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Are You Trauma-Informed?

The Importance of Understanding Trauma and Its Effects on Patient Care

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COVER STORY 156

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Advocacy in Action

BY **H. SCOTT SMITH, JD**
DIRECTOR OF GOVERNMENTAL AFFAIRS

Over and over, surveys and focus groups reaffirm that AMS members see "advocacy" as the main reason for being a member. It is job #1, no doubt … but what does advocacy really mean, specifically? What all does that word encompass?

For AMS, advocacy comes in different forms. Sometimes, the AMS advocacy effort is in a county courthouse or before the Arkansas Supreme Court. At other times, AMS is advocating at the Arkansas Department of Insurance or Department of Health or Department of Labor. A recent example of advocacy at the Arkansas Department of Labor was regarding a Workers' Compensation issue that could significantly impact Arkansas physicians and their patients. But clearly, the most visible AMS advocacy efforts are when we are at the Arkansas State Capitol or the U.S. Capitol, and it is this "legislative" advocacy I would like to touch on briefly.

The 92nd Arkansas General Assembly's regular session adjourned sine die April 24, 2019, and is scheduled to re-convene for a fiscal session this coming April, with the next full-blown regular session scheduled to begin in January of 2021. So, what does legislative advocacy look like when the Arkansas General Assembly is not in session?

First, AMS legislative advocacy never stops, because strengthening our relationships in the "off-season" strengthens our efforts in session. AMS has several strong champions in the Legislature. For this reason, frequent communication via emails, texts, calls and by attending committee meetings (which continue year-round) is important in keeping those relationships strong.

AMS encourages every member to contact their elected officials and candidates, get to know them, and let AMS know about any interaction and developing relationships. It is crucial that AMS members not only offer campaign assistance, but also offer themselves as a health care resource for their legislators and candidates, who probably do not have a background in health care.

This fall, AMS advocacy efforts have also focused at the federal level with the Arkansas congressional delegation and staff on issues like surprise billing legislation and, most recently, responding to the October 3 Executive Order entitled, "Protecting and Improving Medicare for our Nation's Seniors." While the title certainly states a worthy goal and much of the Order is to be commended, the challenge is in the vagueness of the Order. Section 5 gives the Secretary of HHS one year to review policies that "create disparities in reimbursement between physicians and non-physician practitioners…" and proposes regulations to eliminate supervision requirements "and all other licensure requirements of the Medicare program that are more stringent than applicable Federal or State laws require and that limit professionals from practicing at the top of their profession." Clearly, this vague language has significant scope-of-practice-expansion implications and needs to be either clarified or removed.

In addition to federal advocacy, during the first week of November AMS President Dennis Yelvington, MD, moderated a meeting with Arkansas specialty society leadership to begin discussions on how all physician groups can work together on scope of practice advocacy to help make a positive impact on future legislation. As you know, issues regarding scope of practice are always front and center during each legislative session in Little Rock.

This first meeting on scope of practice also touched on the most vital aspect of successful advocacy … physician involvement and continued contact with elected officials. AMS encourages every member to contact their elected officials and candidates, get to know them, and let AMS know about any interaction and developing relationships. It is crucial that AMS members not only offer campaign assistance, but also offer themselves as a health care resource for their legislators and candidates, who probably do not have a background in health care. If you would like to get to know the candidates for office in your area, please contact AMS. We are here to help facilitate communication, and right now, before any election, is the best time to contact candidates and offer assistance and input.

Contributing to ArkMed-PAC, the bi-partisan political action committee of AMS, is another way for members to strengthen advocacy efforts. ArkMed-PAC makes contributions to physician-friendly candidates and is an easy and terrific way for every AMS member to help elect more physician-friendly candidates. There are many important races coming up in the March 3 primaries, long before the November 3 general election, and those races will be expensive.

During the 2019 session of the Arkansas General Assembly, physician-friendly legislators led the way as the Legislature passed many strong bills that will have a positive impact on Arkansas physicians and their patients. Just a few of the many victories included contracting improvements, easing assignment of benefits, insurance card plan identification simplification, and insurance review networking protections after peer review. Today, those same physician-friendly legislators and candidates need our support. Some of the most important primary races affecting the 2021 General Assembly will be decided in only a few months on Super Tuesday. But you can contribute to next session's success now by joining ArkMed-PAC today.

More good news … Arkansas law allows up to $50 - $100 tax **credit** for your PAC contribution ($50 when filing as an individual and $100 when filing jointly) on Arkansas state income taxes. Also, when contributing to ArkMed-PAC, your contributions can come from either a personal (preferred) or business account, up to the annual maximum allowed by Arkansas law of $5,000.

AMS is always fighting for Arkansas physicians and their patients. Please take a moment right now and commit to helping us in those advocacy efforts by getting to know your candidates (we are always here to assist you) and by contributing to ArkMed-PAC. Today's work will fuel tomorrow's successes. •

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BY BENJAMIN THARIAN, MD

Role of Endobariatrics in Metabolic Medicine

Obesity is a global pandemic with increasing prevalence. World Health Organization (WHO) classifies overweight as Body Mass Index (BMI) of 25.0 to 29.9 and obesity as BMI of 30 or higher. As per 2016 statistics, 39% of all adults (men and women) were overweight. Obesity was noted in 11% and 15% in men and women, respectively. This accounts for two billion adults with overweight category and more than one-half billion as obese.[1] With this increasing trend, obesity-related complications are on the rise.[2] A multifaceted approach is required to target this concerning trend. Increasing awareness among youth about overweight and obesity and early lifestyle changes, including pharmacotherapy, are recommended. Individuals who fail the above options could be considered for bariatric surgery. Though bariatric surgery is effective in weight loss, it has a 30-day mortality rate of 0.3% and a complication rate of 7-10%.[3] Thus, techniques to reduce these complications and increase the rate of weight loss and reversing the metabolic profile of patients led to a new field of endoscopy called Endobariatric and metabolic therapy (EMT). This involves the use of flexible gastrointestinal endoscopes via a natural orifice instead of the open or laparoscopic route; a safer and highly cost-effective procedure, it offers an advantage of no skin incision, though bariatric surgery remains the gold standard.

