We Hear That!

• NPA member, Jeff Kildow, Bayard, PharmD, graduate of the University of Nebraska Medical Center College of Pharmacy, was named the UNMC College of Pharmacy Community Preceptor of the Year. Congratulations, Jeff!

• The University of Nebraska Medical Center College of Pharmacy was one of the recipients of the National Association of Chain Drug Stores (NACDS) Foundation 2019 Scholarships for Advance Patient Care. UNMC students will address rural health disparities in Nebraska by screening 500 rural patients for Hepatitis C under the supervision of faculty and pharmacists preceptors. Congrats to UNMC!

• NPA member, Eugene Heath, Lincoln, passed away April 20, 2019, in Elk City, Oklahoma. He graduated in 1965 from the University of Missouri. Most of his professional life was centered around pharmaceutical research and working with the FDA. Condolences to the Heath family!

• NPA member, Mark Swenson, Norfolk, passed away May 11, 2019. Mark was a graduate of the University of Nebraska Medical Center College of Pharmacy. He was an inspiration to doctors, nurses, teachers and pharmacy customers. Condolences to the Swenson family!

Please send “We Hear That” news and photos to diane@npharm.org. You may think your news isn’t important, but M&P subscribers enjoy reading about their pharmacy friends from across the state.
In Case You Missed It

Your NPA member benefits include a daily email with important drug and health information, as well as answers to member questions. Below is a partial list of some of the most recent Daily News Dose items and other important pharmacy news that you may have missed.

Welcome Cory Durbin!
The NPA welcomes Cory Durbin, University of Nebraska Medical Center College of Pharmacy, PharmD Candidate, Omaha, to the NPA Board of Directors as the UNMC Student Board Representative.

Medicaid Lowers Total Daily MME Limit Effective June 1
Nebraska Medicaid will implement total daily dose limits of opioids. These limits are intended to enhance the safe use of opioids.

An initial daily limit of 300 Morphine Milligram Equivalents (MME) was put in place in December 2018 with the new lower limit of 250 MME implemented next month for Nebraska Medicaid patients with pain, unless being treated for active cancer, enrolled in hospice, or receiving end of life care. Claims for total daily doses of more than 250 MME will reject on June 1, 2019 unless an approved prior authorization is on file.

DEA Take Back Day Results
The April 27th Take Back Day collected and destroyed close to 469 tons of potentially dangerous unwanted drugs. There were 47 sites in Nebraska accepting unwanted medications and collected 5,661 pounds. Congratulations to the law enforcement agencies and their partners for another successful event.

Remind your patients that Every Day is Take-Back Day in Nebraska. To find a participating location, go to leftovermeds.com or type "drug disposal near me" in the Google Maps search bar.

USP 800 Deadline December 1
The purpose of USP General Chapter <800> Hazardous Drugs - Handling in Healthcare Settings is to describe practice and quality standards for handling hazardous drugs in healthcare settings and help promote patient safety, worker safety, and environmental protection.

The chapter defines processes intended to minimize the exposure to hazardous drugs in healthcare settings. All hospitals and pharmacies are expected to meet the requirements of USP Chapter <800> by December 1, 2019.

If your facility has not yet begun preparation, start by reviewing the Chapter information. Go to https://www.usp.org/usp-chapter-800-download to download a copy of the USP General Chapter <800>.

Pharmacists for Healthier Lives
The NPA has joined Pharmacists for Healthier Lives – a coalition of national and state pharmacy organizations coming together in a coordinated effort to raise the collective profile of the pharmacy profession. The campaign works to enhance public perception and awareness regarding the value of the pharmacy profession and its role on the healthcare team.

Pharmacists Wear White Coats and Many Hats - Here to listen, to inform, and to help you live your healthiest life. We are #pharmacists. Accessible. Knowledgeable. #Indispensable. https://pharmacistsforhealthierlives.org/

Disaster Preparedness
With the recent flooding in Nebraska, it is a good time to make sure that your disaster plan is up-to-date and all employees know what to do in the event of a disaster.

According to Title 175 of the Nebraska Administrative Code, 8-006.07, The pharmacy must establish and implement disaster preparedness plans and procedures to protect the potency, efficacy, safety, and security of the drugs, devices, or biologicals in the pharmacy in instances of natural (tornado, flood, etc.) or other disasters, disease outbreaks, interruption of utility services, or other similar situations. Such plans and procedures must address and delineate:

1. How the pharmacy will provide for the storage of drugs, devices, and biologicals at the proper temperature;
2. How the pharmacy will provide for the disposal of drugs, devices, and biologicals if the pharmacy determines their potency, efficacy, or safety has been adversely affected;
3. How the pharmacy will secure the drugs, devices, and biologicals from the public; and
4. How the pharmacy will maintain patient records and inventory records.

Medical Marijuana Survey
Based on the responses to a March member survey, the NPA Board of Directors voted to support a version of LB 110, a medical marijuana initiative in Nebraska, that would allow pharmacists involvement in providing and educating patients about medical marijuana. Here are the results:

- Should pharmacies be allowed to sell OTC cannabidiol products? Yes 64.8%, No 35.2%
- Should pharmacists be part of the process of providing medical marijuana to patients? Yes 75.3%, No 24.7%
- Should pharmacists be allowed to own medical marijuana dispensaries? Yes 71.1%, No 28.9%

Thank you for responding to the survey and for the additional feedback.
Remote Dispensing

Curtis Discount Pharmacy

In September 2018, Dan Kreis, PharmD, owner of Gothenburg Discount Pharmacy in Gothenburg, Nebraska, opened the remote dispensing pharmacy - Curtis Discount Pharmacy - in Curtis, Nebraska with fellow pharmacist, Adam Lee. Curtis had been without pharmacy services for about ten years and is located nearly 40 miles from the closest pharmacy. Dr. Kreis had been contacted by several people in the Curtis community asking him to open a pharmacy in town. Dan’s State Senator, Matt Williams, had sponsored the 2018 Legislative Bill 731 which allowed remote pharmacy dispensing. Planning for the pharmacy began with the City of Curtis prior to the passing of LB 731.

The remote dispensing pharmacy has been well received by the patients and providers in Curtis. The store has a robust front-end with over-the-counter medications. Three certified pharmacy technicians have staffed the remote dispensing location at any one time. One lives in Curtis; the others travel from Gothenburg. Because of the success of the location and the increased workload in opening a new pharmacy, a pharmacist had been on-site three or four days each week. When a pharmacist is on-site at the remote dispensing location, flu shots are administered and prescriptions from other pharmacies can be transferred. The remote dispensing pharmacy is open Monday through Friday from 9:00 am to 5:00 pm. The number of prescriptions filled at the remote dispensing location has exceeded Dan and Adam’s projections.

Dan said that the remote dispensing pharmacy verification and patient counseling demands have not interrupted work flow at the supervising pharmacy. If a patient is waiting for a prescription in Curtis, the pharmacy in Gothenburg is notified with a buzzer system. There is a dedicated computer in Gothenburg for the remote dispensing site. Patients in Curtis have access to a large screen to view the pharmacist in Gothenburg who is performing the counseling. The pharmacies are connected by Telepharm software and use McKesson’s Pharmaserv software for prescription processing.

The greatest challenge for opening the remote dispensing pharmacy was the additional paperwork for ordering controlled substances from the wholesaler and third-party contracts for the remote site.

Curtis Discount Pharmacy is one of four remote dispensing pharmacies in Nebraska. The other remote dispensing pharmacies include:

- Overton Community Pharmacy, Community Pharmacy Services, Gretna
- Pierce Pharmacy, Steffen Drug, Hartington
- Emerson Apothecary, The Apothecary Shop, Pender
Please join us at this year’s NPA Annual Convention, July 19 & 20, 2019 at the Lincoln Marriott Cornhusker Hotel in Lincoln, Nebraska.

The convention is a great time to exchange information, network, and learn the most current information that can impact you and your practice. We are excited about the line up of wonderful speakers and excellent topics, but most importantly, we look forward to connecting with you!
6:30 am – 3:30 pm  
**REGISTRATION**

6:45 am – 7:45 am  
**TREATMENT OF DEEP VEIN THROMBOSIS AND PULMONARY EMBOLISM AND REDUCTION IN THE RISK OF STROKE AND SYSTEMIC EMBOLISM IN PATIENTS WITH NONVALVULAR ATRIAL FIBRILLATION**

Robert Percell, MD, FACC, Electrophysiologist, Bryan Heart

*Industry sponsored breakfast. Registration is required.*

7:50 am – 8:00 am  
**WELCOME**

NPA President, Ally Dering-Anderson, PharmD

8:00 am – 9:30 am  
**CPE SESSION 1**

**INFECTIOUS LEADERSHIP**

*Rear Admiral Scott F. Giberson, Deputy Director, Centers for Medicare & Medicaid Services*

ACPE UAN 0128-0000-19-028-L04-P/T

1.5 hrs | 0.15 CEUs - Knowledge-based CPE Activity

**Learning Objectives:**

1. Discuss the foundational principles of an infectious leader, regardless of the leadership style utilized.
2. Enumerate three ways to develop trust as a leader and provide examples.
3. Analyze some of the common challenges of 21st century leadership and be able to articulate ways to overcome them.
4. List and explain the implementation of the four key determinants of infectious leadership.
5. Differentiate between motivation and inspiration and assess how to apply this as a leader.

9:30 am – 9:45 am  
**BREAK**

9:45 am – 10:30 am  
**CPE SESSION 2**

**EMERGING TRENDS: TOP 10 NEW DRUGS**

*Creighton University School of Pharmacy & Health Professions PharmD Candidates: Tiffany Bihis; Ryan Kano; Mackenzie Moritz; Kateri Petto; and Laura Yacinthe; and University of Nebraska College of Pharmacy PharmD Candidates: Melissa Borsh; Anthony Donovan; Kelsey Haywood; Natasha Konfrst; and Xiaoxiao Qi*

ACPE UAN 0128-0000-19-029-L01-P/T

1.5 hrs | 0.15 CEUs - Knowledge-based CPE Activity

**Learning Objectives:**

1. Identify the top ten new drugs.
2. Describe each drug’s role in therapy.

10:30 am – 10:45 am  
**BREAK**

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**KEYNOTE SPEAKER**

*Rear Admiral Scott F. Giberson*

Deputy Director, Centers for Medicare & Medicaid Services

**INFECTIOUS LEADERSHIP**

Friday at 8:00 am
### SCHEDULE
**FRIDAY, JULY 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10:45 am –</td>
<td><strong>CPE SESSION 2 CONTINUED</strong>&lt;br&gt;Emerging Trends: Top 10 New Drugs</td>
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<tr>
<td>11:30 am</td>
<td><strong>INDUSTRY NETWORK MEETING</strong></td>
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<tr>
<td>10:45 am –</td>
<td><strong>LUNCH WITH EXHIBITORS</strong></td>
</tr>
<tr>
<td>11:15 am</td>
<td><strong>WHAT’S HAPPENING IN PHARMACY</strong></td>
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<tr>
<td>1:00 pm –</td>
<td>• Meet the Pharmacy School Deans</td>
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<tr>
<td>2:00 pm –</td>
<td><strong>BREAK</strong></td>
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<tr>
<td>2:15 pm –</td>
<td><strong>CPE SESSION 3</strong>&lt;br&gt;Creating a Gender-Affirming Pharmacy</td>
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<tr>
<td>3:15 pm –</td>
<td><strong>BREAK</strong></td>
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<tr>
<td>3:30 pm –</td>
<td><strong>CPE SESSION 4</strong>&lt;br&gt;Pharmacy Law Review</td>
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<tr>
<td>5:00 pm</td>
<td><strong>Evening is on your own</strong></td>
</tr>
</tbody>
</table>

**EXHIBITORS**

- AbbVie
- Allergan
- Amarin Pharmaceutical
- AstraZeneca Pharmaceuticals
- Athenex Pharmaceuticals
- BTG Pharmaceuticals
- Creighton University School of Pharmacy & Health Professions
- Dakota Drug
- Great Plains Quality Innovation Network
- Independent Pharmacy Cooperative (IPC)
- Janssen Pharmaceuticals
- McKesson
- Nebraska MEDS Drug Disposal
- Nebraska Total Care
- Novo Nordisk - Biopharm, Diabetes and Obesity
- Pfizer - Internal Medicine and Vaccines
- Pharmacists Mutual
- Seattle Genetics
- SpartanNash Buying Group
- Sunovion Pharmaceuticals
- Tabula Rasa Healthcare
- Walgreens
- WellCare of Nebraska

*At time of printing*
SATURDAY, JULY 20

REGISTERATION

CARDIOVASCULAR OUTCOMES DATA
Steven Krueger, MD, Cardiology, Nebraska Heart Institute
Breakfast sponsored by Amarin Pharmaceutical.
Registration is required.

WELCOME
NPA President, Ally Dering-Anderson, PharmD

CPE SESSION 1
ADVANCING WORKFORCE WELL-BEING AND RESILIENCE TO BUILD LONG-TERM CHANGE
Anna Legreid Dopp, PharmD, Director, Clinical Guidelines and Quality Improvement Center on Medication Safety and Quality, American Society of Health-System Pharmacists
ACPE UAN 0128-0000-19-033-L05-P/T
1.0 hr | 0.10 CEUs - Knowledge-based CPE Activity
Learning Objectives:
1. Define burnout, well-being, and resilience.
2. Explain why clinician burnout is a patient care and healthcare workforce problem.
3. Describe the work led by the National Academy of Medicine (NAM) and by the American Society of Health-System Pharmacists (ASHP).
4. Identify strategies for advancing pharmacy workforce well-being and resilience.

BREAK

CPE SESSION 2
THE ART OF A DIFFICULT CONVERSATION
Christine L. Chasek, LIMHP, LADC, LPC, Associate Professor, Department of Counseling and School Psychology; Director of BHECN at UNK; President-Elect International Association of Addiction and Offender Counseling, University of Nebraska at Kearney
ACPE UAN 0128-0000-19-036-L04-P/T
1.0 hr | 0.10 CEU - Knowledge-based CPE Activity
Learning Objectives:
1. Identify the barriers to having productive clinical conversations.
2. Describe the Five Principles of Motivational Interviewing (MI).
3. Illustrate the principles of MI to clinical practice by experiencing a role play scenario.

