



# *Mississippi* Pharmacist

FALL 2024

QUARTERLY PUBLICATION OF THE  
MISSISSIPPI PHARMACISTS ASSOCIATION



*Advocating for the Profession of Pharmacy*



# TOGETHER, WE ARE STRONGER

THE NATIONAL ALLIANCE OF STATE PHARMACY ASSOCIATIONS ENHANCES THE SUCCESS OF STATE PHARMACY ASSOCIATIONS IN THEIR EFFORTS TO ADVANCE THE PROFESSION OF PHARMACY.

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# Mississippi Pharmacists Association

VOLUME XLIX. NO. 3 | FALL 2024 | Growing Stronger Together at MPhA

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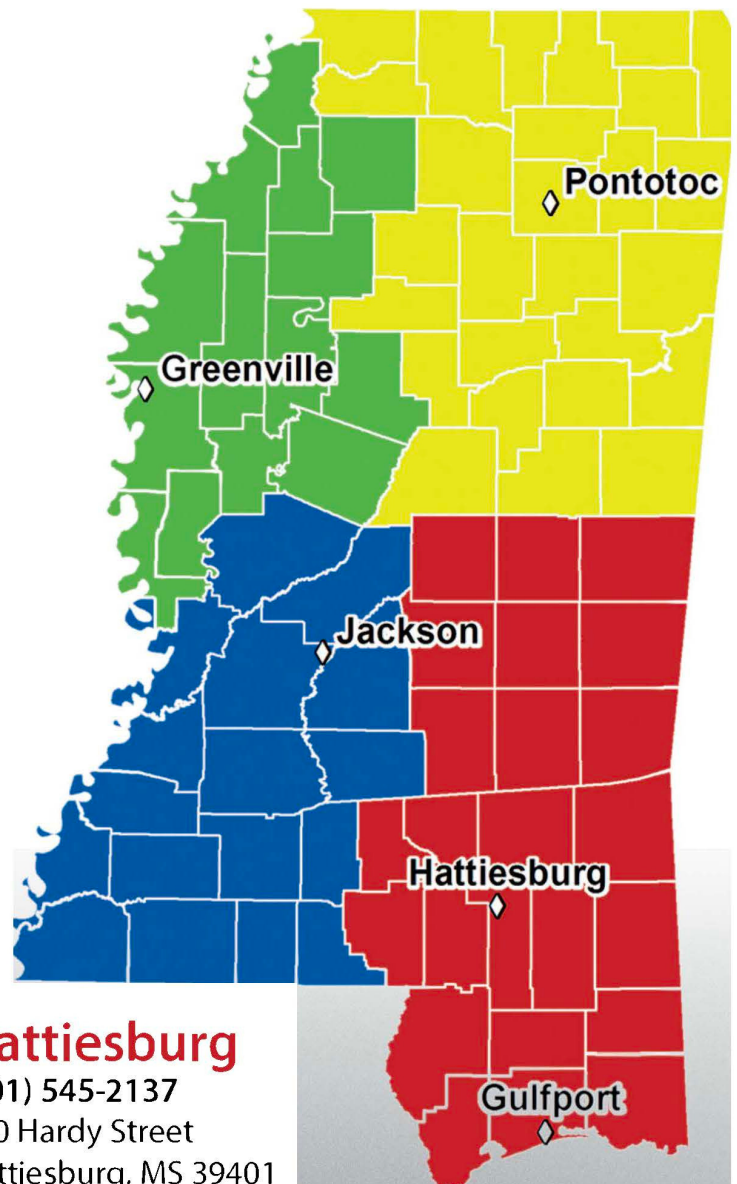
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Pontotoc, MS 38863

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700 Hardy Street  
Hattiesburg, MS 39401

## PRESIDENT'S MESSAGE

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*Members of the Mississippi Pharmacists Association (MPhA),*

*As I step into the position of Association President of MPhA, I am filled with immense pride and a deep sense of responsibility. It is an honor to serve an association that has played a key role in shaping the landscape of pharmacy in Mississippi. My pharmacy journey has been somewhat diverse and always enriching; therefore, I am eager to bring my experiences and insights to the Association and its members.*

### **My Journey in Pharmacy**

*My pharmacy experience started prior to graduation while working as a Pharmacy Intern at Walgreens. Then my career officially began with a Doctor of Pharmacy degree from the University of Mississippi School of Pharmacy in 2007. Over the years, I have held various roles that have equipped me with broad skills and knowledge. From serving as a Pharmacy Manager at Walgreens in Madison to my current position as a Vaccines Medical Science Liaison at GSK, my professional journey has been driven by a commitment to excellence and innovation.*

*At Walgreens, I had the privilege of leading clinical services and training programs, including serving as the Immunization Lead and Medication Therapy Management (MTM) Lead for the Area and/or Region. Additionally, my role as a PGY-1 Community-based Residency Program Director and Preceptor further honed my skills in mentoring and developing future pharmacy leaders.*

*In my current role at GSK, I engage in scientific dialogue with external experts and respond to medical information requests from healthcare providers in both the public and private health sectors across the state, with Walgreens nationwide, and with five national pharmacy associations. All of these positions have allowed me to stay at the forefront of medical advancements and contribute to the broader healthcare community.*

### **Attuned to the Pulse of Pharmacy and the Importance of Involvement**

*Being attuned to the pulse of pharmacy is crucial in our ever-evolving profession. It means staying informed about the latest developments, understanding the challenges we face, and being proactive in addressing them so that we may advocate effectively for ourselves, our profession, and the patients we serve. These are just a few reasons why involvement in professional organizations like MPhA is so vital. Getting involved creates a sense of community, and as I mentioned to several of you at the last MPhA Annual Convention, our strength lies in our unity. By building on our membership and fostering a welcoming environment, we can amplify our voice and advocate more effectively for the interests of pharmacists and patients alike.*

*Additionally, I believe continuing education is one of the cornerstones of professional growth. As an Education Committee Member and former Chair, I have always believed in providing our members high-quality, diverse, and relevant educational opportunities. These opportunities empower our members with the latest knowledge and skills necessary to deliver exceptional care. Is there something you want to know more about or a great speaker you want to suggest or hear again? Please let me know. All suggestions are welcome!*

### **Addressing Key Issues and A Vision for the Future**

*MPhA is working diligently to address critical issues such as Pharmacy Benefit Managers (PBMs), lower reimbursement rates, and provider status. These challenges affect our ability to provide quality care and practice at the top of our license and must be tackled head-on. By collaborating with stakeholders and policymakers, we can overcome these barriers and use our abilities to improve patient outcomes and access to care.*

*As we embark on this journey together, I am committed to helping advance the role of pharmacists as integral healthcare team members. Our profession has evolved significantly, and it is essential that we continue to expand our scope of practice and advocate for recognition and compensation. By doing so, we can make significant strides toward improving the health and well-being of all Mississippians.*

*In closing, thank you for your trust and support. I am excited to serve you all and lead our Association this year. Hopefully, together, we can achieve our shared vision for the future of pharmacy in Mississippi.*

*Kind regards,*

*Olivia Strain, PharmD*

*President, Mississippi Pharmacists Association*



# **SPF-Rx** Provider and Pharmacist

## **Education Sessions:**

- » Role of the Provider in Combating the Opioid Epidemic
- » Stigma and Substance Use Disorders
- » Utilizing SBIRT for Prevention, Identification and Treatment of Opioid and Substance Use Disorders
- » Motivational Interviewing
- » Current Opioid Prescribing Guidelines and Regulations
- » Treating Opioid Use Disorders in Pregnant and Parenting Persons
- » The Impact of Neonatal Abstinence Syndrome and Neonatal Opioid Withdrawal Syndrome
- » Substance Use in the Aging Population
- » Medications for Opioid Use Disorders
- » Opioid Update and Emerging Substance Use Threats in Mississippi