EBT was introduced for the first time in 1980 with intragastric balloon placement.[4] EBT underwent major improvements since then, with the approval of multiple devices by the FDA. The goal of EBT is to achieve targeted, sustained weight loss with the improvement of metabolic profile of the individual, with the least complications and a high safety profile. These procedures could be utilized for weight loss and improving metabolic profile, or they could be a bridge to obtaining some amount of weight loss before a definitive bariatric surgery could be planned. These procedures include a wide variety of procedures targeting gastric and small intestinal segments of the gastrointestinal tract. All the procedures aim for calorie restriction but decreasing the absorption.

EBT could be gastric or small intestinal. Three gastric balloons are approved for use so far – Orbera,[5] Reshape Duo,[6] and Obalon[7] – and few are under investigation.[8] These balloons could be introduced either non-endoscopically or endoscopically and inflated to a variable volume (250 – 900 mL) to fill the gastric lumen creating a sensation of fullness. The number of balloons varies with the type of device. Most of these balloons are tolerated well with improvement of the metabolic profile, including diabetes, hypertension, hyperlipidemia, osteoarthritis, and respiratory-related complications. Adverse events related to these intragastric balloons include mucosal ulcerations, nausea, vomiting, and (rarely) bowel obstruction and perforation. Other techniques such as endoscopic sleeve gastroplasty (ESG), stapling devices, transpyloric shuttle, magnetic anastomotic system, and aspiration therapy have been introduced. These procedures include suturing part of the stomach, inflating balloon along the transpyloric area, and aspirating contents of the stomach with a gastrostomy tube and siphon assembly.

The goal of small intestinal procedures includes bypassing the biliopancreatic limb of the intestine so that the food enters directly from the gastric lumen to mid to distal jejunum. This augments rapid improvements in glycemic control and resolution of type II diabetes.[9] Some of the techniques include duodenal-jejunal bypass (Endobarrier), Duodenal Mucosal Resurfacing (DMR, Revita), bypass sleeve (ValenRx Endoluminla Bypass), and use of self-assembling magnets for enteral bypass in the small intestine (Incisionless Anastomotic System).[10,11] These techniques may mimic Roux-en-Y gastric bypass, resulting in weight loss and improved glycemic status. Adverse effects of these procedures include migration of devices, nausea and diarrhea post-procedure, gastrointestinal bleeding, sleeve obstruction, infection, and perforation.[12]

The goal of small intestinal procedures includes bypassing the biliopancreatic limb of the intestine so that the food enters directly from the gastric lumen to mid to distal jejunum.

A learning curve exists for the endoscopists to master these new techniques. The type of device used (gastric or small intestinal) should be individualized with a detailed discussion about benefits and risks. As new techniques such as endoscopic suturing and over-the-scope clip devices are available for closing the defects in the intestine and controlling the bleeding, most of the complications can be managed endoscopically without the need for open surgery. With time and increasing experience related to these procedures, the safety profile and excess weight loss will continue to improve. Endobariatrics should be considered as a new tool available as part of the multi-disciplinary care for these patients.

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BY CASEY L. PENN

Are You Trauma-Informed?

The Importance of Understanding Trauma and Its Effects on Patient Care

"Intuitively, physicians have known that [traumatic] experiences that happen outside of the exam room – in the home, at school, at work – have a bigger influence on a person's health than what occurs *in* the exam room," said Pediatrician and Arkansas Foundation for Medical Care Physician Chad Rodgers, MD. "Now, we have the science to back that and the words to talk about it."

To understand this phenomenon, Dr. Rodgers used an example that people understand to some degree, post-traumatic stress disorder. "With PTSD, people have gone to fight a battle. They see these traumatic things, and then they come back into a normal environment," he began. "On the other hand, imagine a child who has, for a prolonged period, been in an environment of trauma, oftentimes during developmental periods of life. When these experiences are ongoing, they will influence health."

Noting how the effects of traumatic experiences can follow children into adulthood, he continued, "We're built to survive**.** Being anxious, for example, is a survival instinct that prepares us to run away from danger or fight back. We've all been there. You feel your heart rate pick up, you start to sweat, your stomach doesn't feel good – you're not worried about digesting food, you're worried about 'fighting the bear,' as it were. When kids stay in this hyper-aroused, fight-or-flight state, it influences their blood pressure, heart, liver, endocrine, and inflammatory systems. I think we would all acknowledge the mental health ramifications for children whose bodies stay in that anxious state. We're beginning to understand the physical ramifications, too."

Bringing all this home to present-day Arkansas, AFMC reports that our state has the highest percentage of children with at least one ACE, nearly 56% compared to a 46% average of children nationally.

Adverse Childhood Experiences

Past traumatic events are called *Adverse Childhood Experiences* (ACEs). The term dates to a foundational Kaiser Permanente study involving more than 17,000 participants. The study, conducted in the mid-1980s by Vincent Felitti, MD,* and researchers from the Centers for Disease Control and Prevention, questioned participants about their exposure to traumatic events such as child abuse, sexual abuse, and neglect; emotional trauma; poverty and homelessness; household dysfunction due to parental separation or incarceration; mental illness in a caregiver; and violence in the home.

Dr. Felitti's study revealed not only the commonality of ACEs across the large patient base but also the association between ACEs and chronic illness. According to the study, the more ACEs a person has, the more likely they are to develop difficult-to-manage chronic health conditions.

In addition to the original ACEs study, which focused on mostly Caucasian individuals with some college education, the Philadelphia Urban ACE Study looked at racially diverse adults with only a high-school education. Together, these studies showed that a large portion of the population – regardless of race or socioeconomic status – had experienced at least one ACE. Further, a smaller portion of the population had experienced four or more ACEs.

In response to studies like Dr. Felitti's, movements to understand ACEs and provide trauma-informed care (TIC) have gained ground nationwide. They have led to initiatives like Advancing Trauma-Informed Care, led by the Center for Health Care Strategies (made possible by the Robert Wood Johnson Foundation).

The initiative included a video series relaying feedback from clinicians who were implementing TIC in their practices. A featured physician in the series was Edward Machtinger, MD, professor of medicine and director of Women's HIV Program for the University of California San Francisco. "The majority of illnesses that people are treating in primary care settings are trauma-related," he noted, "especially the real hard issues that physicians and clinicians are struggling with – substance abuse, chronic pain, opioids – things that providers are struggling so hard to change and help with and are failing and feeling really frustrated with."

