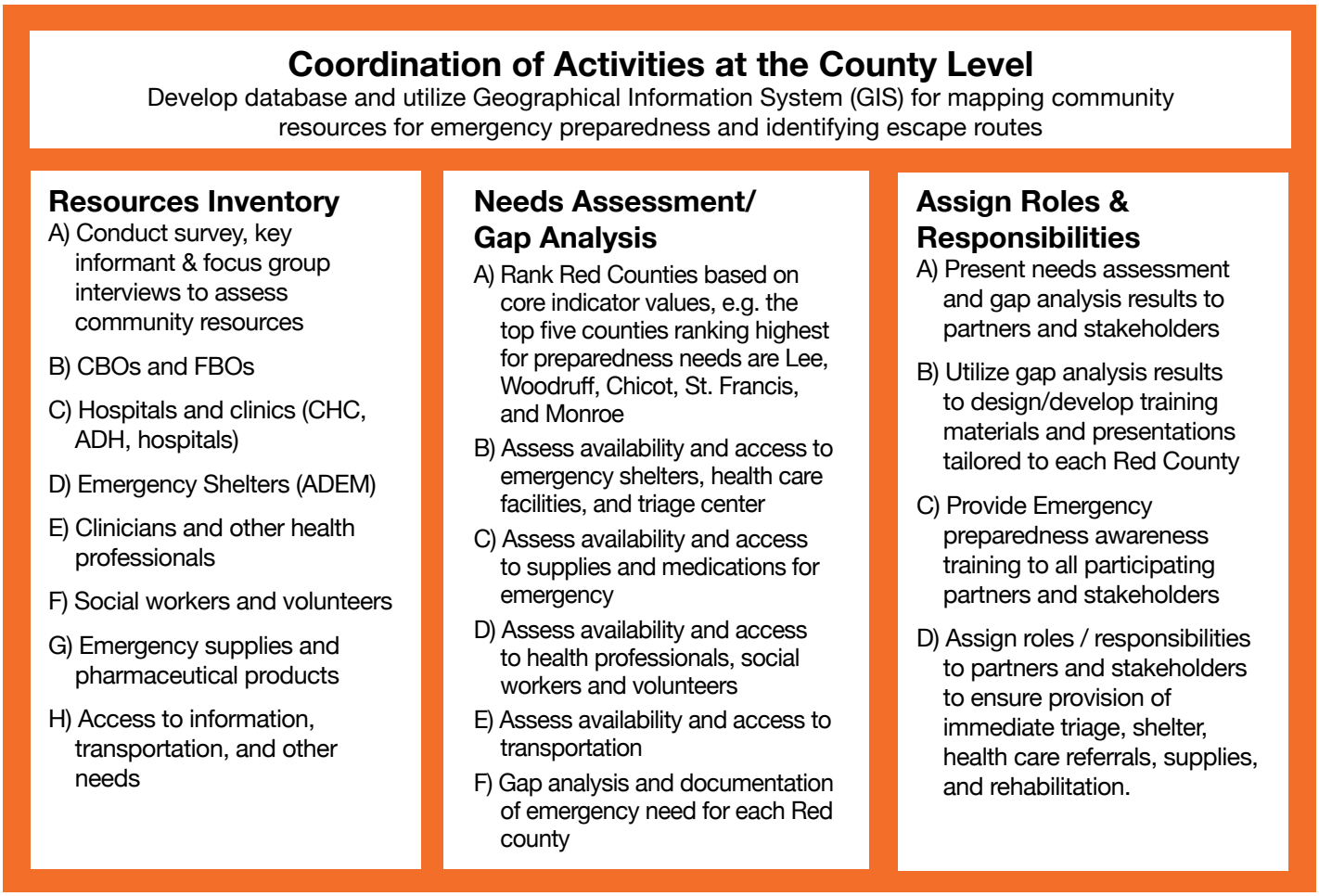
This paper was designed to provide information on emergency needs of 17 Arkansas Red Counties based on population characteristics and historical occurrence of natural disasters. These counties have significant percentages of elderly and disabled with lower median household incomes and potentially fewer resources to prepare themselves for disasters. National and state emergency response groups are more likely to first assist the counties with larger populations (i.e. Pulaski and Benton County), depending on the site and impact of the disaster. Due to its rural nature, Red Counties need to prepare in a manner that allows them to be self-sufficient in the immediate hours or days following an emergency. Individuals and groups would need emergency plans including personal network, escape route, reliable safety information, and access to essential supplies.[5] Compromised individuals and groups, such as the elderly may often need additional help.[6]