BREAK

CONVENTION SPONSORS
Amarin Pharmaceutical
Creighton University School of Pharmacy & Health Professions
Independent Pharmacy Cooperative (IPC)
McKesson
National Association of Chain Drug Stores (NACDS)
Pharmacists Mutual

DONATIONS
Pharmacists Mutual
Rx Systems
CPE SESSION 3
OPIOID PEARLS:
NON-OPIOID TREATMENT OPTIONS FOR PAIN
Krysta Baack, PharmD, BCPS, Emergency Medicine Clinical Coordinator, Nebraska Medicine

Learning Objectives:
1. Examine the different types of pain syndromes.
2. Identify non-opioid options for treating different pain syndromes.

10:30 am – 11:30 am

DRUG DIVERSION: HOW TO SPOT IT AND WHAT TO DO ABOUT IT
Nic Bonney, Investigator, Nebraska State Patrol

Learning Objectives:
1. Identify methods of drug diversion by employees and patients.
2. Define the legal steps to be taken in cases of drug diversion.

ACPE UAN 0128-0000-19-032-L04-P/T
1.0 hr | 0.10 CEU - Knowledge-based CPE Activity

NETWORK CONNECTIONS & BOXED LUNCH
Academia/Specialty – Nicole White, Network Chair
Hospital/Health-System – Jerome Wohleb, Network Chair
Independent – Trevor Bertsch, Network Chair
Long-Term Care – Mackenzie Farr, Network Chair
New Practitioner – Jacelyn Watt, Network Chair
Pharmacy Technicians – Christina Gerrard, Board Member

11:30 am – 1:00 pm

CPE SESSION 4
PATIENT SAFETY & MEDICATION ERRORS IN NEBRASKA: TWO PERSPECTIVES
Edward M. DeSimone, II, RP, PhD, FAPhA, Nebraska Coalition for Patient Safety, Board of Directors; Professor of Pharmacy Sciences, Creighton University School of Pharmacy & Health Professions; and
Daniel Rosenquist, MD, Nebraska Coalition for Patient Safety, Vice President; Columbus Family Practice Associates; Consultant, COPIC, Patient Safety & Risk Management

ACPE UAN 0128-0000-19-033-L05-P/T
1.0 hr | 0.10 CEU - Knowledge-based CPE Activity

Learning Objectives:
1. Describe the role and activities of the Nebraska Coalition for Patient Safety.
2. Identify at least three major causes of medication errors.
2:00 pm – 2:15 pm  Break

CPE SESSION 5
THE PHARMACIST’S ROLE IN TRANSITIONS OF CARE

Karsen Duncan, PharmD, Clinical Pharmacist, Bryan Health
ACPE UAN 0128-0000-19-037-L04-P/T
1.0 hr | 0.10 CEU - Knowledge-based CPE Activity

Learning Objectives:
1. Describe the former transition of care process between hospital and long-term care.
2. Identify Bryan Medical Center’s process for transitions of care (primarily hospital to skilled nursing facility/community).
3. Evaluate barriers to implementing a pharmacist-led transition service.
4. Define the need for collaboration between pharmacists in all areas of care to ensure medication compliance.

3:15 pm – 3:30 pm  Break

CPE SESSION 6
WHAT’S NEXT? A CASE-BASED APPROACH TO DIABETES MANAGEMENT

Ryan Flugge, PharmD, BCPS, Medical Liaison, Medical Markets, Novo Nordisk
ACPE UAN 0128-0000-19-034-L01-P/T
1.0 hr | 0.10 CEU - Application-based CPE Activity

Learning Objectives:
1. Interpret the ADA Standards of Care in diabetes management.
2. Differentiate between patient populations and appropriate agents based on evidence.
3. Devise a plan for patients to achieve maximum outcomes.

CONTINUING EDUCATION

The 2019 NPA Annual Convention is sponsored by the Nebraska Council for Continuing Pharmacy Education (NCCPE). NCCPE is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmacy education.

On Friday, July 19 and Saturday, 20, 2019, pharmacists and pharmacy technicians may earn up to 11.5 contact hours (1.15 CEUs) of continuing pharmacy education credits (CPE) for attendance of the entire CPE activity and the completion of an activity evaluation. If activity evaluations are not completed by August 15, 2019, CPE credits will not be awarded. Credits will be reflected in the NABP CPE Monitor System no later than 45 days after the convention. For questions, call (402) 420-1500.
PHARMACIST & TECHNICIAN REGISTRATION

FULL REGISTRATION (FRIDAY & SATURDAY)
Includes up to 11.5 hours of continuing pharmacy education for pharmacists and pharmacy technicians; access to handouts; breakfasts; morning and afternoon refreshment breaks; and lunch with exhibitors.

FRIDAY ONLY REGISTRATION
Includes up to 5.5 hours of continuing pharmacy education for pharmacists and pharmacy technicians; access to handouts; breakfast; morning and afternoon refreshment breaks; and lunch with exhibitors.

SATURDAY ONLY REGISTRATION
Includes up to 6.0 hours of continuing pharmacy education for pharmacists and pharmacy technicians; access to handouts; breakfast; morning and afternoon refreshment breaks; and lunch.

STUDENT REGISTRATION

FULL REGISTRATION (FRIDAY & SATURDAY)
Includes access to all continuing pharmacy education sessions; access to handouts; breakfasts; morning and afternoon refreshment breaks; and lunch with exhibitors.

FRIDAY ONLY REGISTRATION
Includes access to Friday’s continuing pharmacy education sessions; access to handouts, breakfast; morning and afternoon refreshment breaks; and lunch with exhibitors.

SATURDAY ONLY REGISTRATION
Includes access to Saturday’s continuing education sessions; access to handouts; breakfast; morning and afternoon refreshment breaks; and lunch.

LOCATION & ACCOMMODATIONS
The host hotel for the NPA’s 2019 Annual Convention is The Marriott Cornhusker Hotel at 333 South 13th Street in Lincoln, Nebraska. For reservations, call 402-474-7474. Room block expires July 4, 2019. Ask for the Nebraska Pharmacists group rate.

BREAKFAST
Breakfasts are free to all convention attendees and are the only breakfast options provided by the NPA. CPE is not available. Registration is required.

TICKETED EVENTS

Event Registration Only
Registration for Friday’s Lunch with Exhibitors, and Saturday’s boxed lunch may be purchased as stand alone items. They do not include access to any continuing education sessions, breakfasts, refreshment breaks, or program materials.

CANCELLATION & REFUND POLICY
We understand that circumstances may arise that require you to cancel. Cancelled registrations must be in writing. Cancellations received on or before July 12, 2019, will receive a refund in the amount paid less a 25% administrative fee. No refunds will be made after July 13, 2019. Please notify the NPA of any changes prior to the event to help facilitate the check-in process.

HANDOUTS
Speaker materials will be posted at www.npharm.org and will be available from the NPA convention app. Materials may be viewed or printed before and after the convention.

TARGET AUDIENCE
Programming has been designed for pharmacists, pharmacy technicians, and student pharmacists in all practice settings who take part in the overall healthcare of patients and Nebraska residents.
# CONVENTION REGISTRATION

**2019 ANNUAL CONVENTION**

Name ___________________________ Phone ___________________________

Badge Name ___________________________ Email ___________________________

Mailing Address ___________________________ NABP e-Profile ID # ___________________________

City/Zip ___________________________ Date of Birth (MM/DD) ___________________________

Call 402-420-1500 or email diane@npharm.org for guest pricing and registration information.

<table>
<thead>
<tr>
<th></th>
<th>Early Bird On or Before 06/30/2019</th>
<th>On or After 07/01/2019</th>
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<tbody>
<tr>
<td><strong>Full Registration</strong> (Friday &amp; Saturday)</td>
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<tr>
<td>Pharmacist</td>
<td>$230</td>
<td>$270</td>
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<tr>
<td>NonMember Pharmacist</td>
<td>$330</td>
<td>$370</td>
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<tr>
<td>Technician/Student</td>
<td>$130</td>
<td>$170</td>
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<tr>
<td>NonMember Technician/Student</td>
<td>$180</td>
<td>$220</td>
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| **Friday Only Registration** | | |
| Pharmacist               | $160                              | $200                   | $_______ |
| NonMember Pharmacist     | $260                              | $300                   | $_______ |
| Technician/Student       | $100                              | $140                   | $_______ |
| NonMember Technician/Student | $150  | $190                   | $_______ |

| **Saturday Only Registration** | | |
| Pharmacist               | $140                              | $180                   | $_______ |
| NonMember Pharmacist     | $240                              | $280                   | $_______ |
| Technician/Student       | $100                              | $140                   | $_______ |
| NonMember Technician/Student | $150  | $190                   | $_______ |

| **Lunch Registration Only** | | |
| Friday Lunch & Exhibits  | $45                               | $55                    | $_______ |
| Saturday Lunch           | $35                               | $45                    | $_______ |

**REGISTRATION TOTAL** $_______

I plan to attend breakfast on:  □ Friday  □ Saturday

*Free for registered attendees.*

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**PAYMENT**

☐ Check (Payable to the NPA)

____________________________________________________
Check Number

☐ Credit Card

____________________________________________________
Card Number

______________  ______________
Exp. Date       Sec. Code

__________________________
Signature

Mail
Nebraska Pharmacists Association
6221 S. 58th St., Suite A
Lincoln, NE  68516

Mobile
www.npharm.org
info@npharm.org

Fax
402-420-1406

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**HAVE A QUESTION?**  npharm.org/2019AnnualConvention  |  info@npharm.org  |  402-420-1500
Nebraska Pharmacists Association
Mental Health First Aid Training

THURSDAY, July 18, 2019
7:30 am - 7:50 am Members Only Registration – Limited to the first 50 registered members. Registration is $60.00 and includes program materials and lunch. Login and register at www.npharm.org.

7:50 am - 8:00 am Welcome, NPA CEO, Joni Cover
8:00 am - Noon Mental Health First Aid
   Anthony Pudlo, PharmD, MBA, BCACP, Vice President, Iowa Pharmacy Association
   Pharmacist UAN 0207-9999-18-019-L04-P
   Pharmacy Technician UAN 0207-9999-18-019-L04-T
   8.0 contact hours (0.8 CEUs)
Learning Objectives
Upon completion of this activity, participants will be able to:
1. Discuss the prevalence and impact of mental health problem in the United States.
2. Discuss the barriers to treatment of mental health disorders.
3. Describe the spectrum of mental health interventions, treatments and support.
4. Discuss the core components of recover for people experiencing mental health or substance abuse problems.
5. Describe how the Mental Health First Aid Action Plan fits within the array of interventions available to address mental health problems.
6. Give an overview of the signs, symptoms, and possible risk factors and warning signs of depression and anxiety.
7. Give an overview of the signs, symptoms, and possible risk factors and warning signs of people who are experiencing a panic attack and may be in crisis.
8. Give an overview of the signs, symptoms, and possible risk factors and warning signs of people who are experiencing a traumatic event and may be in crisis.
9. Give an overview of the risk factors and warning signs of psychotic disorders.
10. Give an overview of the risk factors and warning signs of substance use disorders.
11. Demonstrate the Mental Health First Aid Action Plan for someone who may be in a crisis such as a suicide or self-injury.
12. Discuss how to respond to someone who is not in crisis.
13. Provide helpful resources and support groups for people experiencing mental health disorders.

Noon - 1:00 pm Lunch Program sponsored by Janssen
1:00 pm - 5:00 pm Mental Health First Aid (continued)

Originally designed in Australia, this 8-hour course teaches you a five-step action plan to help someone who may be experiencing a mental health or substance use challenge. Similar to traditional physical First Aid and CPR, Mental Health First Aid is help provided to a person developing a mental health problem or experiencing a crisis until professional treatment is obtained or the crisis resolves.

The training helps you to (1) assess a situation, (2) offer initial help and support, and (3) connect someone to appropriate care if an individual is experiencing a mental health or substance use problem. With a focus on learning risk factors, warning signs, and resources for mental illness and substance use disorders, attendees will be provided with the skills to display calmness, non-judgmental attitude, empathy, and support in order to be a reassuring and encouraging professional in your area of practice.

Disclosures:
The speaker declares no conflicts of interest or financial interest in any product or service mentioned in this program, including grants, employment, gifts, stock holdings, and honoraria.

NCPA’s education staff declares no conflicts of interest or financial interest in any product or service mentioned in this program, including grants, employment, gifts, stock holdings, and honoraria.

NCPA is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education. This program is accredited by NCPA for 8.0 contact hours (0.8 CEUs) of continuing education credit. ACPE UAN: 0207-9999-18-019-L04-P and 0207-9999-18-019-L04-T. Activity type: Application-Based.
**Objectives**
At the conclusion of this lesson, pharmacists and pharmacy technicians should be able to:
1. Explain the mechanism of action of probiotics.
2. Identify disease states that probiotics may be utilized.
3. Describe choices of various probiotics and yogurt.
4. Explain the potential efficacy found.
5. List potential risks associated with probiotic use.

**Background**
According to the Food and Agriculture Organization of the United Nations (UN) and World Health Organization (WHO), probiotics, by definition, “are live microorganism that, when administered in adequate amounts, confer a health benefit on the host”. Probiotics have long been studied to determine their role in treatment, prevention, and side effect mediation. There are several possible mechanisms by which probiotics may exhibit their effects. The overall concept is that the “good” bacteria from probiotics interact with the microbiota of the gut and influence the patient’s response and defense to “bad” bacteria. There are receptors in the host’s gut that the probiotic may interact with specifically. Probiotics have also been shown to produce or secrete certain factors in a host’s gut.

Studies show conflicting data when it comes to analyzing the effectiveness of probiotics across several different uses. One of the main conflicts is the lack of standardization amongst probiotic strains due to their unique makeup of bacteria. Dosing is another complicating factor in the effectiveness for probiotics. Each study used their own unique regimens for giving the probiotic such as type of antibiotic, timing of initiation of probiotic, and the type and dose of bacteria present in the probiotic.