Upon implementing TIC, Dr. Machtinger reported, "This is working … the effectual side for providers is dramatic. Our experience as a provider has changed from being overwhelmed, from having a chaotic clinic, from telling each other the worst war stories possible as a way of coping – which is actually just retraumatizing – to an experience where we are feeling like we're doing the absolute best job possible."

TIC Efforts in Arkansas

Bringing all this home to present-day Arkansas, AFMC reports that our state has the highest percentage of children with at least one ACE, nearly 56% compared to a 46% average of children nationally. Further, as many as one in seven children in the state have experienced three or more ACEs.

Following in the steps of national initiatives and organizations, AFMC and the Arkansas Department of Health came together in 2017 to cofound the Arkansas ACEs/Resilience Work Group. The cross-sector collaborative of public and private stakeholders is addressing childhood adversity and working to build community resilience through awareness and policy change. So far, the organization has held three ACEs Summits that have analyzed and addressed various aspects of TIC in Arkansas.

"By reframing our tendency to ask 'What's wrong with you?' to ask the better question, 'What happened to you?', physicians and their staff will be better equipped to understand and connect with patients, [engaging] their patients to foster greater ownership of their health futures," explained Catherine Bain, AFMC chief administra-

tive officer. "It will also improve patient satisfaction and compliance with treatment. Connecting this clinical concept to the workplace, employees will better understand themselves and their colleagues thus creating a better work environment."

AFMC has taken it upon itself to become Arkansas's trauma-and-compassion-informed organization. This means training its staff in TIC and developing training for physicians and other health care professionals interested in implementing a trauma-informed approach in their medical practices. The training will focus on ACEs awareness, TIC, and building resilience. "I appreciate that AFMC is investing resources to become a trauma-informed organization," said AFMC Chief Outreach Services Officer Peggy Starling. "I look forward to AFMC offering this training to the provider community in the near future."

For its work in TIC, AFMC has also been awarded certain grants that will enable related training and fellowships for a select group of clinics, hospitals, and providers across the state. For more information on these opportunities, some of which include a competitive application process that is currently underway, visit https://info.afmc.org/agm.

Another local advocate for TIC and related training is Shashank Kraleti, MD, FAAFP, family medicine physician and residency director for the UAMS Department of Family and Preventive Medicine. In his practice, Dr. Kraleti sees many adults and older adults with behavioral health issues and chronic diseases. Some of them suffer from depression, which he often links to past trauma. "If you go into the history for these patients," he said, "most had multiple ACEs in their childhood."

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Learning what's below the surface is paramount to successful treatment, reiterated Dr. Kraleti. "A patient with depression and diabetes is often managed simply for depression and diabetes. If you don't take time to look for previous history of trauma or negative social determinants of health, you'll be throwing pills and other treatment options at the patient, which most of the time won't work.

"Due to their underlying conditions, these patients aren't ready to respond. We see patients with poorly controlled conditions who have tried several medications, but are making poor choices, have substance abuse issues, etc. They're not responding to treatment because we haven't connected to the real problem. It's about understanding how trauma affects an individual. If you don't go beneath the surface to find the problems and start fixing them, you cannot fix the problems that are on the surface."

TIC is an issue that's close to Dr. Kraleti's heart and one that he and his colleagues will continue to work to advance, despite the challenges. "In the interest of ourselves and the patients and communities we serve, we need to do better than we're doing right now," he said, before touching on past efforts. "Three years ago, UAMS Department of Family and Preventive Medicine proposed a survey to the Council of Academic Family Medicine Education Research Alliance. It was intended for all program directors, and we wanted to see if they were educating their residents on trauma and the effects of trauma. Unfortunately, the survey was turned down because it was evident that the topic wasn't yet being taught.

"We must train the providers and staff first, but that's not happening in 98-99% of residency programs. Even with the evidence on trauma and its effects, many programs are not doing it because of one thing: most of the primary care clinics follow the recommendations of United States Preventive Services Task Force for prevention policies. The USPSTF released their recommendation statement on child maltreatment stating that they didn't have enough evidence to recommend screening for ACEs at this time. For this reason, most insurances will not pay for it and there are several other things that providers are required to do in a visit."

TIC in Practice

Reimbursement and training barriers aside, there are things you can do now to implement TIC in your practice. Through its website, traumainformedcare.org, CHCS offers plenty of literature and advice on things like building awareness and buy-in, investing in a trauma-informed workforce, creating a safe environment for patients, engaging with patients in meaningful ways, and identifying and treating trauma.

Like AFMC, Dr. Kraleti's clinic is in the process of developing its own TIC training program. Meanwhile, he continues training residents and doing his best to approach patients with trauma-informed care. "I've had several success stories with patients," he encouraged. "You must give the time to develop trust. I remember one patient from my time working in the hospital, where you can't always have much of a long-term connection with the patients you're seeing. I sat down and spent almost an hour just listening to what the patient had to share. He had COPD, had smoked for many years, and was on oxygen. He was very sick at the time, and he clearly stated to me that he did ALL of this – picked up a cigarette, picked up bad behaviors – because when he was a child, he had been abused for a prolonged period of time. He didn't have any support system as a child, and this was the first time he had shared his experiences with anybody. The patient felt better after sharing, like a burden was lifted at least a little bit. He was able to connect to me and for the first time, was willing to try some positive changes in this life and habits."

With all the evidence in mind, it only makes sense to approach care in this way, asserted Dr. Rodgers. "Sometimes, the health care environment can be retraumatizing to people," he summed, "but a healthy knowledge of trauma can bring about a shift in focus that can make patients feel more comfortable opening up to their physician (and staff) and in turn, lead to better patient outcomes and a less-stressed health care work force."

***Learn more about Dr. Vincent Felitti's Study** at https://youtu.be/3jLQtjLWMjM.

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A CLOSER LOOK AT QUALITY

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New Guidelines Direct Care for Children with Spina Bifida

LAURA J. HOBART-PORTER, DO, FAAPMR

Spina bifida is a condition affecting 3,000 children every year.[1] It results from the failure of the neural tube to close during gestation. Caused by a heterogeneous combination of environmental and genetic factors, spina bifida has myriad effects on the developing child, ranging from limb paralysis and orthopaedic deformities to neuropsychological differences. The Spina Bifida Association recently published a comprehensive guideline on the care of people with spina bifida, from birth through adulthood.[2]

Children with spina bifida often require multiple specialists including rehabilitation, neurosurgery, orthopaedics, urology, plastic surgery, neurology, pulmonology, nephrology, endocrinology, gynecology, immunology, physical and occupational therapists, speech and language pathologists, dietician, orthotist, neuropsychologist and social worker. Coordination of specialists requires a dedicated interdisciplinary program to assist parents in navigating the medical and social aspects of rearing a child with spina bifida. These services are best delivered in a multidisciplinary setting that allows for care coordination and shared decision making.[3,4] The Spinal Cord Disorders Program at Arkansas Children's Hospital provides collective expertise to coordinate management of this complex condition.