Figure 2 shows our recommendations for an integrated plan for Red Counties emergency preparedness. At the core of these recommendations is the realization, based on our investigation, that there are a significant number of CBOs and FBOs in each of these 17 Red Counties. These organizations are intimately connected to and trusted by their communities, and could serve as the base for a timely response given proper resources and training, and the ability to coordinate emergency response at the county level. Figure 2 illustrates three areas of activities in each county that should be coordinated: resource inventory, need assessment and gap analysis, and the assignment of roles and responsibilities.

As illustrated in Figure 2, a Geographical Information System (GIS) should be used as a database management and coordination system to, for example, to locate local emergency response centers including Red Cross, ADEM centers, ADH and CHC health centers, CBOs and FBOs. GIS mapping further allows development of prediction tools and escape routes tailored to specific type of emergencies. The use of GIS at the county level may require coordination at the state level by agencies mentioned above.

Based on an initial investigation of Resource Inventory, the average number of FBOs in the Red Counties was 147 (119 in Benton County), while the average number of CBOs was 12 (30 in Ben-

Figure 2: *Emergency Preparedness Recommendations for Red Counties*



ton County).[7] An investigation should be conducted to determine which organizations are more established and possess appropriate resources (i.e., vehicles, medical kits, financial resources, computer and phone access, shelter, generators) to help with coordinating local emergency response. With proper guidance/training and resources, the organizations could provide critical services and support when needed.

The ADH, CHC, and UAMS clinics would play crucial role in conducting triage for taking immediate care of the injured and those needing referrals for immediate or follow-up care. On average, each Red County had two ADH clinics and 1 CHC clinic.[8] Plan for an access to basic and more advanced medications for certain illnesses was also recommended.[9] The ADH and CHC clinics have the ability to provide medications specific to illnesses i.e., asthma, diabetes, and heart diseases. According to the Brown et al., (2008) study, medications more likely needed for disease management during disaster included narcotic analgesics, non-steroidal anti-inflammatory drugs, non-narcotic analgesics, sedatives and hypnotics, cephalosporins, antianginal agents/vasodilators, anti-asmatics/bronchodilators, hypoglycemic for various emergencies and chronic ailments.[10]

To conclude, Figure 2 contains a more detailed graphic presentation of a set of action steps to be considered and further refined for Red County Emergency preparedness. The recommended action steps were three parts including an initial resource inventory to be conducted in collaboration with partners and stakeholders, using various tools. The second step included gap analysis based on the resource inventory and the last step included assigning roles and responsibilities to appropriate partner agencies/groups to ensure efficient response during a disaster. The second phase of this study will provide results, in response to these recommendations.

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Critical congenital heart defects among infants born in Arkansas hospitals: Implications for newborn screening

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ABSTRACT

Prior to implementation of universal newborn pulse oximetry (PO) screening, infants born in Arkansas with critical congenital heart defects (CCHDs) were characterized by age at initial diagnosis, infant mortality, and birth hospital level of neonatal care. Using 2000-2010 data from the state's birth defect program, 559 infants were identified with CCHD. Birth prevalence was 13 per 10,000 livebirths, and 1-year mortality was 24.9%. Approximately 20% of term neonates with CCHD were initially diagnosis after 3 days old. A disproportionate number of late diagnoses occurred in neonatal care level I hospitals. These results establish a pre-screening baseline that may assess the effectiveness of PO screening in reducing infant mortality and severe morbidity.