**For more information, contact  
Abby Winstead at [awinstead@msphi.org](mailto:awinstead@msphi.org)**

## EXECUTIVE DIRECTOR'S MESSAGE

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*Dear Members,*

*As we welcome fall, we enjoy football, crisp air, and leaves transformed into a vibrant tapestry of reds, oranges, and yellows. I enjoy seeing pumpkins and gourds dot the landscape heralding harvest time. Sweaters and scarves emerge as people embrace the chill, and the sound of crunching leaves underfoot adds to the seasonal ambiance, making fall a favorite time of year for many.*

*I engage with pharmacists every day as we work diligently to advance the profession of pharmacy. I commend each of our hard-working pharmacists across the state for their work and dedication to the profession.*

*October ushers in “American Pharmacist” month. For over 99 years, radio stations across the country broadcasted special programming for one consecutive week to highlight the pharmacy profession. This month, we celebrate pharmacists’ valuable contributions to healthcare and the pharmacy profession and their positive impact on our communities. We saluted our Pharmacy Technicians on Pharmacy Technician Day on October 15th. Our pharmacy technicians play a vital role in healthcare by supporting pharmacists and ensuring the safe and effective use of medication. Pharmacy technicians enhance the efficiency of pharmacy operations and contribute significantly to patient care allowing pharmacists to focus more on clinical roles and patient interactions.*

*MPhA has diligently advocated for the profession. We have had numerous meetings to stay abreast of current issues facing pharmacists, such as PBM, low reimbursement rates, and drug shortages.*

*I have enjoyed our students at the University of Mississippi School of Pharmacy and William Carey University. In September, we held an ice cream social for our New Practitioners. We had great participation at our Consultant Seminar in September. It’s always exciting to capture memories with our pharmacists, which adheres to the mission statement of MPhA, connecting our pharmacists.*

*I challenge you to be the voice for the profession of pharmacists. Let your Senator and HR know your concerns. MPhA wants you to be involved and engaged. Sign up for a committee and get involved.*

*I am grateful and humbled to be able to serve in this capacity as your Association’s Executive Director. I look forward to working with each of you as we elevate the pharmacy profession together.*

A handwritten signature in cursive script that reads "Mona Arnold-McBride".

**Mona Arnold-McBride, PharmD**  
*Executive Director*

# Mississippi Pharmacists Association

## 2024 Consultant Seminar



The Mississippi Pharmacists Association held their annual Consultant Seminar on Thursday, September 26, 2024, at the Horne Event Center in Ridgeland, Mississippi.

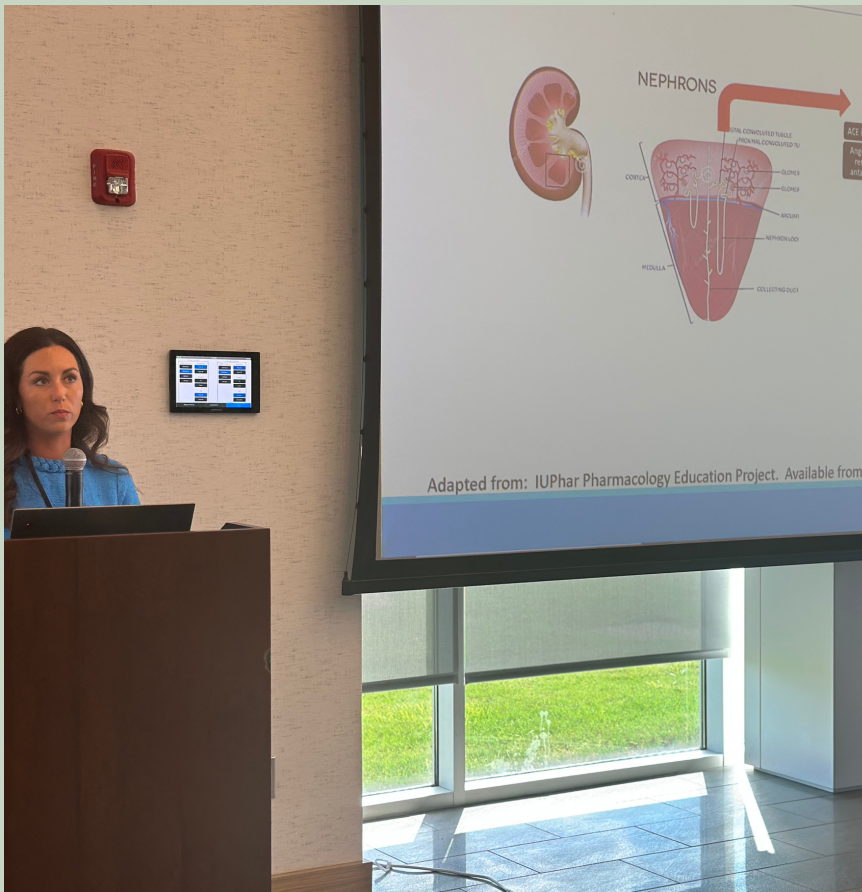
Our Education Committee did an amazing job bringing in speakers to engage the crowd and choose topics that were both relevant and informational to our attendees.

We would like to thank everyone that attended to make the day a huge success. A big thank you to Noble Health Services for providing food for the event.





# Consultant Seminar





# MEET OUR



## 2024-2025 Committee Chairs

### The Education Committee

*The Education Committee is a vital part of the Mississippi Pharmacists Association. With the growth we have experienced in the past few years, we have added additional events to our yearly schedule. The challenge of the Education Committee is presenting relevant topics, new ideas, and current updates to the pharmacy profession. The other challenge is finding speakers passionate about the topics they present. In addition to the events we have on our schedule each year, MPhA publishes a Quarterly Journal 4 times a year with continuing education.*

*This is the second term for the Education Committee Co-chairs. They have done a remarkable job, and our events have been positively impacted.*

*We welcome new members to the committee. If you have a passion for education and want to join the committee, please contact Lorean (“Lori”) Emory at [loleanemory@gmail.com](mailto:loleanemory@gmail.com), or Jennifer Duncan at [jenniferlongmireduncan@outlook.com](mailto:jenniferlongmireduncan@outlook.com).*



Lori Emory

Dr. Lori Emory is a native to Birmingham, Alabama, and a graduate of Auburn University. She completed a PGY-1 residency with the Mississippi State Department of Health where she now works as a clinical pharmacist. Lori is dedicated to providing excellent care to patients through an intensive MTM service offered by the Department of Health which she assists in continually improving and expanding. In addition to patient education, Lori also has a passion for pharmacy education, working closely with students, residents, pharmacy technicians, and pharmacists to promote an active learning environment in her career and across the state of Mississippi as a Co-Chair for MPhA’s Education Committee.



Jennifer Duncan

Jennifer L. Duncan, PharmD BCGP obtained her Doctor of Pharmacy Degree from the University of Tennessee. She has both clinical and operations experience in a variety of settings including community, hospital, mental health, managed care and long-term care. Her particular areas of interest are geriatrics, palliative care, disease management and Pharmacoeconomics.

Dr. Duncan has worked as a Consultant Pharmacist at every opportunity and is currently the General Manager at Omnicare of Jackson.