In a typically developing embryo, the neural tube closes at approximately day 27. Neural tube defects (NTDs) encompass all forms of impaired neural tube closure including spina bifida (lipo and myelomeningocele), encephalocele, sacral agenesis, anencephaly and iniencephaly. Closure failure can occur at any point along the spine, most commonly in the lumbosacral region. Placental fluid on the exposed nerves is neurotoxic. The open neural tube alters pressure gradients within the developing central nervous system, which may have long-term neuromuscular, intracranial and cognitive implications.[5]

Etiologies of NTDs include folate deficiency, genetic mutation or other maternal factors (hyperthermia, exposure to solvents or valproic acid, obesity or diabetes). Folic acid is the most potent measure to prevent neurulation.[1] All women of childbearing potential should take 0.4 mg of folic acid daily to help prevent NTD. Women who have had a previous NTD pregnancy, maternal NTD or other risk factors should take 4 mg. of folic acid daily.[4]

Prenatal consultation should occur shortly after NTD identification (18–24 weeks gestation), giving parents an opportunity to explore all options, including prenatal repairs (not available in Arkansas). Intrauterine repairs are typically done no later than 25–26 weeks gestation. Though intrauterine repair does not typically help with urologic function or motor-sensory outcome, it may decrease the rate of shunt dependence from approximately 80% (in post-natally repaired children) to 40%. There is a small risk of fetal loss and risk of uterine rupture with future pregnancies.[6]

Neonatal intensive care unit (NICU) stay after delivery can vary from days to months. While in NICU, the child should be seen by a team of specialists. Plastic surgery should be involved for complex defect closures. Head and renal ultrasounds are recommended; hips and spine may also be imaged.

It is imperative that NTD infants have therapy arranged upon NICU

discharge. Refer the family to their states' Early Intervention program (in Arkansas — First Connections **https://dhs.arkansas.gov/dds/firstconnectionsweb/#fc-home**). This is vital in getting therapy and teaching underway. Some families may use outpatient therapy and/or a daycare that emphasizes developmental therapy.

Children often have associated intracranial abnormalities. Most will have hydrocephalus although the rates are lower with intrauterine repairs. Hydrocephalus may require surgical intervention, typically a shunt that drains into the abdomen (VP shunt). Programmable shunts require periodic recalibration by the neurosurgical team (particularly after MRIs). Approximately 80–90% of children with spina bifida will also have Chiari II malformation. This hindbrain herniation can be severe enough to require surgical decompression. Signs of herniation in need of neurosurgical evaluation include poor suck, swallow dysfunction, difficulty breathing and speech problems.[7]

As children grow, the spinal cord may develop complications including tethered cord or syringomyelia. Both complications can manifest with changes in bowel or bladder function, loss of motor or sensory control, back pain and progressive orthopaedic deformities. These complications should always be managed by specialists familiar with NTDs.[8]

Children with spina bifida historically had early mortality related to urologic complications, urinary tract infections (UTIs) or renal failure. The use of surgical and nonsurgical techniques (including catherization) to regularly empty the bladder and bowel has improved this. Functional continence has been linked with future income-earning potential and improved quality of life. Because of the methods used to maintain functional bladder continence, the bladder may be colonized with bacteria. Therefore, UTIs should not be treated unless there are symptoms (fever, increased leaking, etc.). Cultures should always be collected as part of urinalysis. Spina bifida patients should be followed by a urologist throughout their life.[7]

Given the abnormal spinal structure and innervation present, orthopaedic concerns are frequent and may include scoliosis, clubfoot deformity and hip dysplasia. X-rays and gait studies can guide treatment plans. There are numerous equipment needs to consider; consequences of inappropriate devices can be disastrous. A physical medicine and rehabilitation specialist can help with selection of appropriate bracing, adaptive devices or wheelchair while considering comorbid neurosurgical, orthopaedic, developmental and urologic factors. Standardized serial exams (including PT, OT and neuropsychology) should be performed regularly to determine if there are clinically significant changes.

Children with spina bifida are vulnerable to skin disorders, pressure sores and latex allergy. Avoid latex products and pressure over bony prominences. Sunscreen and insect repellant should be worn while outdoors. Certain antibiotics used to treat UTIs may make sunburns worse.

Medical conditions associated with spina bifida include precocious puberty, short stature, diabetes, obesity and osteoporosis. A nephrologist may be involved if hypertension or kidney damage is related to neurogenic bladder. Central and obstructive apnea with poor sleep hygiene contribute to sleep disorders that are present in more than 60% of patients. This may require collaboration with psychology, pulmonology and otolaryngology. Seizure disorders are more common and can be life threatening.

Children with spina bifida score lower in assessments of social functioning, attention and executive function. They show lower levels of participation in social and physical activities. Participation in group activities that specifically address these deficits (such as Spina Bifida Camp) can improve adaptive scores and quality of life. ▲

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Abscess of the Mediastinum Caused by Streptococcus Anginosus

Introduction

Streptococcus anginosus is commonly identified in the mouth, gastrointestinal tracts, and vagina as part of the normal flora but has been noted to play a role in oral infections. However, more evidence is starting to show that more significant infections can occur throughout the body, including abscess forming respiratory infections. Differentiation from contaminate or causative agent can make diagnosis challenging. Treatment is typical of other abscess forming infections, and can include surgical drainage and antibiotics.

Case Presentation

A 25-year-old female presented to urgent care with shortness of breath and chest discomfort. Symptoms began one week prior as "gas and bloating." There she was diagnosed with bronchitis and reflux and sent home with a Z-Pak and omeprazole.