Probiotics come in doses that are colony-forming units (CFU) and typically vary in doses between $10^7$ to $10^{10}$ CFUs depending the
genera used.\textsuperscript{5} CFUs only refer to the live bacteria that are present, but does not consider the dead bacteria, thus leading to potentially higher doses than realized.\textsuperscript{6}

**Disease States for Potential Probiotic Use**

Clostridium difficile infection (CDI) is an adverse effect of antibiotic therapy or a hospital-acquired infection that results in severe diarrhea and can lead to life-threatening inflammation of the colon. Probiotics may be considered as CDI prevention because of their potential to prevent a patient losing their intestinal microbiome to antibiotic therapy. Recurrence is a common manifestation of CDI. The prevention of this recurrence could dramatically increase the quality of life for patients.\textsuperscript{7}

Antibiotic-associated diarrhea (AAD) is a common adverse effect of some antibiotic treatments affecting as many as 30\% of patients.\textsuperscript{8} The factors that make a patient more susceptible to include the antibiotic used and unique characteristics of the patient. AAD is a result of the disruption of normal microbiome of the GI tract caused by antibiotics.\textsuperscript{9} Penicillins, more so broad-spectrum, cephalosporins, and clindamycin are among some of the antibiotics that have shown to have increased incidence of AAD.\textsuperscript{10}

Irritable bowel syndrome (IBS) is a chronic gastrointestinal disorder that results in microbial imbalance of the GI flora. IBS can be a difficult disorder to treat due to the high variability of symptoms and patient reports. All patients have different clinical features of their intestinal microbiome ecosystem making a uniform approach of treatment difficult. Primarily, the studies of probiotics in the use of IBS focus on the complications of IBS diarrhea (IBS-D) than IBS constipation (IBS-C).\textsuperscript{3}

**Choosing Between Probiotics**

There are several different strains of bacteria that are made into probiotics. Some formulations contain a single strain while some contain multiple strains in each dosage form. This makes it difficult to compare results and analyses from previous studies as almost all studies use different probiotics without defining the exact microbiota in the probiotic.

There are certain strains that have shown promise in various treatment regimens. Lactobacillus rhamnosus (L. rhamnosus) and Saccharomyces boulardii (S. boulardii) have been studied extensively and have shown to have potential benefits particularly in AAD. Various patient populations may require different strains to have the most benefits. For example, S. boulardii appears to be more effective in the pediatric population as compared to elderly when it comes to AAD.\textsuperscript{11}

**Probiotic vs. Yogurt**

The National Yogurt Association (NYA) determines whether brands are considered to have active, live cultures. NYA is not a regulatory organization and brands are not required to be evaluated by the NYA to report their bacteria. The lack of regulatory organization may lead to discrepancy. To get a seal of approval from NYA, products must have at least 100 million cultures per gram for refrigerated products and 10 million cultures per gram for frozen products.\textsuperscript{12}

The challenge of using yogurt as a supplement is the dosing or amount, the choice of yogurt used, and its efficacy versus the probiotic supplements. A meta-analysis studied probiotic dairy products regarding their efficacy in AAD. Although the dairy probiotics did reduce the overall incident of AAD, the results were not statistically significant (95\% CI 0.95-1.07). Actimel, by Danone\textsuperscript{®}, is a probiotic drink that was shown to have a decrease in AAD which contains Lactobacillus casei.\textsuperscript{11} Actimel is not readily available in the United States, but yogurts such as Fage\textsuperscript{®}, Chobani\textsuperscript{®}, and Dannon\textsuperscript{®} all contain L. casei as a live bacterium\textsuperscript{13}.

A 2014 systematic review identified randomized controlled trials (RCTs) that evaluate the use of

<table>
<thead>
<tr>
<th>Table 1</th>
<th>What is Available at the Drugstore?\textsuperscript{20}</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brand Name</strong></td>
<td><strong>Probiotic Strain</strong></td>
</tr>
<tr>
<td>Align\textsuperscript{®}</td>
<td><em>Bifidobacterium longum</em></td>
</tr>
<tr>
<td>Culturelle\textsuperscript{®}</td>
<td><em>Lactobacillus rhamnosus</em> GG</td>
</tr>
<tr>
<td>Florastor\textsuperscript{®}</td>
<td><em>Saccharomyces boulardii</em></td>
</tr>
<tr>
<td>VSL #3\textsuperscript{®} Capsules</td>
<td>Multistrain</td>
</tr>
</tbody>
</table>
yogurt consumption and the reduction of AAD. Only two studies met the criteria, but were both “low in methodological quality”. Compared to no intervention, yogurt consumption resulted in statistically significant reduction in AAD (95% CI 0.31-1.00).14

A 2015 study was completed regarding the use of yogurt in AAD in children. The children received 200 grams per day of yogurt that contained *Lactobacillus rhamnosus* GG (LGG), *Lactobacillus acidophilus* (La-5), or *Bifidobacterium*, or a pasteurized yogurt for the placebo group. The placebo group experienced more adverse events that included abdominal pain and loss of appetite. For efficacy, the probiotic group had a decrease in stool frequency, duration, and delay of onset that were all statistically significant.5 Although there are no brands in the United States that have this exact formulation, Stonyfield® and Kite Hill® are two brands that have two of the three ingredients available. Several yogurts such as Chobani®, Dannon®, Siggi®, Yoplait®, and Fage® contain *L. acidophilus* along with other strains of live bacteria.13

**Efficacy**

**CDI**

For prevention of CDI, a study was performed at Scripps Memorial Hospital in 2016. There were 1,576 patients treated with IV antibiotics and 649 of these patients received the same probiotic. There were multiple antibiotics that were used, and whether to start probiotic or not was entirely up to the discretion of the physician. Of the 649 patients receiving concomitant antibiotic plus probiotic therapy, CDI occurred in 11 patients. Only eight of the 927 patients receiving antibiotic alone acquired CDI. No statistically significant benefit was found by adding a probiotic to antibiotic therapy in the prevention of CDI.15

For treatment of CDI, probiotics may be added to traditional guideline recommended therapy as an alternative role of use. A study primarily analyzed the duration of diarrhea as well as the recurrence of CDI. The duration was found to be, on average, one day shorter in the probiotic group (p=0.039). The rate of recurrence was not significantly less. The study also found that patients on probiotics had fewer total days of diarrhea with a decreased rate of diarrhea occurrence. There was no increase in adverse events when comparing probiotic versus placebo.16 Therefore, according to the 2018 CDI guidelines, probiotic use is not recommended in either prevention or treatment of CDI.2

**Antibiotic-Associated Diarrhea (AAD)**

Meta-analyses studies have shown consistent evidence that probiotics are beneficial in the prevention of antibiotic-associated diarrhea, particularly in children. Strains *S. boulardii* or *L. rhamnosus* GG have shown the most promise in the prevention of antibiotic-associated diarrhea.11

A meta-analysis included 32 studies testing a probiotic versus a placebo. The study focused on antibiotics that are considered high risk for AAD including amoxicillin, beta-lactams, cephalosporins, and clindamycin. Collectively, there was a lower occurrence of AAD with probiotic usage as compared to placebo. These results were shown to be statistically significant (95% CI 0.64-0.67).11 ESPGHAN, the Europeans Society for Paediatric Gastroenterology, Hepatology, and Nutrition recommends *L. rhamnosus* or *S. boulardii* for the prevention of AAD that is supported by moderate evidence.17

*L. rhamnosus* GG is the identified strain in Culturelle® Kids. *S. boulardii* is the strain present in Florastor® Kids. It is important to note that due to their lack of regulations as a drug, the microorganism can change while marketing it as the same brand name.6 It is important to read the packaging in order to make an appropriate recommendation.

A 2012 systematic review analyzed 82 RCTs that included over 11,000 patients. Overall, the study concluded that patients given a probiotic had a statistically significant reduction in AAD when primarily compared to placebo (P<0.001). Trials utilized *Lactobacillus*, *Bifidobacterium*, *Saccharomyces*, *Streptococcus*, *Enterococcus*, and/or *Bacillus* either as single agents or in combination. When analyzed as a breakdown of subgroups for each genus analyzed, no statistical difference was found amongst the genera utilized.8

**IBS-D Efficacy**

A trial conducted in 2008 demonstrated that when a multistrain probiotic was utilized, it was able to improve IBS symptoms by stabilizing the gut microbiome. Recently, a RCT showed that *Lactobacillus paracasei* (*L. paracasei*) only partially improved IBS symptoms. Results of this study
also found a decrease in pro-inflammatory markers. It is possible that *L. paracasei* alters the function by reducing immune activation. Other studies showed a decrease in abdominal cramping and pain in IBS patients while taking probiotics. Probiotic treatment appears to depend on the individual gut microbiome ecosystem in order to allow a predictive response.³

**Limitations**
The overarching issue seems to be lack of standardization when comparing studies. When each study is completed using entirely different strains of bacteria, it becomes difficult to interpret all of these results as a large cohort of data and extrapolate the data across multiple scenarios.

Age of the patient should be considered when choosing appropriate probiotics. Studies show that different ages respond better to different strains of probiotics. When age and disease state are both considered, it has been shown that pediatric patients appear to respond better to *S. boulardii* than adults and significantly better than elderly patients.¹¹

Genetic variability in the bacteria of the probiotic is another important factor. Although given identical strains, there is still variance within the strains due to their unique genetic makeup. This is especially true in dairy products due to the mechanisms of fermentation.¹¹

**Risks**
*L. rhamnosus* is a bacterium that is typically colonized in the GI flora. Patients with structural heart disease may be at an increased risk of probiotic exposure resulting in *Lactobacillus endocarditis*. This particular invasive infection has high intrinsic resistances to several antibiotics including vancomycin and meropenem. This infection has been recorded with both probiotic supplements as well as high amounts of yogurt intake. Although *Lactobacillus* is considered relatively safe, translocation and systemic exposure to the organisms may result in invasive infections in susceptible patients.⁴

If *Lactobacillus* is found in blood, it should not be immediately considered a contaminant but rather the patient’s diet and probiotic consumption should be analyzed. Immunosuppressed patients, recipients of solid organ transplant, or patients with a history of HIV infection may be considered high risk due to the susceptibility of a dangerous infection if translocation of the bacteria were to occur.⁴ Patients with inflammatory bowel disease (IBD), due to its immunogenicity in nature, may also be at risk. Probiotics, if translocated to blood in IBD patients, have been linked to increase inflammation markers and increase relapse and hospitalizations for these patients.⁶

*Lactobacillus* infection appeared in patients that were at the extremes in ages from less than one year old to greater than 60 years old. Newborns were especially susceptible to infection complications from *Bifidobacterium* compared to any other group of patients. In nearly all the newborns that contracted the infection, external feeding and central venous access were also utilized.¹⁸ A 2014 systematic review found “the overwhelming existing evidence suggests that probiotics are safe” in the general population.¹⁹

In case reports published from 1976 to 2018, 93 patients found to have developed infectious complications related to probiotic ingestion, but this is not all-encompassing due to the large amount of case reports that were not published. Probiotics are regulated as a dietary supplement, therefore, exempting the products from safety and efficacy claims. There have been studies that were not only able to identify the strain of bacteria found in the patient’s blood, but also were able to match the DNA of the bacteria to that of the probiotic strain utilized.¹⁸

**Conclusion**
Probiotic studies lack conclusive evidence for the effectiveness of probiotics in most disease states. One study may show a significant decrease in CDI while another study may show no difference found. The lack of standardization of which probiotics were used, as well as their manufacturing and regulations as a dietary supplement, will continue to be a deterrent in the studies.

For probiotics to become a standard of care in the treatment of CDI, AAD, and IBS, it would be beneficial if probiotics become regulated as drugs. Regulation would allow consistency in these studies, creating the opportunity to determine the effects probiotics could play in various disease states.
References


Probiotics - What Does the Evidence Say?

Quiz #7, May/June 2019, ACPE 0128-0000-19-026-H01-P/T

1. What difficulties arise with the use of probiotics?
   a. Lack of standardization
   b. Variation of doses
   c. Various probiotic strains
   d. All of the above

2. What is a typical dose for a probiotic?
   a. $10^2$ mg
   b. $10^3$ CFUs
   c. $10^6$ CFUs
   d. $10^8$ CFUs

3. Antibiotic-associated diarrhea can affect as many as ____ of patients?
   a. 10%
   b. 20%
   c. 30%
   d. 40%

4. Most studies to date have focused on which component of IBS?
   a. IBS-C
   b. IBS-D
   c. Mixed IBS
   d. Immunogenicity

5. For the seal of approval from the National Yogurt Association, how many live cultures must be in refrigerated yogurt products per gram?
   a. 1 million
   b. 10 million
   c. 100 million
   d. 1 billion

6. What does the 2018 Clostridium difficile Infection Guidelines recommend regarding the use of probiotics for prevention?
   a. Do not recommend
   b. Recommend use for adults greater than 65 years old
   c. Recommend use for everyone
   d. Recommend use for kids less than 5 years old

7. What is the identified strain present in Culturelle Kids®?
   a. B. longum
   b. L. rhamnosus GG
   c. L. casei
   d. S. boulardii

8. What patient population is at an increased risk of infection if translocation of Lactobacillus occurs?
   a. HIV patients
   b. Immunosuppressed patients
   c. Recipient of solid organ transplant
   d. All of the above

9. Newborns are most susceptible to infection complications from which probiotic strain?
   a. Bifidobacterium
   b. Lactobacillus
   c. Saccharomyces
   d. Streptococcus

10. Probiotics are primarily regulated as ____
    a. Drugs
    b. Food
    c. Supplement
    d. All of the Above

Keep the TOP portion for your records. Return the BOTTOM portion to the NPA office. Or, take this quiz online at www.npharm.org

CPE Home Study Evaluation
1. Rate this lesson: (Excellent) 5 4 3 2 1 (Poor)
2. Did this lesson meet each of its objectives? ___ Yes ___ No
3. Was the content without commercial bias? ___ Yes ___ No
   If not, please explain__________________________
4. Did the lesson meet your educational/practice needs? ___ Yes ___ No
5. Comments/future topics are welcome__________________________

The deadline for this quiz is December 12, 2019.
Congratulations
Class of 2019

The Creighton University School of Pharmacy and Health Professions Class of 2019 included 124 Doctor of Pharmacy graduates.