# The Membership Committee

*The Membership Committee focuses on member growth, retention, and increasing engagement. The committee will work with MPhA to assist in planning and implementing events for membership drives and to devise other ways to increase membership. At MPhA, we are committed to the profession of pharmacy. As we increase membership, we will have more to offer. MPhA supports all Mississippi pharmacists and all areas of pharmacy. We legally advocate for pharmacists by having a lobbyist and a pharmacist active in legislative endeavors. MPhA provides multiple continuing education opportunities, e.g., in-person and virtual events, creating a quarterly journal, Mississippi Pharmacist, and many more. MPhA is also great for connecting with other Mississippi pharmacists and students.*

*We welcome new members to the committee. If you are passionate about building and engaging members and want to join the committee, please contact Tia Holloway at [antoniayaholloway@gmail.com](mailto:antoniayaholloway@gmail.com) or Sophie Durham at [sophiemariedurham@gmail.com](mailto:sophiemariedurham@gmail.com), Co-Chairs of the Membership Committee.*



Tia Holloway

Dr. Antoniya "Tia" Holloway is a 2018 graduate of Jackson State University and a 2022 graduate of the University of Mississippi School of Pharmacy. Prior to pursuing pharmacy, Dr. Holloway knew that she wanted her legacy to fuse faith, healthcare, and community servitude, so she participated in several activities and organizations to help mold her into an empathetic and meticulous pharmacist. She completed a PGY1 Community-based Residency at Mississippi State Department of Health Pharmacy and was a 2022-2023 Fellow of the Mississippi Center for Health Policy. Currently, she supervises clinical development for federal grant programs within the Mississippi State Department of Health. She is an active member of the Magnolia State Pharmaceutical Society and Mississippi Public Health Association. Tia is a member of the Mississippi Pharmacists Association where she serves as Co-chair of the membership committee.



Sophie Durham

Originally from Germantown, Tennessee, Sophie graduated from the University of Mississippi with a Bachelor of Science in Pharmaceutical Sciences in 2019 and a Doctor of Pharmacy in 2022. Sophie completed a community-based post-graduate residency with an emphasis in public health at the Mississippi State Department of Health. After completing residency, Sophie was offered a position at the Mississippi State Department of Health and now serves at the Deputy Director of the Opioid & Substance Use Program at MSDH. Sophie is a member of the Mississippi Pharmacists Association where she serves as Co-chair of the membership committee.

# The Government Affairs Committee

*The Government Affairs Committee monitors legislation as it moves through our government. We work with legislators to initiate important legislation, mobilize our membership to speak to their representatives about important legislation, and serve as a source of information to educate officials on the impact that legislation could have on the pharmacy profession. We are the voice for Mississippi pharmacists in Congress and the Mississippi Legislature.*

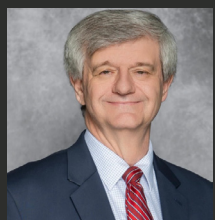
*We legally advocate for pharmacists by having a lobbyist and a pharmacist active in legislative endeavors. This is the second term for the Government Affairs Committee co-chairs. We also have a student, Lain Vitale, who serves as Vice-Chair of this committee.*

*We welcome new members to the committee. If you are passionate about legislation and want to join the committee, please contact Cliff Kelly at [ckelly4700@yahoo.com](mailto:ckelly4700@yahoo.com), Phil Ayers at [ayerspharm@gmail.com](mailto:ayerspharm@gmail.com), or Lain Vitale at [ecvitale@go.olemiss.edu](mailto:ecvitale@go.olemiss.edu).*



Cliff Kelly

Cliff Kelly has been a loyal member of MPhA and has served the Association in several other positions. He took over as Government Affairs Co-Chair during 2023-2024. In addition to being an active member of MPhA, Cliff owns C&C Drugs in Collins, Mississippi. He also serves as the Mayor of Mount Olive, Mississippi. He is a devoted fan of the University of Southern Mississippi. MPhA is proud to have him as a long standing member and to thank him for his willingness to serve not only MPhA but also his community.



Phil Ayers

Dr. Ayers received his Bachelor of Science and Doctor of Pharmacy degrees from the University of Mississippi. He is currently employed by Mississippi Baptist Medical Center in Jackson, MS. He is a clinical specialist in nutrition support and serves the Department of Pharmacy as Chief of Clinical Pharmacy Services. Dr. Ayers is also a Clinical Associate Professor with the School of Pharmacy, University of Mississippi.

Dr. Ayers is a past president of MPhA and served as Interim Executive Director in 2018. Phil's service to MPhA includes Foundation President, Chair of Government Affairs and Membership Committees. He has been a member of the Executive, Government Affairs, Membership, and Education Committees. Dr. Ayers is a past president of the Mississippi Society of Health-System Pharmacists (MSHP) and Mississippi Society for Parenteral and Enteral Nutrition (MSPEN).

As Immediate Past President, Phil serves the American Society for Parenteral and Enteral Nutrition (ASPEN) on the Board of Directors and is Past Chair of the ASPEN Parenteral Nutrition Safety Committee. He is also a member of the USP Compounding Committee and Past Chair of the USP Parenteral Nutrition Subcommittee. He previously served on the USP Healthcare Quality and Safety Committee and chaired the Parenteral Nutrition Expert Panel.



Lain Vitale

My name is Lain Vitale and I am a final-year student pharmacist at the University of Mississippi School of Pharmacy. I am from St. Louis, Missouri, and I am so excited to be the Vice Chair of the Government Affairs Committee this year! I look forward to actively contributing to MPhA's legislative and regulatory agenda, as well as meeting and working with all of you. Thank you for the opportunity to serve the Association!

## The Convention Committee

*The Convention Committee partners with the MPhA staff and the Education Committee to plan and execute our Annual Convention and Trade Show. The duties of the Convention Committee include but are not limited to the following: setting registration fees for members and non-members, setting registration fees for Exhibitors, and working with MPhA to determine the venue and city for the event. In addition, active committee members also volunteer during the Convention to ensure all Continuing Education sessions and activities have a liaison present.*

*We welcome new members to the committee. If you are passionate about planning events and want to join the committee, please contact Meagan Brown at [MBrown18@umc.edu](mailto:MBrown18@umc.edu). We are also looking for someone that would like to Co-Chair this committee. If interested, please contact Meagan as well.*



Meagan Brown

Dr. Meagan Brown is a Clinical Associate Professor in the Department of Pharmacy Practice at the University Of Mississippi School Of Pharmacy (Jackson Campus). She earned a Doctor of Pharmacy degree from Xavier University of Louisiana's College of Pharmacy in 2010. Upon graduation, Dr. Brown completed a PGY-1 Community-Based Pharmacy Practice Residency and joined the faculty. Her clinical practice site is a federally-qualified health center in rural Mississippi, where she provides clinical services to patients focused on cardiometabolic diseases. Additionally, she is the PGY-1 Community Pharmacy Residency Program Director and PGY-2 Ambulatory Care Preceptor. In the classroom, Dr. Brown's coursework is mainly focused on chronic disease, DEI-related topics, and rural health. Most recently, Dr. Brown has been appointed within the Center for Clinical and Translational Science as the Director of the Community/Population Research Unit.

She currently serves as the chair of the Diversity and Inclusion Standing Committee within the School of Pharmacy, past Annual Convention Planning Chair for the National Pharmaceutical Association (SNPhA's "mother" organization) and several committees with other national pharmacy organizations and state organizations. Her most recent honors include being recognized as the Mississippi Pharmacists Association's 2019 Distinguished Young Pharmacist, which highlights a pharmacist who displays a commitment to the profession and community through service and at the 2022 NPhA/SNPhA Annual Convention by the President of NPhA for distinguished service to the organization.