INTRODUCTION

Critical congenital heart defects (CCHD) require surgery or catheter intervention during infancy[1]. CCHDs occur in 15.6 of 10,000 births[2]. Of infants born with CCHD, 18% will die within the first year of life[3]. Without medical and/or surgical intervention, many infants born with CCHD sustain end-organ damage and death[1]. If detected prenatally or within the first few days of life, infants with CCHDs can be managed to minimize long-term morbidity and mortality. A simple, non-invasive diagnostic screen can reliably detect CCHDs while the newborn is in the hospital. In 2010, the United States Department of Health and Human Services approved the addition of pulse oximetry screening for CCHD to the Uniform Screening Panel for newborns[1]. In 2012, the Arkansas General Assembly passed enabling legislation mandating a phased-in program to implement universal CCHD screening for all newborns statewide.

The goal of CCHD screening is to prevent the missed or late diagnosis of newborns with heart defects that could cause significant morbidity or mortality[4]. Pulse oximetry screening for CCHD has been shown to be effective in identifying true positive cases[5], but questions remain about the potential effectiveness in reducing infant morbidity and mortality. Arkansas is notable in that subspecialty pediatric care is unavailable in many rural regions of the state. An estimated 8 out of 44 newborn nurseries in Arkansas birthing-hospitals have access to an on-site neonatologist. Thus large sections of the state have no immediate access to neonatal intensive care units (NICUs) or to neonatologists. Universal screening for CCHD in Arkansas may significantly decrease the likelihood of late-diagnosed CCHD.

We sought to determine the number of infants born in Arkansas with CCHDs. Further, we sought to identify the number of those infants recognized beyond three days of life who could potentially benefit from earlier pulse oximetry screening.

METHODS DATA

The Arkansas Reproductive Health Monitoring System (ARHMS), the statewide population-based birth defect surveillance program, was used to characterize the live birth population of Arkansas with CCHDs. ARHMS uses active surveillance methods to monitor birth defects among approximately 40,000 livebirths per year at 44 delivering hospitals, the pediatric specialty hospital, and the primary prenatal diagnosis center. Infants identified by the registry are linked to Arkansas Vital Statistics including birth and infant death certificates.

STUDY SAMPLE & VARIABLES

The study population consisted of infant cases of CCHDs among Arkansas' birth population born from 2000 to 2010. Cases of CCHDs were defined as those with pulmonary atresia with intact septum, transposition of the great arteries, tricuspid atresia, hypoplastic left heart syndrome, tetralogy of Fallot, truncus arteriosus, and total anomalous pulmonary venous return, all of which have been identified as

Figure 1. *Annual rates of CCHD per 10,000 live births, Arkansas 2000-2010*

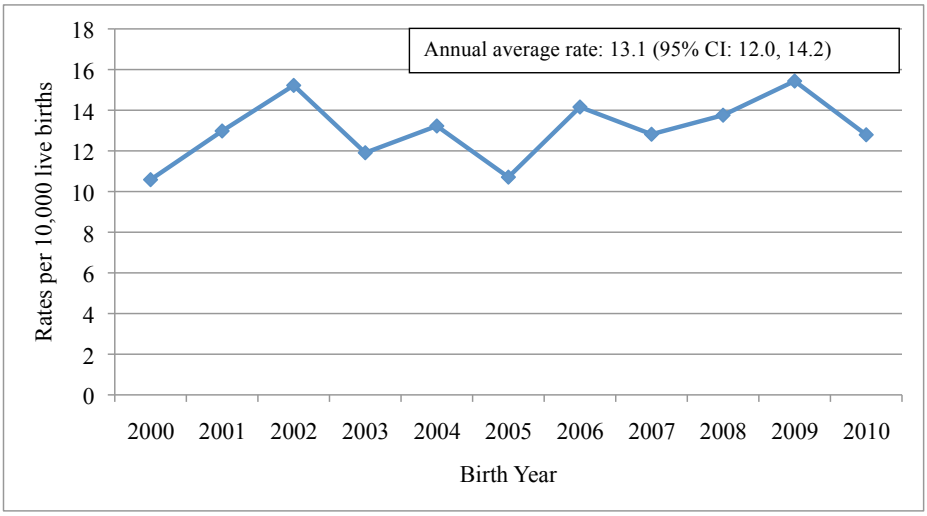
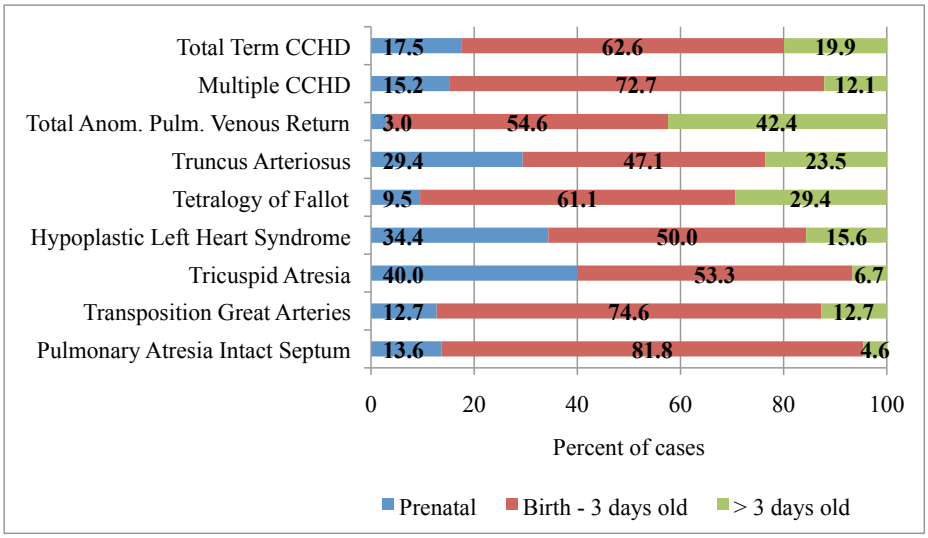