A Hooding Ceremony was celebrated the evening of Friday, May 17, at the Ryan Athletic Center and D.J. Sokol Arena. The following day, graduates participated in the Creighton University Commencement exercises at CHI Health Center Omaha.
Baleigh Ohrt  
Westboro, Missouri  

Kelly Oishi  
Honolulu, Hawaii  

Nicholas Olund  
St. Paul, Minnesota  

Miriam Opara  
Lima, New York  

Brent Oswald  
Madison, Nebraska  

Rohini Patel-Shah  
San Antonio, Texas  

Hoang-Oanh Pham  
Lincoln, Nebraska  

Tuan Phan  
Seattle, Washington  

Mary Powell  
Watertown, Wisconsin  

Kasey Reeves  
DeSoto, Wisconsin  

Angela Reimers  
Sioux Valley, Minnesota  

Gregory Reynolds  
Grand Junction, Colorado  

Shari Rivera  
Ewa Beach, Hawaii  

David Ross  
Loveland, Colorado  

Kasey Rubin  
San Diego, California  

Taylor Sakai  
Honolulu, Hawaii  

Jennifer Salagaj  
Woodland Park, Colorado  

Stacy Sandage  
Pontiac, Illinois  

Megan Schafer  
Burbank, California  

Kristen Schmidt  
Carol Stream, Illinois  

McKenzie Sesker  
Cannon Falls, Minnesota  

Cassondra Solesbee  
Caineville, Texas  

Megan Spragg  
Tucson, Arizona  

Sheena Starkel  
Spokane, Washington  

Morgan Sturm  
Golden, Colorado  

Christian Sukola  
Tacom, Washington  

Henry Tarnue  
Minneapolis, Minnesota  

Colton Taylor  
Olathe, Kansas  

Matthew Thomas  
Tigard, Oregon  

Johnny Tran  
Stockton, California  

Minh Tran  
Omaha, Nebraska  

Caressa Trueman  
Lancaster, New York  

Rachel Tyler  
Omaha, Nebraska  

Stephanie Ung  
Honolulu, Hawaii  

Nicholas Van Peursem  
Sioux Falls, South Dakota  

Trent Van Tress  
Henderson, Nevada  

Matthew Vang  
Glenwood, Iowa  

Karan Verma  
Hicksville, New York  

Peter Vigil  
Springville, California  

Kelly Baxter  
Residency at the Omaha VA Medical Center  

“The distance program has allowed me the flexibility to complete my degree wherever the military sent us (my husband is a U.S. Air Force pilot) and for that I am beyond grateful. Creighton is more than just a school, it’s a community. You will learn more in the next four years than you can imagine—not just about pharmacy, but about yourself, your values, your goals and your passions.”  

Linh Nguyen  
Residency at the Michael E. DeBakey Veterans Affairs Medical Center, Houston, Texas  

“The Creighton family has made a positive and meaningful impact on me, and I hope one day I will be able to serve as role model and give back to my Creighton community. I look forward to working with veterans in inpatient and outpatient settings with other residents while exploring Houston. Being bilingual, I also hope to moonlight at an independent Vietnamese pharmacy in the Bellaire area.”  

Minh Tran  
Regulatory Pharmaceutical Fellowship at Purdue University  

“Omaha will always be home to me and I want to always contribute to the network of successful young adults who come from the Midwest. After graduation, I will be in a post-doctoral fellowship, partnering with IU Health, Janssen Pharmaceuticals and the Food and Drug Administration, which will expose me to various drug information roles in academia, industry, and government.”
Rabies Disease, Counseling, and Treatment

Objectives
At the conclusion of this lesson, pharmacists and pharmacy technicians should be able to:
1. Identify common carriers of rabies.
2. Review ways to avoid rabies exposure.
3. Discuss the prophylactic use of rabies vaccine.
4. Cite the post-exposure regimen for treating known or suspected rabies exposure.

Introduction
According to the World Health Organization more than 59,000 people worldwide will die from rabies this year. It is unlikely that any will be in the United States, but it is possible, as illustrated by a 6-year-old who died in the United States in January 2018 because he was scratched by a bat but did not receive treatment to prevent a rabies infection. With quick and proper treatment, rabies is 100% preventable. The goals for this lesson are to familiarize pharmacists and pharmacy technicians with the disease and the appropriate counseling, prophylaxis, and post-exposure treatment of rabies.

Rabies Disease
Rabies is a zoonotic (transmitted from animals to humans), progressive encephalomyelitic disease caused by two lyssaviruses: the rabies virus and the Australian bat lyssavirus. Lyssaviruses are RNA viruses in the family of Rhabdoviridae. Rhabdoviridae viruses are naturally hosted by humans, mammals, and vertebrates. Most rhabdoviridae viruses have selected hosts and limited geographic distribution. The rabies virus, however, is found throughout most of the world, absent only in Antarctica and on certain islands. Both the term “rabies” and the genus lyssavirus take their names from

Written by Ally Dering-Anderson and Jolyn Merry

This continuing pharmacy education lesson was written by Ally Dering-Anderson, PharmD, and Jolyn Merry, PharmD, neither of whom have any conflicts of interest, nor does they have any financial relationships with a commercial interest related to this continuing pharmacy education activity.
ancient words that are descriptive of this disease: Latin *rabies* meaning “madness” and Greek *lyssa* meaning “violent”.3,4,5,6

Rabies is transmitted primarily through saliva from an infected animal. The infectious saliva is introduced through a bite, a scratch, or saliva coming into contact with mucous membranes of the eyes, nose, or mouth. Human-to-human transmission is extremely rare having been documented only as the result of tissue transplant from a deceased, diseased patient into another person.2,7,8

Initial viral infection infects muscle cells at the location of the bite or scratch. The virus quickly travels through the body to infect the central nervous system, then the peripheral and autonomic nervous systems. Finally, the lyssaviruses multiply in the salivary glands. Infection with lyssaviruses results in inflammation of the brain and nervous tissue in humans and other mammals. Common symptoms of rabies infection include varying degrees of paralysis, anxiety, insomnia, confusion, agitation, paranoia, terror, and delirium. Hydrophobia is also common, which aids in the transmission of the virus to a new host. Since the virus grows in the salivary glands, if the infected animal could drink and swallow, there would be less virus to be transmitted via a bite.8,9,10,11

Unlike other viral diseases, the asymptomatic phase of rabies can vary greatly from a few days to greater than a year. Infection from severe wounds on the face or neck progress more quickly than single bites or non-bite exposures on the extremities. Patients must receive treatment before the onset of symptoms. After symptoms have started, the prognosis for a patient is grim, with fewer than 20 reports of people who have recovered from symptomatic disease. Rabies deaths are not always well reported in poor and developing countries. Children are the most common victims of the disease and many will die at home without any medical intervention and with no public health reporting. Often, people diagnosed with rabies are unable to identify the causative event.2,11

### Sources of Exposure Nebraska

In Nebraska in 2018, the most common source of potential human exposure was bats. In 2017, bats were also the most common source of exposure, but skunks also contributed a number of exposures, as well. Most of these animals were not captured; therefore, the animal’s rabies status was never determined. While bats are the leading source of potential exposures in Nebraska, most bats in Nebraska are not infected with rabies. Some researchers estimate that less than 1% of the bat population carry rabies. Domestic animals are uncommon sources of exposure with an average of one exposure from cats annually. The last potential exposure from a canine was documented 2015, and the report indicated that the canine was not a domesticated dog or pet.12,13

### United States

In the United States, bats are also the most common source of human exposure. Rabid bats have been documented in 49 of the 50 United States. Fewer than 5% of United States exposures can be attributed to dogs. From 2000 – 2004 more cats than dogs were found to be rabid in the United States. The CDC reports that greater than 90% of all animal cases now occur in wildlife, while prior to 1960 the majority of rabid animals were domestic. Mongooses continue to be a reservoir for rabies in Puerto Rico. Even though human rabies is rare in the United States, it is estimated that nearly 40,000 people are vaccinated in the United States every year as post-exposure precautionary therapy. As of July 5, 2017, the CDC reported that Hawaii remains rabies-free.2,13,14

### Worldwide

Around the world, the most common source of human exposure is dogs. Pharmacists with travel clinics or simply being asked about travel vaccines, should consider prophylactic rabies vaccine for travelers to areas of the world with high rates of rabies. India, China, and the Democratic Republic of the Congo had the most human cases in 2015. Haiti also has a high mortality rate from rabies. Antarctica is the only continent without rabies. There are a few islands where there is no rabies disease. It is occasionally thought that Australia has no rabies. While it is technically true that there has been no identification of the lyssavirus known as rabies in Australia, the Australian bat lyssavirus also causes rabies which is reported to have a 100% fatality rate if symptoms of disease are exhibited.3,6,8,15,16

### Rabies Control

In the United States, Europe, Australia, and Japan, animal control laws requiring the vaccination of domestic animals have dramatically reduced the spread of rabies. Conversely, rabies cases are increasing in India since the passage of a law in 2001 that forbids the killing of dogs. Great Britain, by virtue of being an island with very restrictive animal importation laws, and very strict quarantine procedures, has a rabies rates nearing zero. Even though Great Britain has very low
Table 1  |  At A Glance: MMR Vaccine Controversy

In 1998, respected medical journal The Lancet carried the results of a small-scale study (12 children) that claimed a link between the Measles Mumps Rubella (MMR) combined vaccine and autism and colitis in children.

The leader of the research team, Andrew Wakefield promoted mass media coverage of the study. MMR became the biggest science story of 2002 and the public’s confidence in the vaccine was seriously shaken and vaccination rates fell.

Concerned over MMR safety, organisations such as the NHS, the US Centers for Disease Control and Prevention and the Cochrane Library carried out large-scale epidemiological studies. These highlighted some adverse vaccine effects, such as rashes and joint pain, but could not replicate the findings of the original study.

In 2004, Sunday Times journalist Brian Deer revealed that, two years prior to the research, Wakefield had been hired by lawyers from the UK’s legal aid fund, who were hoping to prove that the vaccine damaged children. This undeclared conflict of interest led to The Lancet partially retracting publication of the study.

The study was fully retracted in 2010, after allegations that the study data had been falsified. At the same time, the General Medical Council found Wakefield guilty of serious professional misconduct, unnecessarily invasive tests on children and multiple, undeclared conflicts of interest. He was struck off the medical register.

The scientific consensus is that there is no causal link between the MMR vaccine and autism.

Credit to Alastair Choy; The Telegraph; United Kingdom; 25 April 2018; with permission.

While vaccination of domestic animals is a hallmark of rabies control in the United States, the prevention of human rabies also includes public education to avoid animals that are clearly ill, avoiding contact with wild animals, and seeking immediate medical care for any suspected exposure. Training children not to provoke animals is also essential to the control of rabies exposures. Provocation may be as simple as attempting to pet or feed an unfamiliar animal or as barbaric as intentional animal incitement. Avoidance of unfamiliar animals is a difficult warning for children to understand, especially near baby animals and animals that are other’s pets. Adult supervision of children around animals and reinforcement of this message is important. The vast majority of fatal rabies cases worldwide occur in children.2,3,19

Table 2 describes the CDC recommendations for the disposition of a potentially infectious animal, and the recommendations for post-exposure prophylaxis. Non-domestic or exotic warm-blooded animals known or suspected to have been exposed to rabies should be euthanized immediately, if they can be safely captured. Euthanasia techniques should attempt to preserve brain tissue. Euthanizing non-domestic or exotic warm-blooded animals is also recommended when they have caused a human exposure. Unfortunately, it is uncommon that a wild animal will be captured following an human exposure. With non-domestic, exotic or wild species all recommendations for disposition include euthanasia, there are no recommendations for quarantine or observation for these animals. It is unlikely that wild rodents (mice, rats, etc) would survive an attack.
Table 2 | Guidelines to Animal Disposition and Post-exposure Vaccination²

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Evaluation and Disposition of Animal</th>
<th>Post-exposure Vaccination Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Dog, Cat, Ferret</td>
<td>• Healthy, available for 10-day observation&lt;br&gt;• Rabid or suspected rabid&lt;br&gt;• Unknown (escaped)</td>
<td>• Do not begin vaccination unless animal becomes symptomatic&lt;br&gt;• Immediately vaccinate&lt;br&gt;• Consult with public health officials</td>
</tr>
<tr>
<td>Raccoon, Skunk, Fox, Coyote, most other carnivores; Bats</td>
<td>• Regard as rabid unless animal is proven negative by laboratory test</td>
<td>• Consider immediate vaccination</td>
</tr>
<tr>
<td>Livestock, Horses, Rodents, Rabbits and Hares, other mammals</td>
<td>• Consider each exposure individually</td>
<td>• Consult with public health officials</td>
</tr>
</tbody>
</table>

**Note:** The bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other small rodents, rabbits, and hares almost never require rabies post-exposure prophylaxis.

United States Vaccines

The current inactive United States rabies vaccines offer significant improvements in the route of administration, number of doses, and side effects. There are currently two rabies vaccines available in the United States. Both are inactive vaccines with primary side effects of redness at the injection site and sore arms (or thighs depending upon patient age). The two American rabies vaccines are created differently. Imovax®, by Sanofi Pasteur, is produced in human diploid cell cultures. Imovax® is sometimes abbreviated HDCV (human diploid cell vaccine). RabAvert®, by Novartis, is produced in chick embryo cell culture and is sometimes abbreviated PCECV (purified chick embryo cell vaccine).

**Rabies Vaccine History**

Louis Pasteur and Emile Roux developed the original rabies vaccine in 1885. The vaccine was derived from the nerve tissue of purposefully infected rabbits. The vaccine was a live, attenuated vaccine that was administered into the abdomen in dosing regimens consisting of 14 to 23 injections. This vaccine and the subsequent vaccine developed by David Semple which is also a live, attenuated vaccine, resulted in significant neurologic side effects. Stories of the pain of the injections, the unusual site of administration (abdomen) and the severe side effects were used to discourage inappropriate animal encounters. The Pasteur-Roux vaccine is no longer produced. The Semple vaccine is still utilized in a few countries, but is not used in the United States or Europe. There was also a short-lived adsorbed rabies vaccine, formulated using Rhesus monkey lung tissue cultures that is no longer available on the American market.²¹,²²,²³,²⁴

Domestic animals (dogs, cats, ferrets) with known or suspected rabies exposures, and those that have exposed or potentially exposed a human, may be euthanized. In those situations where the owner is unwilling to sacrifice the animal, quarantine precautions should be undertaken. Quarantine for unvaccinated animals requires strict isolation for 6 months, preventing direct contact with humans or other animals. Animals that have a history of rabies vaccine, but are overdue for a booster should be euthanized or quarantined for observation at the discretion of the local rabies epidemiologist.