# The Awards Committee

*The Awards Committee facilitates the nominations and selection of awards. Also, the members of this committee evaluate and certify candidates for office. The Awards are handed out at Annual Convention during our Awards Luncheon.*

*We welcome nominations throughout the year. Information about the awards process and the individual awards are listed on our website. Please consider making nominations throughout the year so we will have a number of people to vet for the awards. The Chair of the Awards Committee is Wilma Wilbanks and she can be reached at [ima10sluvr@aol.com](mailto:ima10sluvr@aol.com)*



Wilma Johnson Wilbanks is a third-generation pharmacist and has been a proud member of MPhA since 1981. She won the Bowl of Hygeia in 1988 and was inducted into the MPhA Hall of Fame in 2019. Wilma is the chairman of the Mississippi Medicaid P and T Committee and is the current International President of Delta Gamma Fraternity. She is a past president of the National Association of Junior Auxiliaries and a certified parliamentarian. Wilma resides with her husband, Bob, in Cleveland, Miss.

Wilma Wilbanks

# The New Practitioner Committee

*The New Practitioner Committee supports the transition of recent graduates into real world practice, boost networking with practicing pharmacist in our state, and introduces the Association to new pharmacists. At MPhA, we seek to increase the participation and growth of our organization through the involvement of new graduates and young pharmacists.*

*In addition, the New Practitioner Committee sponsors events throughout the year like ice cream socials, bowling, to help introduce recent graduates to established pharmacists. They also assist with Mentorship groups and help with writing a CV. Every new graduate has the opportunity learn from practicing pharmacists.*

*We welcome new members to the committee. If you are passionate about mentoring new graduates and want to join the committee, please contact Chelsea Watts at [chelseadanielle54@gmail.com](mailto:chelseadanielle54@gmail.com). We are also looking for someone that would like to Co-Chair this committee. If you are interested, please contact Chelsea.*



Chelsea Watts

Chelsea Watts is a public health pharmacist at the Mississippi State Department of Health (MSDH). She graduated from Jackson State University with a Bachelor of Science in Chemistry and attended the University of Tennessee Health Science Center to obtain her Doctor of Pharmacy. While completing a PGY1 Community Based Pharmacy Residency at MSDH Pharmacy, Chelsea developed an interest in maternal and child health. She currently works with Healthy Moms/Healthy Babies of Mississippi to improve maternity and infant outcomes through pharmacy interventions.



*Mississippi*  
Pharmacists  
Association

*Mississippi Pharmacists Association is looking for people who are interested in getting involved in joining a committee.*

MPhA has many options regarding committee involvement. We have some amazing Chairs and Co-Chairs for each committee. With the exception of Awards, any committee that doesn't have a Co-Chair has a Co-Chair position available.

Our committees drive so much of our effort, and we need strong people to join them. Each committee addresses different topics relevant to MPhA business. We have the following committees needing good people: Education, New Practitioner, Membership, Government Affairs, and Convention.

If you are in a position to get involved and would like to join a committee, please email our office at [info@mspharm.org](mailto:info@mspharm.org), or you can call the office at (601) 981-0416.



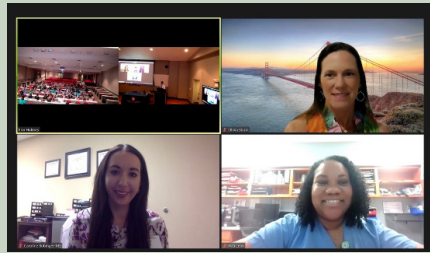


Mississippi  
**Pharmacists**  
Association

# Member News



Pictured left to right: Cliff Osbon, Daniel Schneider and Peyton Herring. Pictured here representing our profession at a statewide conference hosted by End it for Good from the Netflix Series “The Pharmacist.”



Pictures/screenshots from the 8/17 Ole Miss Student Panel on Association/Organization Involvement.

Also pictured, Caroline Bobinger, Kyla Leon and Mona Arnold-McBride



Lain Vitale had the opportunity to serve on the Ole Miss Pharmacy Dean’s Advisory Council and present on a panel discussing student engagement, leadership, advocacy, and organizations. It was truly an honor to tackle conversations about state and federally funded projects, state-level practice and advocacy, and curriculum and training recommendations among so many leaders she admires. She would like to thank Dean Donna Strum and Kris Harrell and the University for investing time and energy into improving their programs and initiatives to benefit staff, students and patients.

***Congratulation***  
**2024 NASP RON  
BOOKMAN MEMORIAL  
SCHOLARSHIP  
RECIPIENTS**

Ellie Doucet  
Kaitlin Jacobwith

**OleMiss** | School of  
**Pharmacy**



Congratulations to Griffin Sublett for starting a new position as a Staff Pharmacist at Walmart. Griffin graduated from the University of Mississippi School of Pharmacy in 2024.



It's American Pharmacist Month, and students at the University School of Pharmacy are out in the community showcasing one of the many roles of pharmacists. Students served in the LOU community at the More Than A Meal event, where they gave out flu shots to community members.



Congratulations Olivia Redmann

APhA announces 2024 Impacting Immunization Implementation Through Quality Improvement Grant Winners

The American Pharmacists Association (APhA) has selected four recipients of its 2024 Impacting Immunization Implementation Through Quality Improvement Grant, recognizing pharmacy residents who have developed continuous quality improvement (CQI) projects designed to positively impact immunization processes at pharmacy practice sites across the country. Olivia Redmann, PharmD, from The University of Mississippi School of Pharmacy in Jackson, MS was one of the winners.



Mona stopped by to visit with Cliff Kelly, owner of C & C Drugs in Collins, MS. They have gifts for all occasions whether it be wedding, baby or just a simple gift to say 'Thanks' or 'Thinking of you'. We can't wait to serve you! If you are in Collins, stop in and say hello!



MPhA would like to congratulate April Miller PharmD as she was promoted to a Program Manager with Mississippi Public Health Institute. Her new position primarily focuses on providing access to COVID-19 testing and vaccines as well as increasing access to telehealth services for victims of domestic violence to help improve safety and wellbeing outcomes for both survivors and children.

MSPHI partners with domestic violence shelters throughout Mississippi and is actively working on building meaningful partnerships between domestic violence programs and healthcare providers. These partnerships are vital in increasing health and behavioral health supports for domestic violence survivors and their children. Survivors have access to telehealth services for both general healthcare and psychiatric needs through a partnership with the UMMC Center for Telehealth. By increasing the availability and capacity of mobile health units and mobile advocacy services, they make it easier for survivors to access safe care and services when and where they need them most.

# Phi Lambda Sigma (PLS) Leadership Conference in Oxford



*Olivia Strain and Anna Touchstone presenting at the Phi Lambda Sigma (PLS) Leadership Conference in Oxford, MS*

## New Practitioner Ice Cream Social



# I am trekking to the Summit of Mount Kenya for Save the Children and Amref Health Africa

Every penny raised will be matched by GSK. Follow and support my journey here: #TrekForHealth2025



Hi! I hope this letter finds you happy & healthy! I am writing to share some exciting news and a request for your support. I am honored to have been selected as one of 40 GSK and ViiV employees from across 20 countries to take part in Orange United's Trek for Health. This 10-day challenge in February 2025 involves trekking to the summit of Mount Kenya and taking part in a community program visit in a local village. Our team goal is to raise over £160,000 for Save the Children (STC) and Amref Health Africa (AHA), and GSK has generously pledged to match all donations!

GSK's mission is to improve global health and the quality of human life by enabling people to do more, feel better, and live longer. Their collaboration with AHA and STC has already made significant strides in achieving this mission. These organizations work tirelessly to provide essential healthcare services, improve maternal and child health, ensure access to clean water and sanitation, and develop sustainable health systems in some of the most challenging environments. My personal fundraising goal is \$5,100, and with your help, I am confident I can reach it. GSK is covering the cost of my trip which means that every penny raised will be matched by GSK then go directly to STC and AHA, making your support not just a donation but a lifeline to those in need.