Figure 2. *Period of initial diagnosis among term infants with CCHD, Arkansas 2000-2010*



the detectable primary targets of pulse oximetry screening[1]. Cases with more than one diagnosed CCHD phenotype were categorized as multiple CCHD. Subjects were defined as premature births when gestational age at birth was <37 weeks and full-term when gestational age was ≥37 weeks.

Late detection of CCHD was defined as an initial diagnosis of any of the CCHD phenotypes after day 3 of life. This 3-day window was conservatively selected as a proxy measure for hospital stay for healthy newborns[6].

The Board of Health of the Arkansas Department of Health recently approved five neonatal levels of care, modeled after recent national guidelines[7]. Level I centers have basic community-based, maternal-newborn services and care for stable newborns 36+ week gestational age. Level II centers include specialty community-based, maternal-newborn services with a special care nursery that may have either pediatric or neonatology coverage, and care for newborns 33+ week gestational age. Level III A designations have a neonatal intensive care unit (NICU) with a board-certified or board-eligible neonatologist and care for newborns 26+ week gestational age and >750 grams. Level III B centers have board-certified or board-eligible neonatologists and perinatology coverage. Freestanding pediatric hospitals with neonatal subspecialty services have a level IV designation. Levels of care for Arkansas birth hospitals are categorized as levels I, II, III B, and III A.

ANALYSES

The overall annual prevalence of CCHDs among Arkansas' birth population was computed for birth years 2000 through 2010. Birth prevalence rate and 95% confidence interval were computed using Poisson methods. Linear regression analysis was used to assess trends across the study period. Timing of initial diagnosis of CCHD among full-term infants was evaluated for the seven CCHD phenotypes. Infant mortality rates were computed and stratified by gestational age and timing of initial diagnosis. Timing of initial diagnosis was compared using Chi Square tests across neonatal level of care at the birth hospital to evaluate trends in late detection of CCHD. Infants born prematurely typically receive a more extensive medical evaluation at the birthing hospital including pulse oximetry monitoring and were excluded from analysis for timing of diagnosis and neonatal level of care.

RESULTS

During the 11-year study period, there were 559 live births in Arkansas having at least one of the seven CCHD diagnoses. Of these 559 livebirths, 101 were premature and 452 were full-term. The prevalence of CCHD in Arkansas was 13.1 per 10,000 live births (95% confidence interval: 12.0, 14.2), with an average of 51 CCHD live births per year. No significant trend in CCHD diagnoses across years was observed (p = 0.3465) (Figure 1).