In some cases, there will be law expressly directing the actions to be taken for these animals. In animals that are current on rabies vaccine, another dose of vaccine should be administered immediately, and the animal should be observed for 45 days. In many communities the owner may observe the animal, in others a quarantine for observation will be required. Domestic rodents (mice, rats, gerbils, etc.) are very rarely infected with rabies. In the case of an exposure from a wild animal, or known rabid domestic animals, the domestic rodent should be euthanized.²

Note: Health care providers are reminded that using abbreviations for vaccines is discouraged because quality related events have been reported due to the misinterpretation of abbreviations.
These vaccines are considered to be equipotent, equiprotective, and interchangeable. Switching between brands in a single regimen should be avoided when possible, as long as it does not cause delay in the administration of the full regimen.25,26,27,28

The inactive rabies vaccines used in the United States are appropriate for all ages, including infants and pregnant patients. In adults, these vaccines are administered intramuscularly in the deltoid. For small children and infants, administration should be into the anterolateral thigh. Gluteal injections are to be avoided because the vaccine does not have proven efficacy when deposited into fat cells.1,25,28

**Rabies Immunoglobulin**

Following vaccination, the development of rabies antibodies to rabies takes about 7 days. Administering rabies immunoglobulin can confer passive immunity. Rabies immunoglobulin is dosed 20IU/kg, given once. The Immunoglobulin should be given at the same time as the first dose of rabies vaccine or within 7 days of the first rabies vaccine. After that time, host antibodies should have developed and the immunoglobulin will not provide any benefit. If there is a bite or visible wound, as much immunoglobulin as possible should be infiltrated around the area, with any remaining immunoglobulin administered deep IM, using a separate needle, at a site distant from the site of the rabies vaccine. Care must be taken not to administer intravenously.29,30

Human rabies immunoglobulin is prepared by cold alcohol fractionation from pooled venous plasma from people hyper-immunized with the rabies vaccine. Imogam®, rabies immunoglobulin, by Sanofi Pasteur, is available as 150IU/ml and is supplied in 2ml and 10ml vials. HyperRab®, rabies immunoglobulin, by Talecris is also available as 150IU/ml in both 2ml and 10ml vials. Rabies immunoglobulin should NEVER be mixed in the same syringe as rabies vaccine. Because immunoglobulin is derived from human plasma there is a chance for allergic reactions. Rabies immunoglobulin should not be administered without ready access to epinephrine.

Patients requiring live attenuated vaccines (measles, mumps, rubella, varicella, rotavirus, yellow fever) should be advised to wait 3 months following the administration of rabies immunoglobulin before receiving these live attenuated vaccines. Given that 40,000+ patients annually are treated with rabies immunoglobulin, pharmacists need to be careful about screening for recent immunoglobulin administration prior to administering any live vaccine.2,28,29,30

**Preventative Rabies Vaccine**

Rabies vaccine is unique amongst vaccines in that it is not only used prophylactically pre-exposure, but also for post-exposure treatment. Rabies vaccine, used prophylactically, is recommended for people who are at high risk of exposure: veterinarians, animal handlers, people who work in rabies laboratories or who handle rabies biologic products, and spelunkers. The vaccine is also appropriate for people who are likely to come into contact with rabid animals through work or travel. This may include nature photographers, travelers to areas of the world where rabies is common or others with a definable risk. Pre-exposure, or prophylactic, rabies vaccine is administered in three doses:

**Dose 1** Day 1

**Dose 2** Day 8 (7 days following dose 1)

**Dose 3** Days 22-29 (21 to 28 days following dose 1)

For people with repeated exposure through work, rabies immunity testing is recommended biannually, with single booster doses being administered to maintain the defined titer of >1:5. Immunity testing is not routinely recommended for travelers.1,2,26,27,31

**Post-exposure Treatment**

Patients who have a known or suspected exposure are broken into two groups: those with a known bite versus all other types of exposures, such as minor or unnoticed injuries, exposure of mucous membranes or existing wounds to potentially infectious material including saliva, brain or nervous tissue. This differentiation is useful in making decisions regarding the timing of treatment initiation or treatment versus non-treatment. Once the decision to treat has been made, the treatment is the same for both groups. Contact with other materials, blood, urine, or feces of a known or suspected rabid animal or petting such an animal is not considered an exposure. Likewise an inadvertent exposure to the modified live vaccine used for domestic animals should not be considered an exposure.2,3,32,33

Any unattended child, mentally disabled, or chemically impaired person found in a room with a bat is an indication for post-exposure treatment. Competent adults are often able to describe any exposures and the decision to treat should be based on each individual incident. All people awakening with a bat in the room should consider post-exposure
treatment because bat bites are not always painful and do not always leave an obvious mark on the skin. The low rate of bat rabies as well as the near 100% fatality rate if symptoms develop before treatment are issues to consider when deciding whether or not to receive post-exposure treatment.\textsuperscript{2,14}

Dead animals, especially those with significant injuries, such as animals killed on roadways, should be treated as having the potential to cause an exposure via nervous or brain matter. While laboratory confirmation of rabies can be obtained when the animal brain is available for testing, post-exposure therapy should not be delayed for laboratory testing. If laboratory testing produces a negative rabies result, any remaining post-exposure therapy may be discontinued.\textsuperscript{8}

Immediately following a known or suspected exposure patients should wash the area thoroughly with soap and water. If available, a virucidal agent, such as povidone-iodine, should be used to irrigate any skin wounds. Irrigation with povidone-iodine is not appropriate for exposures in the eye or mouth. If the exposure is a puncture wound, including a bite, tetanus prophylaxis should be considered, in addition to the rabies post-exposure protocols listed below. Patients who are unable to quickly find a record of tetanus immunization should be given the appropriate tetanus and diphtheria vaccine.\textsuperscript{2,28}

For patients who have not been vaccinated against rabies, post-exposure therapy includes both rabies vaccine and rabies immunoglobulin. The rabies immunoglobulin and the first rabies vaccine are administered as quickly as possible. Three additional doses of rabies vaccine are administered on days 3, 7, and 14. The guidelines for post-exposure care for immunosuppressed patients include a 5th dose of rabies vaccine on day 28. For the immunocompromised patient, the immunoglobulin is to be given at the same dose as instructed for non-immunosuppressed patients.

When patients have an international exposure, treatment may be initiated upon return to the United States. Every attempt should be made to determine the care provided abroad, but rabies vaccine and immunoglobulin should be strongly recommended for these patients.

**Conclusion**

Rabies is a caused by two viruses, that together, cover most of the globe. Because there are so many possible animal hosts and the widespread nature of the virus, eradication is not a realistic goal. That does not mean, however, that the prevention of human death cannot be improved. Post-exposure therapies, starting with appropriate wound care, vaccination, and immunoglobulin, can prevent a rabies infection. Recognition of the value of vaccination in domestic animals and the prevention of animal-to-human exposure is vital to preventing human death.

While bats are the most common source of rabies exposure in the United States, world-wide attempts have been made to control rabies in wild animals, including dosing foxes in the Swiss Alps with chicken heads treated with live attenuated rabies vaccines, but dogs remain the leading cause of human exposure. Finding ways to create a stable and affordable canine vaccine will help to decrease human exposure and the resulting human fatalities. To reach the 70% coverage goal necessary to protect humans, 1 in every 2 unvaccinated dogs would need to be vaccinated, in addition to maintaining vaccination status in the 20% current on rabies vaccines. September 28th has been declared World Rabies Day in hopes of bringing attention to this international health problem.\textsuperscript{3,31,34}
References

5. Rotivel Y; Introduction to the Federation of American Scientists; 26 April 2009-archived.
26. Innovax; Package Insert; SanofiPasteur; Apr 2013.
27. RabAvert; Package Insert; GSK Vaccines; 2018.
28. Recommendations of the Advisory Committee on Immunization Practices; MMWR 2008;57 [No. RR-3].
29. Imogam; Package Insert; SanofiPasteur; Nov 2018
30. HyperRab; Package Insert; Grifols Therapeutics; Sep 2012.

Policies for the Nebraska Mortar & Pestle (M&P) continuing pharmacy education lessons and quizzes:

1. M&P Quizzes are valid only for the membership year in which they are published. Quizzes for the 2019 Membership Year must be received by December 12, 2019. Quizzes cannot be carried over to another membership year.
2. If more than three questions are missed, the quiz will be returned. The quiz can be resubmitted.
3. CPE transcripts can be printed from NABP e-Profiles at www.nabp.net.
4. CPE credits are submitted to NABP by the 15th of each month. For example, M&P CPE quizzes completed in the month of June 2019 will be sent to NABP e-Profiles before July 15, 2019.

The Nebraska Council for Continuing Pharmacy Education (NCCPE) is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmacy education (CPE). This CPE home study activity has been accredited for 1.0 contact hour or 0.10 CEU. UAN 0128-0000-19-038-H01-P for pharmacists and UAN 0128-0000-19-038-H01-T for pharmacy technicians. This is a application-based CPE activity targeted to pharmacists and pharmacy technicians.

The Nebraska Pharmacists Association disclaims any liability to you or your patients resulting from reliance solely upon the information contained herein.

Quiz Answers may be submitted:
Online: www.npharm.org
Fax: 402-420-1406
Email: m&p@npharm.org
Mail: Nebraska Mortar & Pestle
6221 S 58th St, Ste A
Lincoln, NE 68516
Rabies: Disease, Counseling, and Treatment

Quiz #8, May/June 2019, ACPE 0128-0000-19-038-H01-P/T

1. Rabies is a zoonotic disease. What does zoonotic mean?
   a. A disease causing a zombie-like state.
   b. A disease present on all but one continent.
   c. A disease transmitted from animals to humans.
   d. Bat-borne disease.

2. You are staffing a travel clinic. Christian is going on a Rocky Mountain cave exploration encounter and wants to know if rabies vaccine is appropriate. She is current on all age-appropriate vaccines but has never been vaccinated against rabies. Which is the best answer?
   a. 3 doses of purified chick embryo vaccine are appropriate.
   b. 5 doses of Pasteur-Roux vaccine are appropriate.
   c. Rabies immunoglobulin should be given to Christian.
   d. Rabies vaccine is only appropriate for foreign travel.

3. Brooklyn works for animal control and has just been bitten by a stray dog. Brooklyn has never been vaccinated against rabies. Which is the best therapy for her?
   a. Give 4 doses of rabies vaccine.
   b. Give rabies immunoglobulin 20 IU/kg and 4 doses of rabies vaccine.
   c. Give rabies vaccine and 4 doses of immunoglobulin 20 IU/kg.
   d. Wait until the necropsy on the dog is completed to decide.

4. Jacob works with Brooklyn, from the previous question. He was also exposed when the dog’s saliva contaminated both of his eyes. Jacob received prophylactic, post-exposure treatment for rabies 6 years ago. Which is the best therapy for him?
   a. Give 2 doses of rabies vaccine.
   b. Give rabies immunoglobulin 20 IU/kg and 4 doses of rabies vaccine.
   c. Give rabies vaccine and 4 doses of immunoglobulin 20 IU/kg.
   d. Wait until the necropsy on the dog is completed to decide.

5. What is the most common source of a known or suspected human rabies exposure in Nebraska?
   a. Bats
   b. Cats
   c. Dogs
   d. Squirrels

6. What is the most common source of a known or suspected human rabies exposure world-wide?
   a. Bats
   b. Cats
   c. Dogs
   d. Mongooses

7. Taylor has been exposed to a potential rabies infection through a wild-animal bite. She weighs 205 pounds, is 26 years old, has no known drug allergies, and has never been vaccinated against rabies. In addition to administering a rabies vaccine, you want to give rabies immunoglobulin. What dose of immunoglobulin is appropriate for Taylor?
   a. 1860 IU
   b. 4100 IU
   c. 1860 mg
   d. 4100 mg

8. Mrs. Frantik is planning a trip to Paris. She read, on a social media site, that there are rabid dogs in rural France. She is now in a panic and asking for your help. Which of the following is good advice for her?
   a. Don’t approach or provoke any dogs during your trip.
   b. We can dispense rabies immunoglobulin for you to take with you, in case you are exposed.
   c. We can schedule rabies vaccine for you, if you have 5 weeks or more before your trip.
   d. We will give you doxycycline to take with you. Don’t take it unless you are bitten.

9. Which of the following public health initiatives has resulted in the greatest reduction of human exposure to rabies in the United States?
   a. Improvement in rabies vaccine
   b. Improvements in the sanitation system
   c. Mass vaccination of school aged children
   d. Required vaccination of domestic animals

10. Which of the following patients should be given post-exposure treatment for rabies?
    a. A child who awakens to find a bat in her room.
    b. A hunter who has been exposed to deer blood.
    c. An environmental services person who cleans up dog urine.
    d. A and D should each be treated.

---

Name ______________________________________
Mailing Address __________________________________________
City/State/Zip ______________________________________

Circle one (1) Answer:
1. a b c d  6. a b c d
2. a b c d  7. a b c d
3. a b c d  8. a b c d
4. a b c d  9. a b c d
5. a b c d  10. a b c d

CPE Home Study Evaluation
1. Rate this lesson: (Excellent) 5 4 3 2 1 (Poor)
2. Did this lesson meet each of its objectives? ___ Yes ___ No
3. Was the content without commercial bias? ___ Yes ___ No
   If not, please explain_____________________________________
4. Did the lesson meet your educational/practice needs? ___ Yes ___ No
5. Comments/future topics are welcome. ____________________________________

The deadline for this quiz is December 12, 2019.
Spring 2019 Honors Convocation and Commencement

The Joslyn Art Museum was the venue for the 2019 Scholastic Honors Convocation on May 3. Fifty-nine seniors were vested with their doctoral hoods and took the Pharmacist’s Oath. Senior recognition awards and the 2019 Preceptor, Faculty Preceptor and Site of the Year Awards were also presented at the Convocation. Spring Commencement was held at the Baxter Arena May 4. The 2019 graduates and senior award recipients are presented below and on the following page.