She began developing worsening migraines the next day, followed by mid-sternal chest pain and shortness of breath. She presented at the emergency department that day with rust-colored mucus; acute worsening chest pain; and significant difficulty breathing associated with lightheadedness, palpitation, nausea, and chills. Symptoms mildly improved with ibuprofen she took that morning.

Upon examination by the admission team, she had a fever of 103.6º F, heart rate of 137, BP of 128/71, respiratory rate of 22, and respiratory rales with SpO2 of 91%. The patient was alert and cooperative with no physical distress. Her arterial blood gas showed pH of 7.43, pCO2 34, O2 sat 94%, HCO3 22. Her white blood count was 21.2 with a procalcitonin of 0.33. A CTA of her chest was ordered by emergency physicians, and the vRad read showed possible paraesophageal mediastinal right lower lobe mass with low density foci seen in the second-order branches of pulmonary arteries concerning for pulmonary emboli. The initial read also suggested lymphoma as a possible consideration.

Patient was given doses of Levaquin and meropenem as well as fluid resuscitation in the emergency department for meeting initial criteria of sepsis. Given the patient's presenting symptoms, history, and initial examination and workup, pulmonary emboli was considered highly possible. Due to this, she was started on a heparin drip while she was admitted and further work-up was pursued.

Additional initial work-up included blood cultures and coagulation panel as well as a urinalysis. The final read of the initial CTA chest showed a large subcarinal, right paraesophageal, right lower lobe soft tissue mass that partially encased the right lower lobe bronchovascular structures. There was also noted narrowing of the right mainstem and right lower lobe central bronchi. No central pulmonary emboli noted on final read. It was, however, again noted that lymphoma should strongly be considered, with other neoplasms not excluded. Pulmonology had been consulted and, following along with patient, agreed that a pulmonary emboli was less likely given updated findings. Lymphoma remained high on the differential, and an endobronchial ultrasound biopsy was considered as the appropriate step for continued evaluation. The heparin was discontinued in preparation of biopsy.

The biopsy obtained from the EBUS revealed no immunophenotypic evidence of lymphoproliferate disorder. Lymphoid tissue was present, but no granuloma was indicated, and the test did not reveal any neoplasm with low cellular material, ultimately being considered nondiagnostic. Results from other tests were beginning to come in. The initial blood cultures were negative on both counts. Urinalysis was negative as well for infection. The patient's white blood cell count continued to fluctuate throughout this time but remained elevated, and she remained intermittently febrile as well. She was started on Unasyn after repeat chest X-ray showed a post-obstructive pneumonia along with worsening respiratory status.

Oncology was consulted as lymphoma remained high in the differential diagnosis. The oncology noted that if the patient did have lymphoma, a high-grade malignancy should be suspected and treatment should begin as soon as possible. Cardiothoracic surgery was consulted to perform a right thoracotomy to obtain a second biopsy of the mass. The results revealed necrotic lung tissue with fibrin filling airspaces and associated pleuritic and adjacent necrotic debris. Acute and chronic inflammation was noted along with reactive fibrosis, but no evidence of malignancy was noted. A Gram stain highlighted Gram-positive cocci with necrotic debris. Cultures obtained from biopsy grew Streptococcus anginosus in the aerobic cultures with no growth in anaerobic and fungal cultures as well as a negative AFB smear and culture.

Infectious disease was consulted and the diagnosis of mediastinitis with mediastinal abscess secondary to Streptococcus anginosus was made. A culture showed moderate growth of *Streptococcus anginosus*, an organism typically considered to be part of the flora in the human oral cavity as well as the gastrointestinal tract. The patient was switched to ceftriaxone 2g IV QD and clindamycin 90mg IV Q8h and continued showing improvement. She was discharged with ceftriaxone 2g/50 ml IV daily that she gave herself using her PICC line and clindamycin 150 mg, two pills every eight hours for a total of six weeks.

Discussion

Streptococcus anginosus, also known as the *S. milleri* group, was first described by Guthof in 1956 and named in honor of microbiologist W.D. Miller. It is part of a subgroup of viridans streptococci which also includes *S. intermedius* and *S. constellatus*. As previously mentioned, it is part of the normal flora of the human oral cavity and gastrointestinal tract, but has also been isolated

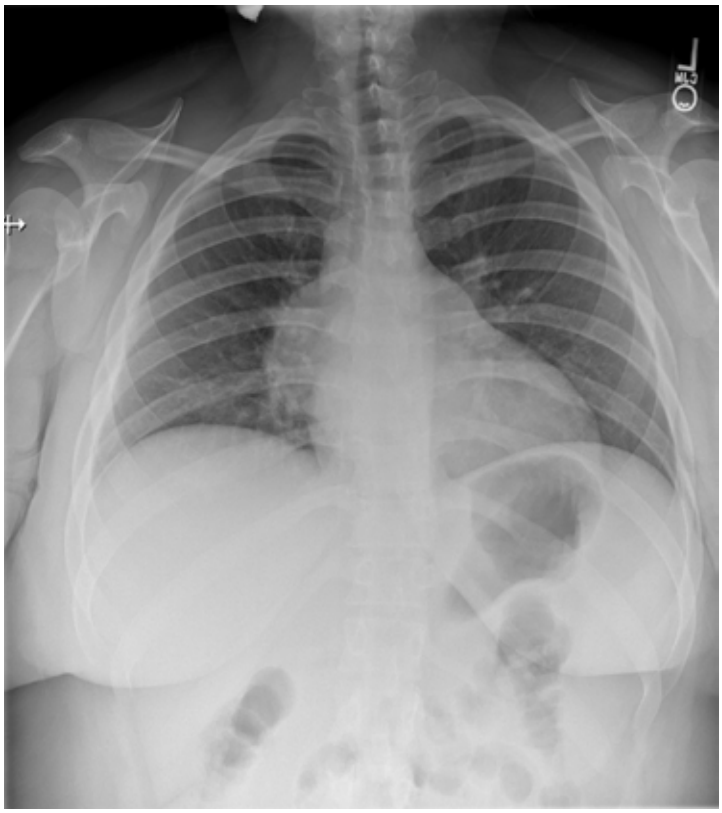

FIGURE 1.