The mean number of full-term live births infants with CCHD was 41 (standard deviation: 7.0) per year. Preterm births would typically be monitored by pulse oximetry in the birth center or in the NICU where they were transferred and may not require additional CCHD screening. Approximately 20% of full-term neonates with CCHD experienced a delay in initial diagnosis until after the 3rd day of life (Figure 2). On average, approximately 8 full-term neonates with CCHD are diagnosed after day 3 of life annually. Of these late diagnoses, infants with total anomalous pulmonary venous return and tetralogy of Fallot experienced the highest proportion of delays in initial diagnosis with 42% and 29%, respectively.

Analysis of timing of CCHD diagnosis among birthing hospitals distinguished by neonatal level of care revealed a disproportionate number of late diagnoses occurred in level I hospitals (p <0.001). Those hospitals accounted for 42.3% of all CCHD live births and 60% of CCHD diagnoses after the 3rd day of life. In contrast, level IV hospitals accounted for 32.7% of all CCHD live births and only 10% of CCHD late diagnoses (Figure 3).

Figure 3. *Term infants delivered at Arkansas hospitals by neonatal level of care, 2000-2010*

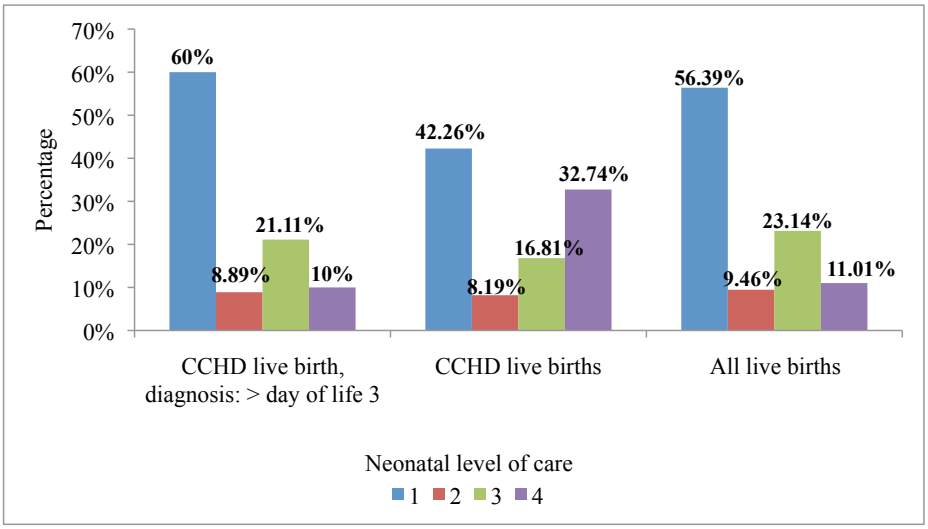
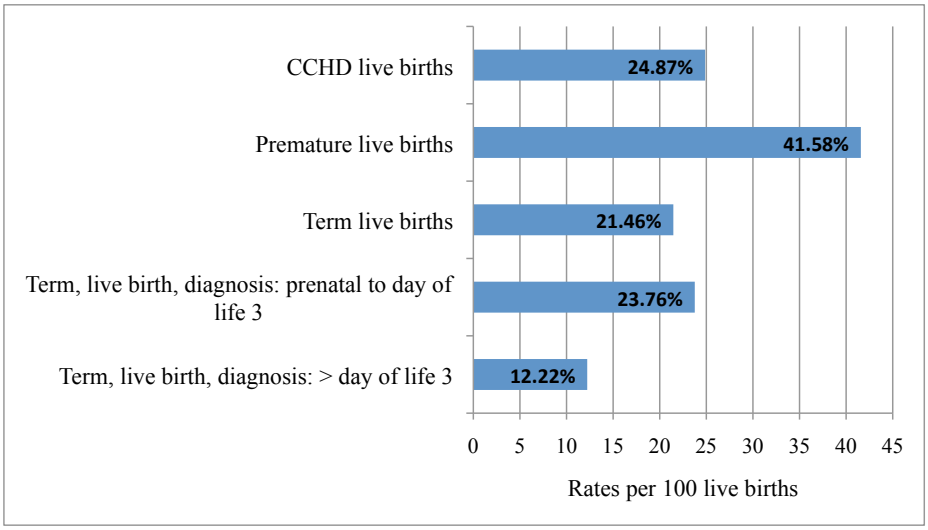