## **\*\*My Personal Journey\*\***

As you all know, I am a pharmacist by training and a wife, mom, daughter, and sister by the grace of God. I have always been blessed with good health and easy access to proper medical care and nutrition. For years, I have felt a calling to participate in medical missions, but busy schedules always seemed to get in the way. Then when I was training for an Ironman 70.3 in 2021, I started repeating the mantra of "no excuses" for myself and it has carried over to our everyday family life. Now, it is time to live out this motto by giving not only my resources but also my time, effort, and self. This trek allows me to practice what I preach and lead by example. I want to show my daughters the importance of serving others, from our neighbors to the vulnerable populations of Kenya. This journey will be a testament to dedication, sacrifice, and love for others, even those we cannot see directly in front of us. My kiddos are now old enough to understand the importance of this mission. Chandler and the girls have always been the biggest supporters (and occasional training partners) of my endurance events, so I know this will be a special journey for us all.

My family and I are committed to making a difference, and we believe that together, we can achieve incredible things, so I humbly ask for your support in this endeavor. Every donation, no matter the size, brings the team closer to our goal and makes a tangible difference in the lives of those we aim to help. Please join me in this mission to provide health, hope, and a brighter future for the children and families of Kenya.

Thank you for your generosity and support. To donate, visit [Olivia Strain - Fundraising for Trek for Health 2025 run by GSK - Save the Children partnership](#).

With heartfelt gratitude,

*Olivia*

# Student Spotlight



*My name is Tyler Fuller, and I am currently a fourth-year pharmacy student at the University of Mississippi School of Pharmacy in Clinton, Mississippi. I have been passionate about pharmacy ever since witnessing a pharmacist's profound impact on my mother's health. Given that she was already established on multiple medications, she had concerns about potential interactions with several new medications being added to her regimen. However, the pharmacist took the time to patiently explain the effects of the new medications and how they would not interact with the existing ones. This not only reassured my mother but also gave me a glimpse of pharmacists' crucial role and expertise in ensuring positive patient outcomes. This experience solidified my determination to pursue a career in pharmacy.*

*Upon completing my Doctorate of Pharmacy in May 2025, I aim to make a meaningful and lasting contribution to the well-being of those under my care. While I may currently be uncertain about the specific career path I intend to pursue, I am deeply committed to leveraging my expertise to positively impact the lives of my future patients, whether that entails working in clinical pharmacy, research, academia, or the retail setting.*

*During my time as a student, I actively participated in several student organizations, dedicating my time to the Student National Pharmaceutical Association (SNPhA), the American Pharmacists Association-Academy of Student Pharmacists (APhA-ASP), and the Kappa Psi Pharmaceutical Fraternity. My involvement extended to taking up the role of secretary for Kappa Psi and serving as the elections chair for the Student Body during my time in Oxford. In addition to my organization engagement, I was selected by student body officers to be among one of the P4 Jackson Free Clinic Coordinators due to my realized passion for volunteering upon the transition to Jackson.*

*My name is Ian McVeay, and I am a fourth-year pharmacy student at the University of Mississippi School of Pharmacy. Originally from Gautier, Mississippi, I earned my Bachelor of Science in Pharmaceutical Sciences, with a minor in Business, from the University of Mississippi in 2022. In May 2025, I will graduate with my Doctor of Pharmacy and a Master of Business Administration, preparing me for a diverse career at the intersection of pharmacy and business.*

*Throughout my time in pharmacy school, I've had the privilege of joining several impactful organizations, including Phi Delta Chi, AMCP, APhA, and PediaRebs. From the very beginning of my pharmacy journey, these groups have enriched my experience and contributed to my professional growth. In addition to my involvement in these organizations, I've also had the honor of serving as the official tutor for two different pharmacy courses. The combination of leadership roles, organizational involvement, and diverse work and rotation experiences has equipped me with the skills needed to excel as a future pharmacist.*

*After graduating in the Spring of 2025, I plan to pursue a residency in Managed Care pharmacy. My goal is to take advantage of my expertise in both pharmacy and business to enhance patient care while ensuring cost-effective solutions. I am excited about the opportunities that lie ahead and look forward to making a meaningful impact on patients' lives through innovative, value-driven care.*





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- Home delivery tips
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  - Avoid leaving medications in the mailbox or at the door without evidence of delivery (geotagged photos from pharmacy staff are typically insufficient)
  - Avoid “automatic refills” and instead implement a “medication synchronization” program that includes a telephone check-in prior to medication billing and delivery to ensure that patient is still alive, living at same address, has not been hospitalized since last delivery (or had medication therapy changes), and to confirm the needed medications prior to scheduled delivery date
  - Collect payment at the time of delivery, or implement a robust accounts receivable (“house charge”) process
- Facility delivery tips
  - Coordinate with LTC facilities to understand if Medicare patients are in a “Part A” versus a “Private Pay” status as this will dictate whether pharmacy is to bill the facility (if Part A) or Medicare Part D (if private pay)
    - Develop written agreements in place that require facility cooperation with retroactive billing changes such as when claims are accidentally billed to Medicare Part D and then subsequently adjusted due to Part A status
  - Pre-printed dates on delivery manifests are insufficient, receiving individuals should handwrite the date received
- For additional insight on house charge accounts and copay collection, contact PAAS (608) 873-1342

By Trenton Thiede, PharmD, MBA, President at PAAS National®, expert third party audit assistance, FWA/HIPAA and USP 800 compliance.

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# CONTINUING EDUCATION

## Tick-Borne Illness

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### OBJECTIVES

By the end of this program, the participant will be able to:

1. Provide proper tick removal techniques
  2. Recall the symptomatology and treatment of Lymes disease, Rocky Mountain Spotted Fever, Southern Tick Associated Rash Illness, and Human Monocytic Ehrlichiosis
  3. Provide strategies for prevention of tick-borne illnesses
  4. Recognize the pharmacists' role in tick-borne illnesses
- 

### Overview

Tick-borne illnesses have been recognized as a threat to humans in the United States for over a century. Over the years, tick species and tick-borne pathogens have evolved and evaded our efforts to decrease their impact on human health. As of 2022, tick-borne illnesses made up 75% of all vector-borne illnesses.<sup>1</sup> The increased number of infections shows a continued need for improvements in prevention and treatment.

Tick-borne illnesses can result in serious infections that can be chronic and life-threatening. The early stages of tick-borne infections typically look the same and present with flu-like symptoms; these symptoms include fever, chills, aches, pains, and a rash where the bite is. The severity and extent of the symptoms will vary based on the tick that transmitted the bacterium, as well as the microorganism involved. To determine if there is an infection from a tick bite, first consider the geographical location in which the bite occurred and then consider the specific symptoms. If a tick has been attached for over 24 hours or the patient starts to experience flu-like symptoms, they should contact their provider. Additional lab tests will then be done to determine if an infection is present, what type of infection is present, and whether treatment is needed or not.

The CDC identified at least 20 infections transmitted by ticks.<sup>2</sup> We have narrowed down the twenty infections to four of the most common tick-

borne illnesses. These infections are Lyme disease, Rocky Mountain Spotted Fever, Southern Tick Associated Rash Illness, and Human Monocytic Ehrlichiosis. This article will review a few of these infections including their epidemiology, diagnostics signs and symptoms, treatments, and recent guideline updates.

### Selected tick-borne illnesses

#### Lyme Disease:

Lyme disease is the most common systemic vector-borne disease in the United States. It is caused by the spirochete *Borrelia burgdorferi* which is transmitted through infected *Ixodes scapularis* ticks, also known as black-legged ticks.<sup>3</sup> According to the CDC, approximately 476,000 people were diagnosed with Lyme disease in the year of 2022; none of which were reported from Mississippi.<sup>4</sup> Lyme disease is most prevalent around the East Coast, the Great Lakes, and the Pacific Northwest. From April to July the immature ticks (nymphs) are more active and from early Spring to Fall, the adults are more active. Once a tick has bitten a host, it takes approximately 36 to 48 hours before the bacteria can be transmitted. If the host removes the tick within 24 hours of the bite, the chances of contracting Lyme disease diminish greatly.