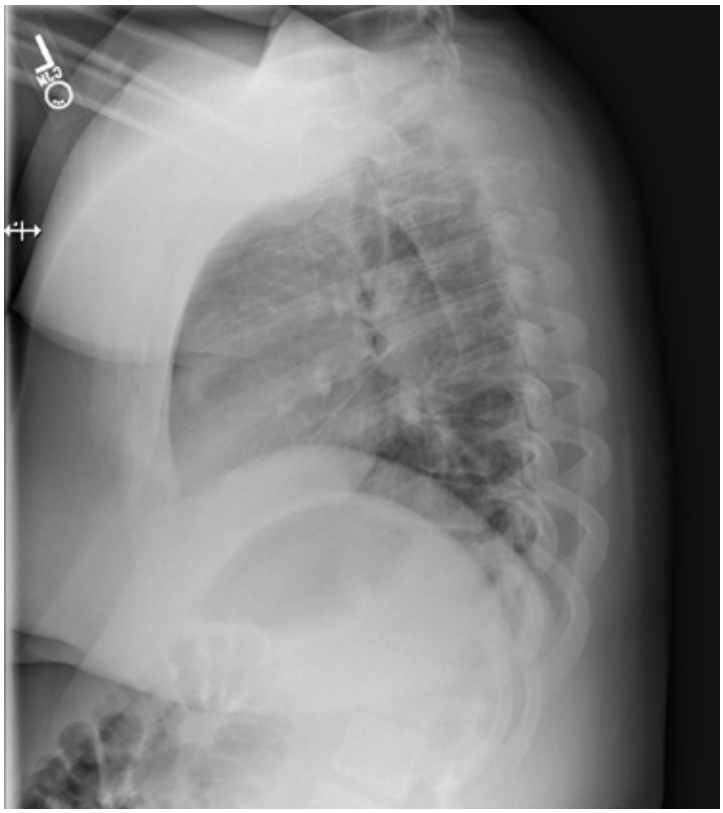

FIGURE 2.

as normal flora of the respiratory female genital tracts.[1] The *S. anginosus* group presents as gram-positive, catalase-negative cocci like other members of the *Streptococcus* genus.[2] Many of the strains of this infection are either enhanced by the presence of carbon dioxide or anaerobic.[2] The *Streptococcus anginosus* group has been noted to be particularly important in the pathogenesis of respiratory infections.[3]

The most telling symptom of *S. anginosus* infection is an abscess. This is what sets it apart from other pathogenic streptococci.[2] *S. anginosus* is also commonly associated with invasive pyogenic infections. Unlike less virulent viridans streptococci, *S. anginosus* should be considered true pathogens when isolated. Patients who have had previous trauma, surgery, or who have a history of diabetes or immunodeficiency are most likely to get infections from the pathogen, although this was not the case with our patient.[1]

While initial studies linked the organism to oral infections, *S. anginosus* can infect most parts of the body including the head and neck; the central nervous system; the abdomen in the form of liver abscess, cholangitis, peritonitis, appendicitis, subphrenic abscess, or pelvic abscess; the thoracic cavity in the form of pneumonia, mediastinitis, empyema, or lung abscess; the heart (endocarditis); or as bacteremia in any of the above-listed locations.[1]

Common treatments include drainage of the abscess, most often surgically, and long-term antibiotics. It should be noted that *S. anginosus* is largely susceptible to B-lactams but resistance to quinolones can develop easily.

In the thoracic cavity, *S. anginosus* has significant morbidity and mortality rates. Typically, infection occurs most in men, alcoholics, patients with cancer, or those with cystic fibrosis.[2] The infection is often complicated by pleural effusion or epyema.[3]

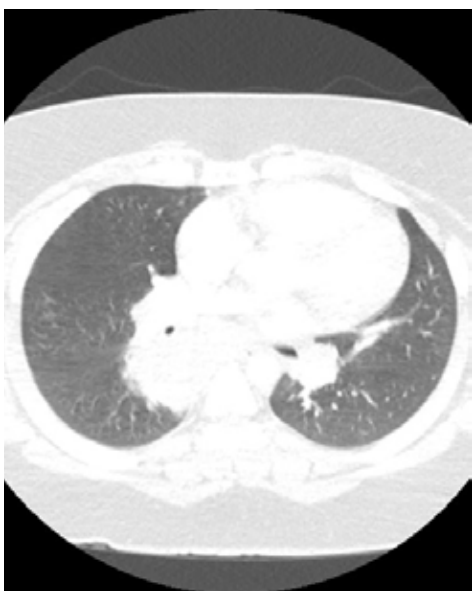

FIGURE 3.

Antibiotic therapy with ceftriaxone is the first-line treatment. However, monotherapy with a beta-lactum/beta-lactamase inhibitor can also be used.[2]

Conclusions

S. anginosus is a rare and often misdiagnosed medical problem. The bacterium is often considered to be flora in the oral cavity, oropharynx, gastrointestinal tract, and vagina, but can cause infections throughout the body. *S. anginosus* should be considered as part of a differential diagnosis when abscess or bacteremia is present.

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SCIENTIFIC ARTICLE

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A Skeletal Trauma Pathway for Infants

Abstract

A retrospective review of 276 infants that was conducted to evaluate for skeletal trauma with a clinical practice pathway using a set of objective indicators for decision making is presented here. Utilizing the clinical practice pathway, 32 cases of additional fractures were found (11.6%). Twenty two percent of cases had a change in abuse suspicion following completion of the pathway. Bruising at any site was a positive predictor for abuse suspicion (OR 3.022; 95% CI 1.589-5.750; p = 0.0007). Type of insurance was not associated to final suspicion for abuse. Use of an objective pathway may improve detection of injuries and reduce bias when evaluating infants with skeletal trauma.

Background

While abusive injury can occur in children of any age, fractures from abusive events occur most commonly in children < 18 months of age,[1] and the percent of fractures caused by abuse declines markedly when children begin to walk.[2] History, physical examination findings, and the presence of additional injuries are all important factors in distinguishing abusive from non-abusive fractures.[3,4] Skeletal surveys have been found to identify additional fractures in over 10% of suspected physical abuse cases, with an even higher rate in infants.[5] However, screening for occult injuries varies by provider and institution[6] and minority/disadvantaged children are screened for abuse at disproportionately higher rates.[7] Algorithms utilizing objective factors can attenuate this screening bias[8] and increase detection of suspected child abuse.[9] Failure to recognize and report suspected abuse represents a missed opportunity to protect a child from future injury, which could have dire consequences as mortality has been shown to increase with recurrent episodes of abuse.[10] Overscreening for abuse can result in increased medical cost, discomfort to the child during testing, and potentially unwarranted exposure to radiation.