Figure 4. *Mortality rate among infants with CCHD, Arkansas 2000-2010*



The overall mortality rate among infants with CCHD including infants born preterm was 24.9 deaths per 100 live births with a total of 139 deaths during the 11-year study period. The infant mortality rate was higher in those with CCHD who were born prematurely (41.6 per 100 live births) when compared to those born at term (21.5 per 100 live births) ($p<0.0001$). When stratified by timing of diagnosis, infant mortality among full-term infants diagnosed with CCHD during the prenatal through 3 days old timeframe was 23.8 deaths per 100 live births and those diagnosed late with a CCHD were observed with a rate at 12.2 (Figure 4). Including preterm births, the infant mortality rate was highest in infants affected by hypoplastic left heart syndrome (44.6) followed by tetralogy of Fallot (14.4) and transposition of the great arteries (13.7).

DISCUSSION

Using historical data from Arkansas's birth defect registry, ARHMS, this analysis has shown that each year as many as 8 infants with CCHD are diagnosed after 3 days old, possibly after they are discharged from their birth hospital. Statewide pulse oximetry screening could substantially reduce the morbidity, mortality and medical costs for infants born with CCHD. Late detection of CCHD may result in infants presenting for care in extremis and has been associated with increased hospital admissions, length of stay, inpatient costs during infancy, and continued organ dysfunction later in life[8].

The majority (60%) of infants in Arkansas diagnosed with CCHD after 3 days of age are born at level I neonatal care facilities. These results are consistent with other findings from Florida where Dawson et al.[9] concluded that level I and level II nurseries in Florida were more likely to have late-diagnosed CCHD than nurseries with on-site neonatologists. Simple pulse oximetry screening could identify at-risk infants with CCHDs earlier, particularly in rural areas of the state where immediate access to necessary medical and surgical care is limited.

Infant mortality was higher among infants diagnosed earlier with a CCHD than in the later time period evaluated, 24% vs. 12%, respectively. Infants diagnosed later may be those with less severe conditions. In contrast, infants recognized prenatally or soon after birth may be manifesting more severe congenital heart lesions with early symptoms of cardiac insufficiency including cyanosis.

In addition to the primary CCHD conditions evaluated in this study, pulse oximetry screening may detect other conditions in newborns exhibiting hypoxemia or hypoperfusion. Other studies have shown pulse oximetry detects other CHDs, sepsis, and pneumonia[10].

Limitations of the study should be acknowledged. Because Arkansas has no standard neonatal level of care designation system in place, estimated neonatal care levels were used to categorize hospitals. Co-morbid conditions were not considered in our analysis and would likely have impacted both case fatality and timing of diagnosis rates. Late diagnosis was measured as a 3-day window from birth for initial timing of diagnosis as recorded by the ARHMS registry. This measure may not measure time-to-hospital-discharge precisely for all full-term infants.

With these limitations, our results characterize the CCHD prevalence in Arkansas prior to implementation of universal pulse oximetry screening. These results may be used to establish a pre-screening baseline from which we can assess the effectiveness of pulse oximetry screening in reducing infant mortality and severe morbidity. Screening is currently conducted on a voluntary basis in Arkansas, and the passage of Act 768 presents a completing goal for mandated screening in 2015. Our results support the need for universal CCHD screening in Arkansas, particularly in the smaller birthing hospitals found in most parts of the state.

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Perin Receives First Place in Ophthalmological Competition

Andrew Perin, MD, from the Jones Eye Institute, University of Arkansas for Medical Sciences, placed first in the 2015 Table Rock Regional Roundup Resident Podium Competition for his presentation entitled "Moxifloxacin Toxicity to Human Iris Pigment Epithelium." The Table Rock Regional Roundup is a joint venture of the Arkansas, Kansas, Missouri and Oklahoma state ophthalmological societies and top residents from the four states' residency programs compete in the podium competition.

Pictured from left to right: Dr. Perin, Jean Hausheer, MD, Oklahoma, regional meeting chair, and Michelle Boyce, MD, from the University of Kansas Medical Center, Department of Ophthalmology, Kansas City, KS, who placed second.