2019 Doctor of Pharmacy Degree Recipients

Kyle Baumgart, Columbus
Nichole Boggs, Ponca
Brittney Boterman, Tea, SD
Delores Anita Brown, Stanton
Colin Brunick, Sioux Falls, SD
Qing Cao, Zhengzhou, China
Adam Cheloha, Lincoln
Kelsey Christensen, Seward
Brendan Cope, Omaha
Kevin Creal, Lincoln
Jacob Duncan, Aurora, CO
Dane Ewald, Omaha
Morgan Flannigan, Lawrence, KS
Megan Fleury, Omaha
Erik Furst, Omaha
Yangyang Gao, Zhengzhou, China
Krissa Glaubius, Gering, NE
Ashleigh Grammer, Wildwood, MO
Jordan Gran, Soldier, IA
Allison Graner, Omaha
Molly Haley, Red Oak, IA
Alex Hamilton, Fremont

Brian Haskell, Lincoln
Brandon Heuermann, Grand Island
Lauren Hoeft, Holdrege
Miranda Hopper, Grand Island
Tanner Johnson, Elkhorn
Kokou Kanley, Omaha
Abraham Karimi-ASL, Omaha
Stefanie Kellogg, Ashland
Byron Korf, Yuma, CO
Matthew Laetsch, Atkinson
Michaela Leddy, Omaha
Jazmin Lee, Bloomfield
Shanna Leise, Hartington
Kent Marburger, Humboldt
Nicholas Miesbach, Waverly
Molly Miller, Kennard
Spencer Moore, Hebron
Catherine Nguyen, Omaha
Lien Nguyen, Can Tho City, Vietnam
Ngoc Nguyen, Saigon, Vietnam
Mackenzie Patterson, Bellevue
Corey Paz, McCook
Weilin Qian, Shanghai, China
Margaret Renner, Fairbury
Weilin Qian, Shanghai, China
Travis Scheuler, Grand Island
Hunter Severin, Bellevue
Jasmin Lee, Bloomfield
Weilin Qian, Shanghai, China
Matthew Laetsch, Atkinson
Jordan Gran, Soldier, IA
Allison Graner, Omaha
Molly Haley, Red Oak, IA
Alex Hamilton, Fremont

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Preceptors and Distinguished Alumnus Honored

The College of Pharmacy Class of 2019 named Jeffery Kildow, Pharm.D., Preceptor of the Year. Faculty Preceptor of the Year was presented to Jennifer Foster, Pharm.D., Clinical Assistant Professor. Site of the Year award was presented to Grand Island Veterans Administration and accepted by Drs. Brent Bollwitt, Lourdes Heuermann, Paula Carlson, and Lisa Bilsland.

Dr. Kildow's practice site is Regional West Hospital in Scottsbluff, NE.

Students praised Dr. Kildow's excellence at balancing both the management and the clinical side of pharmacy. He allowed flexibility and encouraged rotation students to gain experience in many patient care settings including overnight shifts. He spent significant time reviewing important topics and provided excellent feedback throughout the rotation.

Popular rotation site, Grand Island VA, hosted twenty P4s this year. Their reputation has been earned through the challenging and diverse patient population students work with but more importantly the quality of preceptors at this site. The preceptors are excellent at facilitating learning opportunities through relevant and interesting mini lectures and projects. The most rewarding part of this rotation is the trust that the preceptors show in the students. They encouraged independent clinical problem-solving, allow students to do full patient work-up, and expect students to make appropriate recommendations to their care. Students finish the four weeks feeling very confident in their abilities as pharmacists.

Dr. Foster was awarded the Faculty Preceptor of the Year award. Dr. Foster practices at OneWorld Community Health Center where the focus is on ambulatory care.

Dr. Foster is one of the most vibrant and passionate healthcare professionals you'll ever have the opportunity to work with. From day one, you can feel her true passion for the profession. She is extremely knowledgeable and beyond willing to teach and to share her knowledge in any way she can. She is a true role model for our profession, and I think the field of pharmacy would benefit greatly if we all strived to practice like she does.

Dr. Foster was awarded the Faculty Preceptor of the Year award. Dr. Foster practices at OneWorld Community Health Center where the focus is on ambulatory care.

Gary Stroy, a 1967 graduate, was presented with the Distinguished Alumnus Award. Mr. Story co-founded a company called LifeScan, which pioneered the concept of personal blood glucose monitoring for managing diabetes. He was an initial investor in ChemTrack, which was a firm that developed the first home cholesterol test. He is a co-inventor on several patents, and he is recognized worldwide for his pioneering contributions in the area of immunoassay technology for therapeutic drug monitoring and diabetes management.

Congratulations to Drs. Kildow and Foster, Grand Island VA, and Distinguished Alumnus, Gary Stroy.

Senior Award Recipients

Rho Chi Achievement Award
Krissa Glaubius

Phi Lambda Sigma Award
Delores Anita Brown

Kappa Psi Key
Jacob Siel

Merck Index Award
Qing Cao
Mackenzie Patterson

Mylan Pharmaceuticals Award
Brandon Heuermann

Barbara Osborne Manchester Award
Lindsay Heimann

Stephen A. Scholtz Memorial Award
Kyle Baumgart

Bradley G. Wulf Memorial Award
Spencer Moore

Clinical Services Award
Kokou Kanley

Cunningham Memorial Award in Pharmacodynamics
Matthew Laetsch

Joseph B. Burt Memorial Award
Tanner Johnson

Phyllis Rhodes Award
Molly Miller

Academy of Students of Pharmacy Certificate of Recognition Award
Amy Venteicher

Varro and Virginia Tyler Award
Jazmin Lee

US Public Health Service Excellence in Public Health Pharmacy Practice Award
Delores Anita Brown

Patient Care Champion Award
Logan Smolla
Nathan Suck

Facts and Comparisons Award of Excellence in Clinical Communication
Jacob Duncan

Excellence in Advanced Practice Experiences Recognition Award
Michaela Leddy
Sunscreen Products

Written by Shana Castillo, PharmD

As summer approaches, it’s time to start thinking about sunscreens. The American Academy of Dermatology (AAD) estimates that 20% of people will develop skin cancer in their lifetime.1 Of course, the best way to protect against this is to wear protective clothing or to stay out of the sun altogether, but when this isn’t possible, sunscreen provides an effective alternative. New proposed regulations by the U.S. Food and Drug Administration (FDA) aim to ensure that sunscreen products are safe and effective and make it easier for consumers to identify important information on the product labeling itself.2

Sun Protection Factor (SPF)
A common misconception is that SPF relates directly to the amount of time spent in the sun. For example, “If I burn after one hour, a sunscreen with an SPF of 30 will allow me to stay in the sun without burning for 30 times that.” This is simply not true. SPF is a measure of solar energy exposure which is affected by factors in addition to time, such as solar intensity and skin type.3 The AAD recommends that consumers use a sunscreen with an SPF of at least 30.1 A previous FDA proposed ruling suggested that products should be labeled with a maximum SPF of 50+, citing a lack of evidence showing increased protection beyond this;3 however, the new proposed ruling increases that value to 60+.2 SPF is only indicative of protection against UVB radiation which is why it is important to select a product labeled as “broad spectrum” to ensure coverage against UVA radiation as well.4 The new proposed ruling would require all sunscreens with an SPF ≥15 to provide broad spectrum coverage as well, making it easier for consumers to select an appropriate product. This key product information will also be presented in a new, easier to read format.2

Other Key Labeling Requirements

Sunscreen products may provide labeling that indicates they are “water resistant” (40 minutes) or “very water resistant” (80 minutes).5 The AAD suggests that consumers purchase a product that is at least “water resistant”; however, it’s important to note that there is no such thing as a “waterproof” sunscreen.1,4 Only broad spectrum sunscreens with SPF ≥15 are allowed to include labeling that states they “decrease the risk of skin cancer and early skin aging caused by the sun”. Others may only state that they “help prevent sunburn”.3 The FDA now proposes in its new ruling that the front label advise consumers to read the skin cancer and skin aging alert on sunscreens that do not prevent these.2

Generally Recognized as Safe and Effective (GRASE)

Some nonprescription products in the U.S. are allowed to be marketed without an approved new drug application because they are generally recognized as safe and effective (GRASE). Under the new proposed ruling, the FDA considers only zinc oxide and titanium dioxide, both physical sunscreens, to be GRASE. Aminobenzoic acid (PABA) and trolamine salicylate are not considered GRASE and the FDA proposes that there is insufficient evidence to make a determination regarding the other twelve chemical sunscreens at the present time.2 A recent exploratory study further demonstrated the need for more research on these products when it showed the magnitude of systemic exposure to four commercially available sunscreen ingredients after application to 75% of the body surface area every four hours. The resulting plasma concentrations were above 0.5 ng/mL for all four ingredients, a level at which the clinical effects are unknown.6 Dosage formulations of sunscreen considered GRASE are butters, creams, gels, lotions, oils, ointments, sprays, and sticks. The FDA is requesting additional data on powders but proposes that any other dosage forms be handled with new drug applications. Finally, any combination product with both sunscreen and insect repellent will not be considered GRASE.2

Tips for Consumers

The new FDA proposed ruling will allow consumers to feel confident in knowing that the sunscreen they choose is safe and effective. Remind patients to always use products according to their labeling and apply 15 minutes before intended exposure.7 The AAD suggests that most adults need to apply about 1 ounce — or the size of a shot glass — to the body.1 A good method of distribution is ½ teaspoonful to the face and neck area (avoiding the eyes), ½ teaspoonful to the arms and shoulders, ½ teaspoonful each to the front and back of the torso, and 1 teaspoonful to each leg and top of foot.8 Sunscreen should be reapplied according to label instructions but every 2 hours for products that are not water-resistant. The expiration date on the sunscreen label should be checked before use and the product should be stored out of direct sunlight to retain potency and effectiveness.7

Objectives
At the conclusion of this lesson, pharmacists and pharmacy technicians should be able to:
1. Describe the transmission and diagnosis of head lice.
2. Identify available prescription and over the counter treatments for lice.
3. Discuss ways to educate patients and communities about head lice.

Introduction
Head lice infestations are common in the United States and affect all socioeconomic classes. Outbreaks typically occur in preschool or elementary school settings where children have direct head-to-head contact. Their household members and caretakers may also become infested. Traditional treatment strategies include application of topical products to kill lice and/or nits (eggs), followed by manual removal of lice and nits from the hair using fine-tooth nit combs.

Alternative treatments are available, although most lack solid scientific evidence of efficacy. Misinformation about head lice is rampant, often leading to misdiagnoses and improper treatment. Many schools still have “no-nit” policies that prevent children from returning to school until they are nit free. The National Association of School Nurses (NASN), the American Academy of Pediatrics (AAP), and the Centers for Disease Control and Prevention (CDC) have declared “no-nit” policies that are based on misinformation, not scientific facts, disrupt student learning, and stigmatize and shame children. Pharmacists can assist their communities by arming themselves with evidence-based facts to help dispel fallacies related to effective management of head lice.

Background
Head lice (Pediculus humanus capitis) infestation is a common occurrence and affects people worldwide. Head lice are transmitted through head-to-head contact, so outbreaks typically occur in day-care centers and elementary schools where children directly interact with one another. Household members and caretakers may also become infested. Head lice are problematic, but they are not known to transmit any disease and are not considered a health hazard. Secondary bacterial infections may develop when patients scratch itchy areas on the scalp causing open lesions.

Head lice infestation (pediculosis) is not due to poor hygiene or cleanliness of the environment and all socioeconomic groups can be affected. Nevertheless, having lice carries a stigma and infested children are often excluded from events with their schoolmates and friends. Although sound data are lacking, it is estimated that six to twelve million cases of pediculosis occur annually in children three to eleven years old in the United States.
States. Treatments for head lice are generally safe and effective when used correctly. Misinformation about head lice abounds and this article aims to provide evidence-based information to help readers distinguish facts from fallacies. See Table 1 for facts and fallacies. Pharmacists can play a key role in dispelling incorrect perceptions about head lice and educating patients about effective management of this common problem.

**Etiology**

The head louse is a parasitic insect that requires a human host for its survival. The life cycle of the head louse involves three stages: egg, also known as a nit, nymph and adult (see Figure 1). The adult female louse lays single eggs on the hair shaft of the host approximately ¼” from the scalp. Females lay eight to ten eggs daily and produce between 80 and 100 eggs in their lifetime. The eggs are “glued” to the hair shaft with a substance produced by the louse and resemble small oval specks (about the size of a knot in thread) that are yellow to white in color. The eggs will hatch into nymphs in six to nine days and leave the egg casings. When the nymph hatches, it resembles an adult head louse but is much smaller, about the size of a pinhead. Nymphs may appear reddish in color due to ingested blood or grayish in color after the blood has been digested. Nymphs pass through three molting cycles and become mature adults roughly ten days after hatching. An adult louse is the size of a strawberry seed or sesame seed and may live on a person’s head for up to 30 days. The louse prefers environments that are dark and warm to maintain its body temperature. Adult head lice have six clawed legs which facilitate gripping the hair shaft and they are commonly found behind the ears, near the temples, at the nape of the neck or under a ponytail. Occasionally, they may be located on eyebrows and eyelashes. Lice stay close to the scalp of humans and use their piercing mouthparts to dig into the skin and feed on blood multiple times per day. Without a host, lice will die within one to two days because they no longer have warmth and a food source and eggs will die within a week because they are not incubated at an appropriate temperature.

**Transmission**

Head lice cannot fly or hop, they can only crawl. The primary manner in which lice are transmitted from an infested person to another individual is via close head-to-head contact. Pets do not carry head lice from person to person. Rarely, head lice may be transmitted to a human host from inanimate objects such as articles of clothing, stuffed animals, towels, bed linens, contact with upholstered furniture or carpet, helmets, combs or brushes.