Symptoms of Lyme disease appear in two phases. The early phase includes flu-like symptoms such as chills, fever, headache, fatigue, and muscle aches, as well as an expanding red rash called “erythema migrans” (EM). If someone has been bitten and does

not develop the rash, it does not mean that they still will not contract Lyme disease; one in five patients that get Lyme disease never develop EM. Early phase symptoms will appear about three to thirty days after the tick bite while late phase symptoms appear months after. In the later stage, symptoms which involve the musculoskeletal system, the nervous system, and the heart start to worsen. Patients with severe cases may experience signs of facial palsy, intermittent pain in tendons, heart palpitations, nerve pain, joint pain, additional rashes appearing, or severe head and neck stiffness. The later symptoms can be irreversible if treatment is delayed too long.<sup>5</sup>

Treatment of Lyme disease depends on how severe the infection is and when it is diagnosed. Due to the severity of the long-term effects of the disease, prophylactic measures are recommended in specific patients to avoid the risk of infection. According to the Infectious Disease Society of America (IDSA), patients that are high-risk for Lyme disease should receive prophylactic antibiotics if they have identified and removed a tick within 72 hours.<sup>4</sup> To be considered a high-risk patient, the tick must have attached in an endemic region, remained attached for over 36 hours, and be identified as a *Ixodes scapularis* vector species. The prophylactic regimen is a single dose of doxycycline 200 mg taken by mouth for adults and 4.4 mg/kg given (max of 200 mg) in one dose by mouth for children.

The recommended treatments for Lyme disease are based on the four most serious manifestations of Lyme disease: erythema migrans, neurologic Lyme disease, Lyme carditis, and Lyme arthritis.<sup>6</sup>

**Erythema Migrans:** Patients with evident an erythema migrans rash should receive oral doses of doxycycline 100 mg daily with amoxicillin 500 mg three times daily or cefuroxime 500 mg twice daily. If patients cannot tolerate beta-lactam antibiotics, azithromycin may be considered as an alternative. Doxycycline should be given for a 10-day course, beta-lactam antibiotics should be given for a fourteen day course, and azithromycin should be given for 7 days.

**Neurologic diseases:** Patients that present with peripheral nervous system or central nervous system disorders and have positive antibodies for Lyme disease should receive oral doxycycline 100 mg for 14 to 21 days. If the patient cannot take doxycycline, then intravenous (IV) ceftriaxone, cefotaxime, or penicillin G may be considered.

**Lyme Arthritis:** Patients that are receiving their initial treatment for Lyme arthritis should receive oral doxycycline 100 mg for 28 days. If the initial course of antibiotics does not resolve the arthritis, then an additional oral or IV antibiotic course may be considered.

**Lyme Carditis:** Patients that are hospitalized for

Lyme carditis should receive IV ceftriaxone 2 grams once daily until AV block is resolved and PR interval is less than 300 msec. Patients that have a mild to moderate case and do not require hospitalization can be given oral doxycycline 100 mg twice daily for 14 to 21 days.

The 2020 update to the IDSA guideline includes the use of prophylactic treatment for high-risk patients, treating patients presenting with erythema migrans, and not routinely testing for Lyme disease in specific patient populations due to a lack of benefit. This patient population includes those with neurological presentations, psychiatric illnesses, myocarditis/pericarditis, or chronic cardiomyopathy, as there has not been a causal association established between Lyme disease and these conditions or presenting symptoms.<sup>6</sup>

### **Rocky Mountain Spotted Fever:**

Rocky Mountain Spotted Fever (RMSF) is caused by *Rickettsia rickettsii* which is historically carried by several species of ticks including the brown dog tick, Rocky Mountain dog tick, and the most common carrier in Mississippi, the American dog tick.<sup>7</sup> Since 2010, RMSF cases have been placed in a new category called Spotted Fever Rickettsiosis, which includes four related diseases carried by these ticks. In 2017, cases of RMSF peaked at about 6,000, but have been decreasing, with a drastic fall between 2020 and 2021 likely due to the COVID-19 pandemic.<sup>8</sup> In Mississippi, up to 100 cases are reported each year.<sup>7</sup>

If left untreated, up to 25% of RMSF cases will end in fatalities, but the use of antibiotics will lower this percentage to around 4%. Most of these infections take place during the months of April to October because this is when ticks normally are active, however, infection can happen at any time of the year. Mississippi has an RMSF rate of over 4.77 per one million people in one year, one of the highest rates in the United States. Statistics show that men and people 40 years and older are more timely to develop the disease, however, the most deaths due to RMSF occur in children 10 years old or less. Notably, people with a deficiency in the glucose-6-phosphate dehydrogenase (G6PD) enzyme will have a higher likelihood of experiencing a more severe illness.<sup>8</sup> RMSF has an incubation period of 3 to 12 days and manifests as a few vague symptoms. Early disease signs and symptoms may include a headache, fever, fatigue, myalgia, abdominal pain, anorexia, and a rash in most cases.<sup>7</sup> The rash associated with RMSF usually shows up around 2 to 4 days after the presentation of a fever and is characterized early on as small, flat macules that spreads from the ankles and wrist, to the trunk of the body. This maculopapular rash can then evolve into a

petechial rash, which can mean progression to severe disease.<sup>9</sup> Ninety percent of patients with RMSF will develop this rash, but many do not see signs of it until at least three days into the infection, so it is important to consider diagnosis from other signs and symptoms that may be present.<sup>8</sup> The late stages of this illness can cause symptoms like meningoencephalitis, acute renal failures, acute respiratory distress syndrome, necrosis, arrhythmia, and seizure.<sup>9</sup> These symptoms can also be accompanied by lab work showing thrombocytopenia, elevated hepatic transaminases, and hyponatremia. RMSF can become fatal within a few days if treatment is not immediately started upon suspicion.<sup>8</sup>

The treatment of choice for most patients, including children and pregnant women, is doxycycline.<sup>9</sup> The recommended regimen of doxycycline includes taking 100 mg twice daily for a minimum duration of 5 to 7 days.<sup>8</sup> For children under 45 kg, doxycycline should be given as 2.2 mg/kg twice daily. A concern that some healthcare professionals may have about the use of doxycycline in children include the discoloration of their teeth, but one study showed that a short term course of doxycycline had no effect on the coloration of children's teeth.<sup>10</sup> If doxycycline cannot be used, the only alternative medication is chloramphenicol, although it has been shown that use of any other medication besides doxycycline results in an increased risk of death.<sup>8</sup> Prophylactic antibiotic treatment is not recommended in the management of RMSF.

RMSF is a common and easily treated disease state, it can be fatal without proper diagnosis or treatment. It is important to be aware of signs and symptoms, as well as the patient's history of potential exposure in order to identify and treat this infection as soon as possible.

### **Southern Tick Associated Rash Illness:**

Lone Star ticks, *Amblyomma americanum*, have become more prevalent over the past few decades. These ticks transmit multiple illnesses, one of them being Southern Tick Associated Rash Illness (STARI). STARI presents as a bullseye rash around the area of a Lone Star tick bite.<sup>11</sup> They are found throughout the Eastern, Southeastern and South-Central states.<sup>12</sup> The University of Mississippi Medical Center published an article stating that Lone Stars are among the most common tick types in Mississippi.<sup>13</sup> Because this tick-borne illness is so close to home, Mississippians must stay vigilant when it comes to getting bitten by the Lone Star tick.