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OBITUARIES

LITTLE ROCK – **Samuel William Boellner, MD** passed away on September 5, 2015. Dr. Boellner built a reputation as a highly intelligent, generous, and compassionate physician, who enjoyed family and the practice of Medicine, in the private practice of Pediatric Neurology, and Clinical Research. He was also an accomplished athlete. Upon graduation of medical school in 1961, he was honored with The Faculty Key Award, presented to the outstanding graduate in each graduating class by vote from the medical school faculty. He served two years in the U.S. Navy during the Vietnam War and was honorably discharged with the rank of Lieutenant Commander. He was a founder of the first private practice group of neurologists in Arkansas, Neurology Associates, P.A., which grew to eight neurologists. He is survived by his wife, Marilyn, his stepchildren, Karen Gordon (Brian) and Eric Jameson (Shelley), and seven step grandchildren and three daughters, Mildred Cain (Richmond, VA), Elizabeth Boellner (Little Rock), and Caroline Jeffrey (Little Rock), and their mother Mary Bellingrath Boellner (Little Rock), as well as seven grandchildren.

BLYTHEVILLE – **Merrill J. Osborne, MD**, 90, of Memphis, Tennessee and formerly of Blytheville, Arkansas, passed away August 24, 2015. Following graduation from Manila High School in 1942, Dr. Osborne attended the University of Arkansas until he was drafted into the US Army in 1944. He proudly and honorably served his country with the 38th and 86th infantry division in the Philippines. Upon completion of his service, he returned to the University of Arkansas to continue pursuing his pre-med degree. In 1953, he returned to the University of Arkansas to fulfill his lifelong dream of becoming a physician. He graduated in 1958 from the University of Arkansas Medical School and then completed his residency at Lafayette Charity Hospital, Lafayette, LA. In 1960, he began his family practice in Blytheville, Arkansas. He would go on to a very fulfilling and happy life as he dedicated himself to his patients and the community. From happily birthing children to the sadness of going through death, his patients were always foremost in his life. He was an active member of the Mississippi County and Arkansas Medical Societies. Surviving Dr. Osborne are his wife, Helen Whistle Osborne; children, Kay O. Walsh, Rebecca Rogers (David), and Beth Green and many grandchildren and great-grandchildren.

LITTLE ROCK – **Lawson Edward Glover, Jr., MD**, passed away August 30, 2015. He was an accomplished Boy Scout, achieving the rank of Eagle Scout and earning both the Silver Palm and the God and Country Awards. He attended the University of Arkansas at Fayetteville. He completed his senior year concurrently with his first year of medical school at UAMS, graduating with a B.S. in 1965. In 1967 he was awarded his M.D. He chose to specialize in Internal Medicine and Endocrinology and Metabolism. His residencies in those specialties were interrupted by two years in the U.S. Army (1969-71). He then joined the Arkansas National Guard (1971- 76) and, over the next few years, completed his medical training. In 1974 he began practicing medicine at the Little Rock Diagnostic Clinic (LRDC). He left the National Guard in 1976 with the rank of Major. Dr. Glover is survived by his wife Amelia Walters; his daughter Amy Glover Bryant (Kent) of Little Rock; his son Christopher Lawson Glover (Satya) of San Francisco, CA; and by his three grandchildren: Jackson Thomas Bryant, Amy Caroline Bryant, and his one-year-old namesake, Styron Lawson Edward Glover. In addition are many loving cousins, nieces, nephews, and close friends.

JONESBORO – **Michael Tzuoh-Liang Hong, MD**, 46, passed away May 24, 2015, at NEA Baptist Hospital, surrounded by his family. Michael was born in Taipei, Taiwan and has lived in Jonesboro since 1998. He served the community of Jonesboro as a beloved and dedicated obstetrician/gynecologist at NEA Baptist Women's Clinic and Hospital. He loved to run, travel and taste food from around the world. Most of all, he was a devoted father, husband, and son who cherished every moment with his family, and also a member of the First Baptist Church in Jonesboro. Michael is survived by Connie, his wife of 20 years, his sons Aaron and Justin, his parents Chu-Chu and Grace Hong, and his siblings Jason and Amy Hong. AMS

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