**Diagnosis**

Seeing a live nymph or louse in the hair or on the scalp establishes a diagnosis of pediculosis. However, head lice move rapidly, avoid light, and can be difficult to spot if only a few are present. The presence of nits does not necessarily confirm an infestation. Nits located more than ¼ inch from the scalp are likely nonviable or are empty egg casings. Pediculosis is likely when nits are attached to the hair shaft and within ¼ inch of the scalp. Use of a magnifying glass in good lighting may help determine if the egg casing is empty or if a nymph is present in the egg. Eggs may be easier to locate in the hair behind the ears or at the nape of the neck. Misdiagnoses occur commonly when dandruff or other hair debris, droplets of hair products, nonviable nits, or even other insects are mistaken for lice or viable nits.

Pruritis, caused by an allergic reaction to louse saliva, is the most common symptom associated with pediculosis. Scratching may lead to sores on the scalp. Other potential symptoms include a tickling sensation of movement in the hair and nighttime restlessness or trouble sleeping because head lice are most active in the dark.

If evidence of an active infestation is found, all household members and close contacts should be carefully checked. Treatment is indicated only
### Table 1 | Head Lice: Fact versus Fallacy*

<table>
<thead>
<tr>
<th>Fallacy</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head lice infect people with poor hygiene habits or those who reside</td>
<td>Personal hygiene or cleanliness in the home or school has nothing to do with getting head lice.</td>
</tr>
<tr>
<td>in unclean environments.</td>
<td></td>
</tr>
<tr>
<td>Head lice infestations should be avoided because lice spread</td>
<td>Head lice should not be considered a medical or public health hazard. Head lice are not known to spread disease.</td>
</tr>
<tr>
<td>infection.</td>
<td></td>
</tr>
<tr>
<td>People’s pets can spread lice.</td>
<td>Head lice are specific to humans. Dogs, cats and other pets do not play a role in the spread of head lice.</td>
</tr>
<tr>
<td>Lice are mobile and can hop and fly from person to person.</td>
<td>Head lice move by crawling. Lice cannot hop, fly, or swim. Most transmission is only by direct head-to-head contact.</td>
</tr>
<tr>
<td>You cannot see head lice because they are microscopic.</td>
<td>Head lice are the size of sesame seeds. They can be tan, brown, or gray in color. They might be a bit difficult to see with the naked eye, so it is helpful to look for them in natural light with a magnifying glass.</td>
</tr>
<tr>
<td>Lice can hide and live in beds, clothing or brushes for days.</td>
<td>Head lice need warmth and a host to survive. They live close to the human scalp and feed on human blood several times a day. Adult head lice can live 1–2 days off the human head.</td>
</tr>
<tr>
<td>Lice can be easily spread by sharing earphones or sports helmets.</td>
<td>The most common way head lice are spread is through direct contact with the hair of an infested person. Spread by contact with inanimate objects rarely occurs. Head lice legs are adapted to hold onto human hair. They would have difficulty attaching firmly to smooth or slippery surfaces like plastic or metal.</td>
</tr>
<tr>
<td>If an egg falls out of the hair, it may hatch and infest another person.</td>
<td>Eggs are glued to the hair shaft by a “cement-like” substance made by lice and are very hard to remove. When a nymph (baby louse) is hatched, it cannot survive without the warmth and food source of a human head.</td>
</tr>
<tr>
<td>Lice misdiagnosis is uncommon.</td>
<td>Identification of eggs, nymphs, or adult lice establishes the diagnosis. This can be difficult sometimes because lice avoid light and can crawl quickly. Dandruff, hair casts, hairspray or hair gel residues, dirt, scabs, or other insects (e.g., aphids caught in the hair) have led to misdiagnosis of lice infestation.</td>
</tr>
<tr>
<td>In all cases of head lice infestation, people will have incessant</td>
<td>If this is a person’s first infestation or if the infestation is light, the patient may be asymptomatic. Itching is the most common symptom and is caused by an allergic reaction to louse bites. For first time infestations, it may take 4–6 weeks for itching to appear. Other symptoms experienced are a feeling that something is moving in the hair, irritability or sleeplessness, or sores on the head caused by scratching.</td>
</tr>
<tr>
<td>itching.</td>
<td></td>
</tr>
<tr>
<td>Cutting your child’s hair so that it is very short prevents the spread of head lice.</td>
<td>Lice infestation is not significantly influenced by hair length, so this will not impact the risk of getting head lice.</td>
</tr>
<tr>
<td>Children with head lice should stay home from school until they are</td>
<td>The American Academy of Pediatrics’ guidelines recommend letting the parent of the child know about the lice diagnosis but refraining from sending the child home that day or restricting them from attending school. “No-nit” policies have been associated with increased risk of incorrect diagnosis of head lice, increased number of days children are out of school and negative social stigma.</td>
</tr>
<tr>
<td>nit-free.</td>
<td></td>
</tr>
</tbody>
</table>

if live nymphs, adult lice or viable eggs are present. All infested family members should be treated on the same day to prevent reinfections in the household.

**Prevention**

Common concerns that arise when an individual has lice are how to prevent the transmission of lice to other household members and how to avert re-infection via contact with items in the house. It is helpful to bear in mind that lice will survive only one to two days once removed from the host. Thus, items that have been in contact with an infected person within 24-48 hours prior to treatment must be disinfected. Combs, brushes and hair accessories can be soaked in hot water (at least 130°F) for five to ten minutes and allowed to air dry. Clothing, bedding, and other machine washable articles should be washed in hot water (at least 130°F) and dried at high heat. Upholstered furniture, car seats and floors should be vacuumed.

Insecticide sprays are not recommended due to the self-limiting nature of lice and potential toxicity if inhaled or absorbed through the skin. Recommendations to seal all items that cannot be washed in a plastic bag for fourteen days are still advanced by some organizations, while others no longer endorse this measure.

Preventing passage of head lice from one person to another is fairly simple. Hairbrushes/combs, hair accessories, hats, scarves, or other clothing items should not be shared. Avoid head-to-head contact with infected people and do not lie on beds, pillows or carpets with which they may have had contact in the past 24-48 hours.

**Treatment**

Many treatment options are available for head lice including pharmacologic and non-pharmacologic. Over-the-counter (OTC) and prescription topical products include creams, lotions, shampoos and gels, some of which are pediculicidal (kills lice) and some are both pediculicidal and ovicidal (kills eggs). Oral prescription drugs are also an option. Non-pharmacologic options include nit combs, desiccation devices and alternative topical products.

**Pharmacologic Treatments**

**Topical Products (Table 2)**

**Dimethicone gel** is a silicon polymer approved for individuals two years of age and older. When applied, dimethicone occludes the respiratory system of lice and inhibits water excretion leading to death. In a study of 58 children, 98.30% were free of live lice and 55.20% were free of viable eggs one day after treatment. Fourteen days after treatment 96.50% were still free of live lice and 80.70% were free of viable eggs. Forty-three children received one treatment, 10 children received two treatments and 5 received three treatments.

Directions for use: Cover face and eyes with a towel and keep eyes closed during treatment. Apply behind the ears and back of neck. Apply to dry hair and massage until thoroughly wet. Wait ten minutes. While hair and scalp are wet with gel, comb out lice, eggs and nympha with a lice comb. After combing the entire head, wash hair thoroughly with shampoo and warm water.

**Permethrin lotion, 1%,** is approved for use in individuals two months of age and older. Hyper-stimulation of the nervous system leads to paralysis and death. Permethrin is a synthetic pyrethrin and leaves a residue on the hair which allows for continued killing of newly hatched nymphs so a second treatment may not be necessary, however, resistance is widespread.

Directions for use: Keep eyes closed during treatment. Wash hair with shampoo and rinse with water. Do not use a conditioner or a shampoo that contains a conditioner because this decreases effectiveness. Dry hair with a towel until damp. Shake permethrin lotion well. Cover face and eyes with a towel. Keep eyes closed during treatment. Apply permethrin lotion to hair and scalp area beginning behind ears and the back of the neck and then cover all the hair. Leave the lotion on hair and scalp for ten minutes after applying. Use a timer or clock to track the time. Rinse hair and scalp with warm water in a sink. To keep the lotion off the rest of the body do not rinse off in a shower or bathtub. Dry hair with a towel and comb out tangles. Wash hands carefully after the application and rinsing steps. If live lice are seen seven days or more after treatment, repeat this entire process.

**Pyrethrins with piperonyl butoxide** shampoo is approved for use in individuals two years of age and older. Like permethrin, pyrethrins hyper-stimulate the nervous system leading to paralysis and death. The shampoo does not leave a residue, so a second application is necessary. Pyrethrins are derived from chrysanthemum plants and there have been rare reports of allergic reactions and asthma exacerbations in individuals with ragweed allergies. Resistance has been reported but varies geographically.

Directions for use: Shake the shampoo well. Cover face and eyes with a towel and keep eyes closed during treatment. Apply pyrethrin with piperonyl butoxide shampoo to dry hair and scalp beginning behind ears and the back of the neck. Keep the shampoo on for ten minutes, but no longer. Use a timer or clock to track the time. After ten minutes, use a small amount of warm water to form a lather and shampoo as usual. Rinse hair and scalp thoroughly with warm water. Dry hair with a towel and comb out tangles. Repeat this entire process in seven to ten days to kill the lice that hatch from eggs.

**Benzyl alcohol lotion, 5%,** is approved for individuals six months of age and older. It is occlusive and kills lice by suffocation. It is not ovicidal, so a second application is necessary. In clinical trials 75% of patients were lice-free two weeks after two treatments applied one week apart.
<table>
<thead>
<tr>
<th>Drug</th>
<th>OTC/Rx</th>
<th>Ovicidal</th>
<th>Resistance</th>
<th>FDA-Approved Lower Age or Weight Limit</th>
<th>Dosage and Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethicone gel – generic LiceMD</td>
<td>OTC</td>
<td>Yes</td>
<td>No</td>
<td>2 years</td>
<td>Apply to dry hair for 10 minutes comb hair with provided comb then shampoo hair</td>
</tr>
<tr>
<td>(Quantum Pharmaceuticals)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permethrin 1% cream rinse – generic Nix</td>
<td>OTC</td>
<td>No</td>
<td>Yes</td>
<td>2 months</td>
<td>Apply to shampooed, towel-dried hair for 10 minutes then rinse; repeat 7 days later</td>
</tr>
<tr>
<td>(Insight)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrethrins w/piperonyl butoxide shampoo –</td>
<td>OTC</td>
<td>No</td>
<td>Yes</td>
<td>2 years</td>
<td>Apply to dry hair for 10 minutes then shampoo; repeat 7-10 days later</td>
</tr>
<tr>
<td>generic Rid (Bayer)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Benzyl alcohol 5% lotion – Ulesfia</td>
<td>Rx</td>
<td>No</td>
<td>No</td>
<td>6 months</td>
<td>Apply to dry hair for 10 minutes then rinse; repeat 7 days later.¹</td>
</tr>
<tr>
<td>(Lachlan)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ivermectin 0.5% lotion – Sklice</td>
<td>Rx</td>
<td>No</td>
<td>No</td>
<td>6 months</td>
<td>Apply to dry hair and scalp for 10 minutes then rinse.²</td>
</tr>
<tr>
<td>(Arbor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malathion 0.5% lotion – generic Ovide</td>
<td>Rx</td>
<td>Yes</td>
<td>Not in US</td>
<td>6 years¹</td>
<td>Apply to dry hair for 8-12 hours then shampoo; repeat 7-9 days later if necessary.²</td>
</tr>
<tr>
<td>(Taro)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spinosad 0.9% suspension – Natroba</td>
<td>Rx</td>
<td>Yes</td>
<td>No</td>
<td>6 months</td>
<td>Apply to dry hair for 10 minutes then rinse; repeat 7 days later if necessary.²</td>
</tr>
<tr>
<td>(ParaPro)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 | Topical Drugs for Head Lice*

*Adapted with permission by The Medical Letter®, Volume 58, November 21, 2016.

1. The amount of benzyl alcohol 5% lotion recommended per application depends on hair length: 0-2 inches (4-6 oz), 2-4 inches (6-8 oz), 4-8 inches (8-12 oz), 8-16 inches (12-24 oz), 16-22 inches (24-32 oz), >22 inches (32-48 oz).
2. The manufacturer recommends using up to one single-use, 4-oz tube of topical ivermectin lotion per application.
3. The safety and effectiveness of malathion lotion have not been established in children <6 years old; it is contraindicated in children <24 months old.
4. In clinical trials, patients used a maximum of 2 fl oz of malathion lotion per application.
5. One or two 20-minute applications have also been effective (TL Meinking et al. Pediatr Dermatol 2004; 21:670).
6. The manufacturer recommends using up to one 4-oz (120 mL) bottle of spinosad 0.9% suspension per application.

Directions for use: Cover face and eyes with a towel and keep eyes closed during treatment. Apply benzyl alcohol lotion to dry hair and scalp area. Apply the lotion in the scalp areas behind the ears and at the back of the neck. Use enough lotion to cover the entire scalp area and all the hair. Keep the lotion on for ten minutes after applying. Use a timer or clock to track the time. After ten minutes, rinse the lotion from the scalp and hair with water in a sink. To keep the lotion off the rest of the body do not rinse off in a shower or bathtub. Wash hands carefully after the application and rinsing steps. May shampoo hair after rinsing the lotion from scalp and hair. Repeat this entire process in one week to kill the lice that hatch from eggs.¹⁹

Ivermectin lotion, 0.5%, is approved for individuals six months of age and older. Ivermectin causes paralysis and death and while not oxicidal, lice that hatch after treatment normally die within 48 hours.²⁰

Directions for use: Keep eyes closed during treatment. Apply ivermectin lotion to dry hair and dry scalp area starting at the scalp and then working outwards towards the ends of the hair. Be sure to use enough lotion to cover the entire scalp area and hair thoroughly. Use up to one entire 117 gram tube. Leave the lotion on hair and scalp for ten minutes after the hair and scalp are completely covered. Use a timer or clock to track the time. After ten minutes have passed, rinse hair and scalp only with water. Wash hands thoroughly after the application and rinsing steps. Discard any unused portion of the tube once you finish this treatment. Wait 24 hours before shampooing hair.²¹

Malathion lotion, 0.5%, is approved for individuals six years of age and older. Malathion hyper-
stimulates the nervous system which prevents feeding, leading to death. One application of malathion is usually sufficient, and resistance has not been reported in the United States. Malathion is contraindicated in children under two years of age and has not been studied in children under the age of six years.