A pathway containing evidence-based practice standards for the evaluation of physical abuse was adopted by the Trauma Council at Arkansas Children's Hospital (ACH) in February, 2011. A link to the infant skeletal pathway can be found at http://www.archildrens.org/programs-services/a-to-z-services-list/trauma-services/trauma-education-and-resources. The American Academy of Pediatrics recommends a complete skeletal survey in all children younger than two years when physical abuse is suspected.[3] The Infant Skeletal Trauma pathway expanded this screening process to include a skeletal survey in all infants (<12 months of age) who presented with any fracture, regardless of suspicion for abuse, that was not clearly related to a major trauma event such as a motor vehicle crash. The pathway also included screening for other occult injuries when indicated by examination findings or when there was a suspicion of abuse. This included obtaining a urinalysis and liver/pancreatic enzymes for occult abdominal trauma as well as neuro-imaging.[4]

The pathway was approved by members of the Trauma Council at ACH, which includes representatives from Pediatric Trauma Surgery, Pediatric Emergency Medicine, Pediatric Orthopedics, General Pediatrics, Pediatric Radiology, Pediatric Neurosurgery, and Child Abuse Pediatrics. Non-adherence to the pathway was addressed through ongoing quality assurance case reviews by the Trauma and Child Abuse teams at ACH.

Methods

A retrospective chart review was performed for infants who presented to ACH and had a skeletal survey ordered as part of the pathway over a three-year period.

Information included for analysis included: index fracture, age, race, co-occurring med-

Table 2: Characteristics of Subjects	
Characteristics	N=276 (%)
Age	
0 to <3mo	69 (25)
3mo to <6mo	81 (29.3)
6mo to <9mo	73 (26.4)
9mo to <12mo	53 (19.2)
Race	
Caucasian	174 (63)
African-American	72 (26.1)
Hispanic	20 (7.2)
Other	10 (3.6)
Payee	
Self-Pay	24 (8.7)
Private Insurance	48 (17.4)
Medicaid	198 (71.7)
Federal	6 (2.2)

ical conditions, insurance payee, presence of cutaneous injury on examination, presence of additional fractures identified by skeletal survey, presence of additional abnormal pathway findings (lab test results, abnormalities on head/abdominal imaging), and whether the findings from the pathway evaluation impacted the final suspicion of abuse. Determination of abuse suspicion was based on review of decision making by the medical provider(s) in the documentation of the patient encounter. These results were separated across age ranges (0 to < 3 months, 3 to < 6 months, 6 to < 9 months, 9 to < 12 months) with the intent of analyzing whether the yield of significant pathway findings differed between sub-sets of age and developmental abilities.

The study was approved by the UAMS Institutional Review Board (IRB). All statistical analyses were conducted using SAS software version 9.4 (SAS Institute Inc., Cary, North Carolina). Categorical characteristics were presented as frequencies and percentages. All categorical variables were compared using the Chi-Square test. For those variables where the cell counts for individual categories were lower than 10, a Fischer's Exact Test was used to compare differences. Additionally, a multiple logistic regression model was utilized to predict confirmation of abuse at the end of the skeletal pathway. Demographic characteristics, as well as type-of-index fracture and bruising at any site were used as independent variables in the model. Statistical significance was determined at p-values < 0.05.

Results

There were 276 patients included for analysis following chart review. Table 2 details the demographic characteristics. There was relatively even distribution of patients across the four age groups. The majority of the study population was Caucasian (63%), followed by African American (26%), Hispanic (7%), and other racial groups (4%) completing the distribution. The patients were predominantly insured by Medicaid (72%), with 9% self-pay, 17% privately insured, and 2% with federally sponsored insurance. The patient distribution for race and payor source mirrored the community population served by the hospital. Pathway adherence was tracked by the Pediatrics Trauma Service. More than 90% of the patients eligible for inclusion on the pathway had a skeletal survey obtained when indicated.

The most common index fracture was skull (60%, n = 166) followed by femur (15%, n = 43) and humerus (12%, n = 34). See Table 3 for other index fractures identified. Thirty-two cases (11.6%) had additional fractures identified by skeletal survey. Fifty cases (18%) had abuse status change from suspicion to no suspicion after the pathway was completed. Ten cases (4%) had

Table 3: Index Fracture Characteristics	
Fracture Type	N=276 (%)
Skull	166 (60.1)
Femur	43 (15.6)
Humerus	34 (12.3)
Rib	10 (3.6)
Clavicle	10 (3.6)
Radius	8 (2.9)
Ulna	4 (1.4)
Tibia	10 (3.6)
Fibula	2 (0.7)
Scapula	1 (0.4)

abuse status change from no suspicion to suspicion after the pathway was completed. Additional fractures were identified in only three children (1.8 %) with a final diagnosis of no suspicion of abuse while additional fractures were identified in 29 (27%) of those with a final diagnosis of suspicion of abuse ($p < .0001$).

Bruising at any site was found to be a positive predictor for final suspicion of abuse (OR 3.022; 95% CI 1.589-5.750; $p = 0.0007$). Age of 9-12 months was found to be a negative predictor for suspicion of abuse (OR 0.276; 95% CI 0.116-0.659; $p = 0.0047$). Type of insurance was found to have no relationship to a final suspicion of abuse (OR 1.34; 95% CI 0.514-3.503; $p = 0.0561$). When skull fracture was compared to all other types of index fractures, it was found to be a negative predictor for suspicion of abuse (OR 0.386; 95% CI 0.223-0.668; $p = 0.0007$). There was one case (0.3%) of bone disease detected during the evaluation. The mother of this patient was known to have Osteogenesis Imperfecta. There were no cases in which isolated lab abnormalities resulted in a suspicion of abuse.