With STARI's red and expanding bullseye lesions, the illness can sometimes be confused with early onset Lyme disease. It is important to note that the saliva from Lone Star ticks can be irritating, but redness and discomfort at a bite site does not necessarily indicate

an infection.<sup>12</sup> The rash usually appears within 7 days of tick bite and expands to a diameter of 8 centimeters (3 inches) or more. The rash should also not be confused with much smaller areas of redness and discomfort that can occur commonly at the site of any tick bite. Symptoms include fatigue, headache, fever, and muscle pains. Unlike Lyme disease, STARI is less likely to result in neck stiffness, arthralgia, and regional lymphadenopathy.<sup>14</sup> STARI is diagnosed on the basis of symptoms, geographic location, and presence of tick bite. Since the cause of STARI itself is unknown, no diagnostic blood tests have been developed.<sup>11</sup>

This tick-borne illness may resemble early phase Lyme disease and providers may choose to treat with doxycycline. However, it is not known whether antibiotic treatment is necessary or beneficial for patients with STARI.<sup>12,14</sup>

### **Human Monocytic Ehrlichiosis:**

Human monocytic ehrlichiosis (HME) is most commonly caused by the bacteria *Ehrlichia chaffeensis* and up until the 1980s was only seen in animals. *Ehrlichia chaffeensis* is transmitted by the Lone Star tick found in the South-Central region of the United States. About 500 cases are reported each year with the most cases occurring in the summer months.<sup>15</sup> HME infections are set apart from the other tick-borne illnesses because of the population that is most affected by the tick. According to the CDC, the majority of the reported cases occurred in people aged 60 to 69 years old. Cases can also occur in young children, HIV patients, or patients that are immunocompromised.

Symptoms will start to appear one to two weeks after the patient is infected, and will include rash, fever, chills, headache, nausea, or vomiting.<sup>15</sup> While the majority of the cases of HME are uncomplicated and do not cause severe illness, about 40% of cases do require hospitalizations and about 2% are fatal. This is not an illness that can be ignored to resolve on its own and should be taken seriously. If treatment is delayed, patients can have coagulopathy, adult respiratory distress syndrome, as well as central nervous system manifestations which can lead to coma and potentially death. When patients present with symptoms that suggest a diagnosis of HME, a polymerase chain reaction test should be done to confirm the diagnosis. Once HME is confirmed, the recommended treatment is doxycycline 100 mg by mouth twice daily for 10 days.<sup>16</sup>

### **Alpha-gal Syndrome**

Not all illnesses associated with tick bites are the result of the transmission of microorganisms. An example of one of these exceptions is Alpha-gal syndrome (AGS). AGS appears to be an allergic reaction resulting from the transmission of alpha gal,

a specific sugar molecule, from the tick to the victim. When the victim is exposed to alpha-gal, also known as galactose- $\alpha$ -1,3-galactose, an allergic reaction occurs. Alpha-gal is found in relatively high amounts in mammalian meats such as beef, pork, and lamb, and it can even be found in game meats such as venison or hare. According to the CDC, more than 110,000 suspected cases of AGS were identified between 2010 and 2022, but since AGS is not a nationally notifiable disease, this number is likely an underestimate.<sup>17</sup> This could be partially due to the fact that 42% of healthcare professionals surveyed for a study conducted by the CDC were not aware of AGS, and did not feel confident in their ability to diagnose it or manage its treatment.<sup>18</sup>

In the United States, AGS seems to be mostly associated with the Lone Star tick, though other types of tick have not been ruled out. Not surprisingly, most cases are reported in the South, East, and Central states, which are the areas Lone Star ticks are most commonly found. Symptoms of AGS typically appear 2 to 6 hours after exposure to alpha-gal containing products, however they are not necessarily seen after each exposure. These symptoms can range from hives to facial or throat swelling and potentially even an anaphylactic reaction. If diagnosed, the best way to manage AGS is to avoid foods or other products containing alpha gal.<sup>17</sup>

### **Tick Paralysis**

A rare but severe manifestation that may occur with tick-borne illnesses is paralysis, which occurs when female ticks release a salivary neurotoxin that reaches the bloodstream of the host and causes the loss of muscle function. Tick paralysis will start in the lower body and slowly ascend to the top of the body.<sup>19</sup> Symptoms of tick paralysis include flu-like symptoms, unsteady gait, weakness in the lower limbs, and difficulty breathing. The clinical findings can be confused with Guillain-Barré syndrome, so it is important for practitioners to consider a tick-borne infection in their differential diagnosis.<sup>20</sup> A study conducted in Mississippi found that of 26 children that presented with symptoms similar to Guillain-Barré, 6 of these patients actually had tick paralysis due to an undiscovered tick.<sup>21</sup> If tick paralysis is left untreated, it could lead to respiratory failure and death. The treatment for tick associated paralysis is simply removing the tick. Once the tick is removed, the patient is expected to make a full recovery.<sup>19</sup>

### **Prevention**

The prevention of tick bites is the first step and the best way to combat tick-borne diseases. Listed below are strategies to consider when trying to avoid being bitten.

**Knowing where ticks typically reside:** Ticks prefer to occupy areas with lots of tall grass, brush, bushes, and trees. They tend to be closer to the ground where it is warm and moist. They are also capable of living in

more developed locations like backyards or parks.<sup>22</sup>

**Utilizing insect repellent:** The United States Environmental Protection Agency (EPA) has a list of chemicals that are approved to be the main ingredient in tick repellents. These chemicals include DEET, picaridin, IR3535, Oil of Lemon Eucalyptus (OLE), para-menthane-diol (PMD), and 2-undecanone. These repellents work to keep ticks from getting onto the skin.<sup>23</sup>

**Avoiding contact:** Some methods to avoid interactions with ticks include steering clear of areas that ticks are known to occupy and wearing long shirts and pants to ensure the least amount of exposed skin. Also, permethrin-impregnated clothing has demonstrated a reduction of tick infestation.<sup>24</sup>

**Check for ticks upon coming inside:** Even if all of the measures above have been implemented, there is still a possibility of harboring a tick somewhere on the body. It is essential to check all parts of yourself for these pests after coming inside from an outdoor activity. Be sure to examine the locations that ticks are known to want to live including under the arms, in and around the ears, inside belly button, back of the knees, in and around the hair, between the legs, and around the waist.<sup>24</sup>

It is important to follow these steps each time you visit a location with the potential of sheltering ticks. Even if a tick is found attached to the body, the diseases that they carry can still be avoided if they are removed from the skin as soon as they are discovered. There are many tools, methods, and at-home remedies to remove ticks, but simple tweezer removal is the most effective way to prevent infection. According to the CDC, it is recommended to use a clean pair of fine-tipped tweezers. To remove the tick, grasp it with the tweezers as close to the skin as possible and pull upward. When pulling the tick, refrain from twisting or jerking the tweezers, as this may cause the tick to be ripped apart and may leave parts of it in the skin. After removal, wash the wound with soap and water. To dispose of the tick, flush it down the toilet, put it in alcohol, or place it in a sealed container. Try not to make contact between your skin and the tick when disposing of it.<sup>25</sup>

### **Role of the Pharmacist**

Pharmacists are the most accessible healthcare provider to the community, however, we are often underutilized.<sup>26</sup> When a person experiences some sort of bite, or recognizes they are not feeling well, they often turn to their local pharmacist while picking up their usual prescriptions. Pharmacists are well-equipped to direct patients to the appropriate over-the-counter medications that are conveniently within the pharmacy. Pharmacists can provide guidance in selecting insect repellants, treating symptoms, and

recognizing when someone needs further evaluation from another healthcare professional.