Directions for use: Keep eyes closed during treatment. Apply malathion lotion to dry hair and scalp area being sure to cover area behind ears and at the back of neck. Use enough lotion to cover the entire scalp area and hair thoroughly. Allow hair to air dry and to remain uncovered. Malathion lotion is flammable. The lotion and wet hair should not be exposed to open flames or electric heat sources including hair dryers or curlers. Leave the lotion on your hair and scalp for eight to twelve hours. After eight to twelve hours, shampoo hair and scalp with warm water in a sink. To keep the lotion off the rest of the body do not rinse off in a shower or bathtub. Wash your hands thoroughly after the application and rinsing steps. If live lice are seen seven to nine days after rinsing the suspension from scalp and hair. If live lice are seen one week after treatment, repeat this entire process.

Spinosad suspension, 0.9%, is approved for individuals six months of age and older. Spinosad also contains 10% benzyl alcohol and is thought to be ovicidal so a second application is usually not required. In two studies comparing spinosad to permethrin, 84.6% and 86.7% of spinosad treated patients were lice free fourteen days after the last treatment while 44.9% and 42.9% of permethrin treated patients were lice free. More permethrin treated patients required a second treatment.

Directions for use: Shake the suspension well right before use. Use a towel to cover face and eyes and keep eyes closed during this treatment. Apply spinosad suspension to dry hair and scalp area. Use enough suspension to cover the entire scalp area first and then apply outwards towards the ends of the hair. Keep the suspension on for ten minutes after applying. Use a timer or clock to track the time. After ten minutes, rinse the suspension from scalp and hair with warm water in a sink. To keep the lotion off the rest of the body do not rinse off in a shower or bathtub. Wash hands thoroughly after the application and rinsing steps. May shampoo hair after rinsing the suspension from scalp and hair. If live lice are seen one week after treatment, repeat this entire process.

Lindane shampoo is available in the United States but is not recommended by the American Academy of Pediatrics (AAP) due to potential neurotoxicity. For that reason, directions for use are not provided in this article.

Oral Products (Table 3)
Ivermectin is an antihelmintic agent that is used for parasitic infections in humans and animals. It is not FDA approved for the treatment of head lice but has been shown to be effective in studies. A single dose of ivermectin, 400 mcg/kg, was given to 398 patients on day one. Study personnel applied malathion to 414 patients on days one and eight. On day fifteen, 95.2% of the patients treated with ivermectin were lice free compared to 85% in the malathion group, p < 0.001.

Trimethoprim/Sulfamethoxazole (TMP/SMX) is not FDA approved for head lice but like ivermectin has been shown to be effective in treating infestations in a clinical study. One hundred and fifteen children were divided into three groups. Group 1 was treated with 1% permethrin which was repeated in seven days if lice were still present. Group 2 was treated with TMP/SMX 10 mg/kg/day divided twice daily based on the TMP component for 10 days. Group 3 was treated with a combination of permethrin and TMP/SMX using the same treatment and dose as Groups 1 and 2. Two weeks after treatment began 79.5%, 83% and 95% of patients were lice free in Groups 1, 2 and 3 respectively. Four weeks after treatment began 72%, 78% and 92.5% of patients were lice free in Groups 1, 2 and 3 respectively.

Non-Pharmacologic Treatment
Nit Combs
Proper use of a nit comb is an effective non-pharmacologic treatment strategy for head lice removal. Combing may be used as an alternative to pediculicide treatment or may be performed after treatment with a pediculicide to remove dead lice and nits. A variety of nit combs are commercially available at most pharmacies. Prior to using a nit comb, apply conditioner to facilitate moving the comb through the hair. Tangles should be removed with a standard comb first, then use a nit comb. Working with small sections of hair at a time, comb from the scalp to the end of the hair strands. It may be helpful to move from one side of the head to the other, utilizing clips or bands to separate the combed hair from the uncombed hair. If any nits or lice are removed when combing, dip the comb in soapy water and wipe with a tissue before returning to combing the hair. Combing once does not guarantee that all lice and nits are removed. Repeat the combing procedure every two to four days for a minimum of two to three weeks to ensure all the lice and nits are removed.

Electronic lice combs are also commercially available. These combs have oscillating teeth that claim to remove live lice better than the standard lice combs, but there are no studies confirming these claims. Electronic combs are substantially more expensive than a standard nit comb and manufacturers warn against use in people with seizure disorders or pacemakers.
**Table 3 | Oral Products for Head Lice**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Resistance</th>
<th>FDA-Approved Lower Age or Weight Limit</th>
<th>Dosage and Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivermectin tablets(^1) – Stromectol (Merck &amp; Co)</td>
<td>No</td>
<td>15 kg(^2)</td>
<td>200-400 mcg/kg PO once; repeat 7-10 days later</td>
</tr>
<tr>
<td>Trimethoprim/Sulfamethoxazole(^1)</td>
<td>No</td>
<td>2 months</td>
<td>10 mg/kg/day of TMP divided BID for 10 days</td>
</tr>
</tbody>
</table>

\(^1\)Not FDA-approved for treatment of head lice.
\(^2\)The safety and effectiveness of oral ivermectin have not been established in children weighing <15 kg.

**Alternative Treatments**

An alternative to standard pharmacologic agents may be an attractive option to some, especially if treatment “failed” with one of the pediculicides. Besides manual removal of nits with a nit comb, alternative treatments include natural products, such as essential oils; occlusive agents; and desiccation.

Essential oils are gaining in popularity. Some essential oils with purported effects on lice include tea tree oil, anise oil, ylang ylang oil and nerolidol, an alcohol found in many essential oils.\(^6\) There are very few studies involving these oils, but one study that looked at in vitro activity of tea tree oil and nerolidol demonstrated a potential role for these oils in treatment.\(^21\) The potential adverse effects are unknown and essential oils may elicit allergic reactions in some individuals.\(^28\)

Occlusive or smothering agents ostensibly suffocate head lice when applied to the hair and scalp. These include mayonnaise, olive oil, butter and petroleum jelly. Little evidence demonstrating effectiveness of these products is available.\(^8\)

Desiccation or dehydration therapy involves the application of hot air followed by combing. The mechanism of action is to kill lice or viable eggs through dehydration. Commercial machines, such as those used in lice removal clinics, are expensive and require special training for effective use. Models intended for consumer use at home are available through various retail sources. A regular hair dryer cannot be substituted for this purpose because it produces hotter air that may burn the scalp.\(^8\)

Overall, alternative treatments may have some benefit, but there are no studies to evaluate efficacy or safety. In addition, the lack of standard doses/strengths for the essential oils make product comparisons and recommendations for use arbitrary.

**School Policies**

In the past, many schools had a “no-nit” policy that prohibited students from returning to school until they were nit free. Several organizations have issued position statements calling for elimination of “no-nit” policies. The National Association of School Nurses (NASN), the AAP and the Centers for Disease Control and Prevention (CDC)\(^30,31,32\) have all emphasized that a “no-nit” policy is based on misinformation not scientific facts, unnecessarily stigmatizes and shames children and disrupts the learning process. The NASN recommends allowing a child to remain in school if an infestation is observed, notifying the child’s parents/caregiver at the end of the school day and providing information about evidence-based treatment options.\(^29\) In a review of several Nebraska school districts, the policies vary greatly from “no-nit” policies to the more up-to-date recommendations from NASN, AAP, and CDC.\(^20,31,32,33,34,35,36\) Contact your local school system to find their current policy.

**Conclusion**

Head lice infestations are common in the United States affecting 6-12 million individuals per year. Many treatment options are available including OTC products, prescription drugs, and alternative therapies. There are many fallacies about lice and lice treatments that are widely available for public consumption including personal hygiene, how lice are transmitted and "no-nit" policies for school districts. Pharmacists must become familiar with evidence-based information about lice and lice treatments so they can provide sound advice to their patients.
References


Debugging the Mysteries of Head Lice
Quiz #9, May/June 2019, ACPE 0128-0000-19-039-H01-P/T

1. Select the true statement regarding head lice.
   a. Contracting head lice is a sign of poor hygiene.
   b. Head lice are a vector for disease.
   c. Head lice are winged and can crawl, hop, and fly.
   d. Head lice need a warm environment and a human host for survival.

2. Select the true statement regarding head lice.
   a. Cats and dogs play a role in the spread of head lice.
   b. If head lice are detected in the home, insecticide sprays are recommended for use on furniture and bedding.
   c. Lice eggs will die within one week if not incubated at an appropriate temperature.
   d. National organizations such as the American Academy of Pediatrics support “no-nit” policies in schools.

3. Head lice are commonly spread _____________.
   a. by airborne transmission
   b. by direct contact
   c. by sharing combs, brushes or hats
   d. via waterborne transmission

4. A diagnosis of pediculosis is established by_______.
   a. observing the child of lice-infested family members itching his scalp.
   b. visualization of a live nymph or louse on the scalp.
   c. visualization of egg casings on a hair shaft.
   d. visualization of eggs on a hair shaft one inch away from the scalp.

5. What is the definition of an ovicide?
   a. An agent that kills a head louse.
   b. An agent that kills a nymph.
   c. An agent that kills the eggs of a head louse.
   d. An agent that paralyzes but does not kill a head louse.

6. Which product is available over the counter?
   a. Benzyl alcohol
   b. Malathion
   c. Permethrin
   d. Spinosad

7. What product has both pediculicidal and ovicidal activity?
   a. Benzyl alcohol
   b. Ivermectin
   c. Pyrethrins and piperonyl butoxide
   d. Spinosad

8. Which product should be used with caution in a patient with chrysanthemum or ragweed allergies?
   a. Dimethicone
   b. Malathion
   c. Permethrin
   d. Pyrethrins with piperonyl butoxide

9. Which product use to treat head lice is applied to damp hair?
   a. Benzyl alcohol
   b. Dimethicone
   c. Ivermectin
   d. Permethrin

10. Which medication used to treat head lice comes in both a topical and oral formulation?
    a. Ivermectin
    b. Malathion
    c. Permethrin
    d. Spinosad

Keep the TOP portion for your records. Return the BOTTOM portion to the NPA office. Or, take this quiz online at www.npharm.org

Name__________________________________________ Mailing Address__________________________________
City/State/Zip __________________________________

Circle one (1) Answer:
1. a b c d  6. a b c d
2. a b c d  7. a b c d
3. a b c d  8. a b c d
4. a b c d  9. a b c d
5. a b c d 10. a b c d

CPE Home Study Evaluation
1. Rate this lesson: (Excellent) 5 4 3 2 1 (Poor)
2. Did this lesson meet each of its objectives? ___ Yes ___ No
3. Was the content without commercial bias? ___ Yes ___ No
   If not, please explain_______________________________________
4. Did the lesson meet your educational/practice needs? ___ Yes ___ No
5. Comments/future topics are welcome. ________________________

The deadline for this quiz is December 12, 2019.
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Partial Fills

Partial filling of prescriptions has been going on for a long time in pharmacies. So long in fact that most pharmacists don’t think about the legalities of doing so. When you search for laws or regulations about partial filling, you get few results addressing partial filling for non-controlled substances. One of the few that is found is in West Virginia. This code section allows the partial filling of any prescription if the pharmacy is unable to supply the entire amount or if the patient requests a lesser amount. Many states just don’t address partial filling for non-controlled substances in their laws or regulations.

Almost all states have a regulation regarding the partial filling of controlled substances, particularly Schedule II. Many of them are worded similarly to the DEA regulation on this subject. What is different about the DEA regulation is that it only allows partial filling in situations where the pharmacy is unable to supply the entire amount of the prescription. It doesn’t permit the patient to request a partial fill of a Schedule II substance. One of the unforeseen results of these regulations has been its potential contribution to the opioid crisis. In response to the crisis, Congress passed the Comprehensive Addiction and Recovery Act of 2016 (CARA). One of the many provisions of the law allows the patient or the prescriber to request the partial fill. Although the DEA hasn’t rewritten its regulations, the interpretation of the law has been that CARA supersedes the DEA regulations to allow the patient or the prescriber to request the partial fill. For non-controlled substances, what is the legal status of partial filling in those states whose laws and regulations are silent on the issue? The answer depends on your view of how the law works. Some would say that there is nothing prohibiting it, so I can proceed to partially fill the prescription. The other view would say that there is nothing permitting it, so I can’t do it. Given the history of partial filling, I would agree with the former view. It is such an ingrained part of pharmacy practice, with little apparent risk to the public, that regulators haven’t felt the need to address it.

However, there are risks when partial filling a prescription. There have been claims reported when the remaining portion of the prescription has been filled incorrectly. Partial filling is a deviation from the normal workflow, so there is an increased chance of error in that situation. Errors occur most often with look-alike, sound-alike pairs. There can also be interruptions in therapy if the remainder is overlooked or misplaced. There is also a risk that the patient will not come back to finish the course of their treatment. It is important to make sure that there is accurate documentation of what was dispensed and when.

On top of the treatment risks, there are also contractual issues. Partial filling may be addressed in your contracts with third-party payers. These provisions may address when partial filling may occur, how it is to be documented, and how to charge for the prescription. Failure to follow the contractual requirements could result in an audit and recoupment of third party payments. It is especially important to follow the contractual requirements in cases of partial filling when the patient fails to pick up the remainder of the prescription. Failure to adjust billings in those cases could end up as cases of unjust enrichment or fraud.

At first glance, the issue of partially filling a prescription seems pretty benign. However, it does present some pitfalls for the unwary. The legal and/or contractual requirements may be contradictory to what is seen as good patient care. For example, the patient presents with a new prescription for an expensive medication. It may make sense to dispense a few days’ supply to make sure that the patient can tolerate the new treatment. But this can be problematic if regulations or contractual requirements do not allow partial fills. Unfortunately, the world is not always rational or logical. Because of these complexities, partial filling should be addressed in your pharmacy’s policy and procedure manual.

1. West Virginia Code Section 30-5-27.
2. Title 21 CFR Sections 1306.13, 1306.23 for Schedules III, IV, and V does not contain that limitation.
3. Public Law 114-198

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