Discussion and Conclusions

Use of the infant skeletal trauma pathway resulted in the identification of additional fractures in 11.6 % of our cases. This is similar to the yield from other studies using a pre-test suspicion of abuse in order to complete a skeletal survey.[5] If pre-test suspicion for abuse is an effective strategy in identifying which cases to evaluate, a higher yield of positive skeletal surveys in the "suspicious" group would be expected. Our results support that infants presenting with any fracture are a specifically high-risk group even if there are no other indicators for abuse on initial evaluation. In 22% of the cases, there was a change in final determination of suspicion of abuse, with 18% from suspicion to no suspicion of abuse and 4% from no suspicion to suspicion of abuse. Therefore, use of this objective clinical pathway may have utility in both "ruling-in" and "ruling-out" a suspicion of abuse. However, it should be emphasized that a negative skeletal survey does not eliminate the possibility for abuse and providers should not be falsely reassured by a negative skeletal survey if the index injury alone is suspicious. The 4% of cases in which the clinical impression changed from no suspicion to suspicion of abuse represent possible missed opportunities to identify abuse if the decision to obtain a skeletal survey were based solely on abuse-suspicion. Type of insurance was not associated to final suspicion for abuse and using an objective pathway may reduce bias in evaluation.

Bruising at any site was predictive of final suspicion of abuse. This reinforces the need to have a low threshold to evaluate infants, with bruising as potential "sentinel injuries" with specific emphasis on bruises on the torso, neck, face, head and ears.[4] Infants are at particularly high risk to have occult injuries related to physical abuse since they do not localize pain well on exam making it difficult to distinguish between a "fussy" infant and one who has been injured. Additionally, the types of events that are often inflicted by a frustrated caregiver include forceful squeezing of the chest and yanking/jerking of extremities which can result in rib and metaphyseal fractures, which do not typically have overlying deformity or bruising. A thorough evaluation at the time an infant presents with what may be a subtle "sentinel" injury provides an opportunity to recognize and address a situation in which the child will be at risk for further and possibly more serious injury if returned to the same environment without intervention.[10]

The study was limited by its retrospective nature, so it was not possible to identify the specific factors that went into initial and final determination of suspicion of abuse versus no abuse. Skeletal survey results may not have been the only factor that could have been considered. We also do not know the final outcome of investigations, and clinical suspicion may not accurately reflect the final determination of abuse or accidental injury. There was no comparison of the 9-12-month age group to younger infants in terms of skeletal survey yield because of the low numbers in each group.

Adaptation of a skeletal survey pathway for particular injuries, as opposed to suspicion for abuse, has the potential to reduce bias during evaluation and to increase identification of physical abuse. Given that there was a positive skeletal survey for more than one of every 10 infants evaluated with a fracture at ACH and 4% of cases changed from a determination of not suspicious to suspicious after the skeletal survey was obtained, our results support the current practice of obtaining a skeletal survey in all infants with a fracture regardless of suspicion for abuse.

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Arkansas Cardiology
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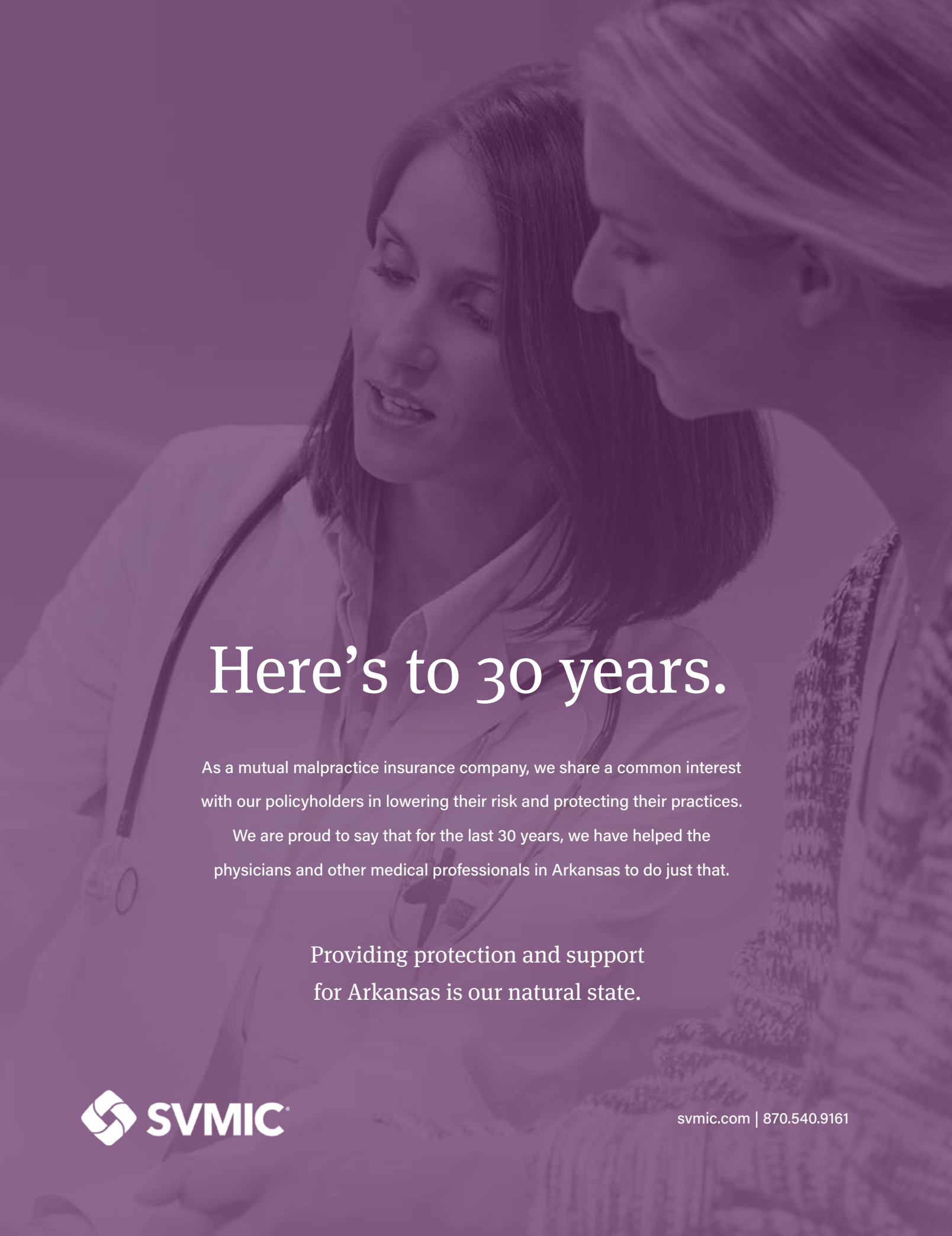

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