Pharmacists hold a unique position in a patient's healthcare because they are accessible both in person and via phone call. For example, if a patient suspects they have been bitten by a tick, calls their pharmacist, and describes a red rash that has grown in size, the pharmacist is able to recognize that they may need to seek further evaluation from a provider, as it may be a sign of Lyme disease or STARI. By utilizing pharmacists, especially with phone calls, the patient can go straight to a provider and be treated in a timely manner.

Additionally, patients may mention to the pharmacist that they are traveling somewhere that the pharmacist recognizes has a high rate of tick-borne illnesses. Pharmacists are able to provide tick bite prevention strategies to patients, as well as what to do when the person suspects they have been bitten by a tick. Pharmacists play a key role in preventing illness, identifying signs and symptoms of tick illnesses, and providing education to patients when needed.

For instance, a bullseye rash (i.e. erythema migrans) is a common manifestation of both Lyme disease and STARI, so it is important for clinicians to gather more background information to differentiate between the two. If the patient visited the northeast, we may be more worried about Lyme disease and could start prophylactic treatment. On the other hand, if they were bitten in more southern states, we would be clued into the possibility of STARI, and could watch the rash for changes. By identifying factors such as this, we have the opportunity to differentiate tick-borne illnesses earlier and treat the patient more appropriately.

The most common and most deadly tick-borne illness is Lyme disease. As mentioned earlier, most of the cases appear in the northwest during the spring and summer months. Lyme disease manifests in four different forms: erythema migrans, neurologic Lyme disease, Lyme carditis, and Lyme arthritis. The treatment of Lyme disease is based on the specific manifestation and differs between each group. The Lyme disease treatment guidelines from Infectious Disease Society of America were updated in November 2020 and included three main updates. The points were that high risk patients should receive prophylactic treatment, patients with erythema migrans should receive treatment, and that routine testing of Lyme disease is not beneficial in specific populations that present with similar symptoms of Lyme disease.

RMSF is one of the most common tick-associated infections in Mississippi. Diagnosis may be difficult

because of the similarity in symptoms to other tick-borne illnesses, but identifying and treating this condition early will lead to a major decrease in the severity of its symptoms and associated fatalities.

While STARI may initially present with similar physical symptoms as Lyme disease, recall that a STARI diagnosis is based on symptoms, geographical location, and presence of a tick bite. STARI typically resolves on its own, so correctly identifying this illness can protect patients from receiving incorrect treatment. The issue with STARI is the fact that its cause is still unknown, and thus diagnostic markers cannot be properly studied. Future research could provide the medical world with these answers.

HME is set apart from the other tick-borne illnesses because it affects vulnerable populations. It is most commonly seen in the South-Central region of the United States. The older adult population should be wary when traveling in this region and should take preventative measures for tick bites. The same tick that causes STARI, the Lone Star tick, also transmits HME. While this illness is not the deadliest it is one that will not resolve on its own. If patients suspect they have HME they should seek further medical attention.

Over the years, the incidence and severity of tick-borne illnesses have increased. Healthcare professionals should remain well educated in identifying and treating these potentially fatal illnesses, as well as actively educating patients on prevention and when to seek further medical attention. The role of the pharmacist in preventing and treating tick-borne illnesses should not be overlooked by patients or pharmacists themselves; it is important they stay vigilant in keeping themselves up to date on recent guideline changes and new treatment options.

## **Conclusion**

Tick-borne illnesses are extremely prevalent in the United States, especially in our own state of Mississippi. While they are small, tick bites can pack a mighty, and sometimes deadly, punch. It is important for clinicians to recognize the similarities and differences between these disease states. The first step to avoiding a tick-borne illness is the prevention of a tick bite. However, in the event that a patient is bitten, early discovery, removal, diagnosis, and treatment will lead to the most desirable outcomes.

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# CONTINUING EDUCATION ARTICLE QUESTIONS

CE Approval #008-021-024-002 for 1.5 clock hours. CE Credits can be claimed through October 1, 2025

## Tick-Borne Illness

Instructions: After reading the continuing education article, quizzes can be taken at [mississippi pharmacist.org](http://mississippi pharmacist.org) or detach this page. A grade of 70% or better is required to earn 2.0 hours of continuing education credit. This is a free service for MPhA members.

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Name \_\_\_\_\_

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1. Of the following, which is the most effective method to remove a tick?
  - a) Burn the tick head
  - b) Apply petroleum jelly to the tick to loosen it before removing
  - c) Pull the tick with your fingers in a twisting motion
  - d) Pull the tick straight upward with tweezers
2. Which of the following is true of Tick paralysis?
  - a) Tick paralysis is nonreversible
  - b) Tick paralysis occurs from female tick bites
  - c) Tick paralysis causes Guillain barre syndrome
  - d) Tick paralysis will resolve on its own
3. Of the following, which is the most common systemic vector-borne disease?
  - a) Lyme disease
  - b) Rocky Mountain Spotted Fever
  - c) Southern Tick Associated Rash Illness
  - d) Human Monocytic Ehrlichiosis
4. Which of the following is not one of the recent updates to the Infectious Disease Society of America guidelines for Lyme disease?
  - a) Patients with cardiomyopathy should not be routinely screened for Lyme disease
  - b) Patients with erythema migrans rash should initiate treatment
  - c) Patients that present with neurologic presentations should be routinely screened for Lyme disease
  - d) Patients that are considered high-risk should receive prophylactic treatment if there is suspicion of disease
5. Which tick is the most common vector of RMSF in Mississippi?
  - a) Lone Star tick
  - b) American dog tick
  - c) Brown dog tick
  - d) Rocky Mountain dog tick
6. Which deficiency is associated with a more severe illness of RMSF?
  - a) Glucose-6-phosphate dehydrogenase
  - b) Vitamin C
  - c) Thyroid hormone
  - d) Phosphoglycerate kinase
7. Of the following, which lab abnormality is NOT expected to be associated with an RMSF infection?
  - a) Hyponatremia
  - b) Thrombocytopenia
  - c) Elevated hepatic transaminases
  - d) Hyperglycemia
8. What is the scientific name of the Lone Star tick?
  - a) *Rhipicephalus sanguineus*
  - b) *Dermacentor variabilis*
  - c) *Amblyomma americanum*
  - d) *Ixodes scapularis*
9. Which other tick-borne illness has a similar rash presentation to STARI?
  - a) Lyme disease
  - b) HME
  - c) RMSF
  - d) Babesiosis



10. During which season are cases of human monocytic ehrlichiosis most commonly seen?
- Spring
  - Summer
  - Fall
  - Winter
11. Of the following, which population does the human monocytic ehrlichiosis virus most commonly infect?
- Elderly
  - Infants
  - Middle aged
  - Men
12. Which statement is false regarding the correlation of contracting tick-borne illnesses and rash formations?
- If a patient does not have a rash, then they will not contract the disease.
  - A rash may take days to form so patients should stay consistent with monitoring themselves if they have had a recent tick bite.
  - The rash, by itself, is not enough to differentiate among tick-borne illnesses.
  - Treatment may be indicated based on other signs and symptoms, even if a rash is not present
13. Which of the following is not an approved ingredient in insect repellent?
- DEET
  - Xylitol
  - IR3535
  - Oil of Lemon Eucalyptus
14. Of the following, which antibiotic is most frequently used in the treatment of tick-borne illnesses?
- Azithromycin
  - Ciprofloxacin
  - Doxycycline
  - Cefepime
15. The role of the pharmacist when managing patients with tick-borne illnesses includes all of the following except:
- Prescribing antibiotics when they suspect a tick-borne illness
  - Advising patients on when to seek medical attention from their provider
  - Recommend over-the-counter products to help prevent tick bites
  - Provides education and answers patients question on tick bites



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