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DEBUGGING THE MYSTERIES OF HEAD LICE



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None of these authors have any relevant financial relationships that would be considered a conflict of interest for the purposes of this continuing pharmacy education activity. This article will include a discussion of non-FDA approved (off-label) medication use.

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 caregivers 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.¹ Head lice are problematic, but they are not known to transmit any disease and are not considered a health hazard.² Secondary bacterial infections may develop when patients scratch itchy areas on the scalp causing open lesions.¹

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

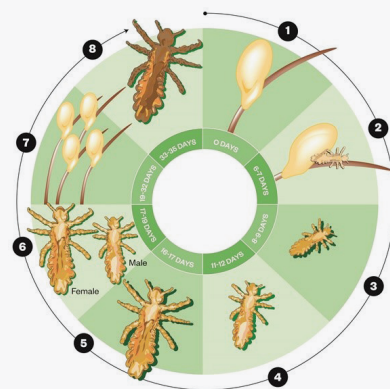
States.¹ Treatments for head lice are generally safe and effective when used correctly. Misinformation about head lice abounds and this article aims to provide evidence-based information to help readers distinguish facts from fallacies. See Table 1 for facts and fallacies. Pharmacists can play a key 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).³ 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.⁴ 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 (see Figure 2) and may live on a person’s head for up to 30 days.⁴

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

Figure 1: Life Cycle of the Louse



The life cycle of the head louse has three stages: egg (nit), nymph and adult. Stages of the lifecycle:

1. Egg (nit) is laid on the hair shaft.
2. Nymph emerges from eggs laid on day 0.
3. Nymph molts for the first time.
4. Second molt.
5. Third molt.
6. Adult male and female lice mate.
7. Female lays first eggs two days after mating and can lay four to eight eggs per day for the next 16 days.
8. Louse dies.

Used with permission: *The Pharmaceutical Journal* 7 SEP 2016

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.⁵

Figure 2: Louse Size



Source: Centers for Disease Control and Prevention

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.⁴

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.^{1,6}

Diagnosis

Seeing a live nymph or louse in the hair or on the scalp establishes a diagnosis of pediculosis.¹ 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.⁷

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.^{4,6}

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*

Fallacy	Fact
Head lice infect people with poor hygiene habits or those who reside in unclean environments.	Personal hygiene or cleanliness in the home or school has nothing to do with getting head lice.
Head lice infestations should be avoided because lice spread infection.	Head lice should not be considered a medical or public health hazard. Head lice are not known to spread disease.
People's pets can spread lice.	Head lice are specific to humans. Dogs, cats and other pets do not play a role in the spread of head lice.
Lice are mobile and can hop and fly from person to person.	Head lice move by crawling. Lice cannot hop, fly, or swim. Most transmission is only by direct head-to-head contact.
You cannot see head lice because they are microscopic.	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.
Lice can hide and live in beds, clothing or brushes for days.	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.
Lice can be easily spread by sharing earphones or sports helmets.	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.
If an egg falls out of the hair, it may hatch and infest another person.	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.
Lice misdiagnosis is uncommon.	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.
In all cases of head lice infestation, people will have incessant itching.	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.
Cutting your child's hair so that it is very short prevents the spread of head lice.	Lice infestation is not significantly influenced by hair length, so this will not impact the risk of getting head lice.
Children with head lice should stay home from school until they are nit-free.	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.

*Adapted from: Centers for Disease Control and Prevention <https://www.cdc.gov/parasites/lice/head/index.html>. Pontius DJ. Demystifying Pediculosis: School Nurses Taking the Lead. *Continuing Nursing Education*. 2014;40(5):226- 235.

if live nymphs, adult lice or viable eggs are present. All infested family members should be treated on the same day to prevent reinfestations 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.⁶ 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.^{5,8,9} Insecticide sprays are not recommended due to the self-limiting nature of lice and potential toxicity if inhaled or absorbed through the skin.⁵ Recommendations to seal all items that cannot be washed in a plastic bag for fourteen days are still advanced by some organizations,^{4,6} while others no longer endorse this measure.¹⁰

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.^{4,8}

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.¹¹

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 nymphs with a lice comb. After combing the entire head, wash hair thoroughly with shampoo and warm water.¹²

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.^{13,14}

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.¹⁵

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.¹⁴ Resistance has been reported but varies geographically.^{14,16}

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.¹⁷

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.^{13,18}

Table 2 | Topical Drugs for Head Lice*

Drug	OTC/Rx	Ovicidal	Resistance	FDA-Approved Lower Age or Weight Limit	Dosage and Administration
Dimethicone gel – generic LiceMD (Quantum Pharmaceuticals)	OTC	Yes	No	2 years	Apply to dry hair for 10 minutes comb hair with provided comb then shampoo hair.
Permethrin 1% cream rinse – generic Nix (Insight)	OTC	No	Yes	2 months	Apply to shampooed, towel-dried hair for 10 minutes then rinse; repeat 7 days later.
Pyrethrins w/piperonyl butoxide shampoo – generic Rid (Bayer)	OTC	No	Yes	2 years	Apply to dry hair for 10 minutes then shampoo; repeat 7-10 days later.
Benzyl alcohol 5% lotion – Ulesfia (Lachlan)	Rx	No	No	6 months	Apply to dry hair for 10 minutes then rinse; repeat 7 days later. ¹
Ivermectin 0.5% lotion – Sklice (Arbor)	Rx	No	No	6 months	Apply to dry hair and scalp for 10 minutes then rinse. ²
Malathion 0.5% lotion – generic Ovide (Taro)	Rx	Yes	Not in US	6 years ¹³	Apply to dry hair for 8-12 hours then shampoo; repeat 7-9 days later if necessary. ^{5,6}
Spinosad 0.9% suspension – Natroba (ParaPro)	Rx	Yes	No	6 months	Apply to dry hair for 10 minutes then rinse; repeat 7 days later if necessary. ⁶

*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 ovicidal, 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.¹² One application of malathion is usually sufficient, and resistance has not been reported in the United States.¹³ Malathion is contraindicated in children under two years of age and has not been studied in children under the age of six years.¹³

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 treatment, repeat this entire process.²²

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.¹⁵ 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.²³

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.²⁴

Lindane shampoo is available in the United State but is not recommended by the American Academy of Pediatrics (AAP) due to potential neurotoxicity¹³. 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, $p < 0.001$.²⁵

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.²⁶

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.⁹ 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.⁸

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.⁶

Table 3 | Oral Products for Head Lice

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

¹Not FDA-approved for treatment of head lice.

²The 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)^{4,6,10} 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.^{30,31,32,33,34,35,36} 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.

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

- 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.
- If more than three questions are missed, the quiz will be returned. The quiz can be resubmitted.
- CPE transcripts can be printed from NABP e-Profiles at www.nabp.net.
- 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 CEUs. UAN 0128-0000-19-039-H01-P for pharmacists and UAN 0128-0000-19-039-H01-T for pharmacy technicians. This is a knowledge-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

Debugging the Mysteries of Head Lice

Quiz #9, May/June 2019, ACPE 0128-0000-19-039-H01-P/T

- Select the true statement regarding head lice.**
 - Contracting head lice is a sign of poor hygiene.
 - Head lice are a vector for disease.
 - Head lice are winged and can crawl, hop, and fly.
 - Head lice need a warm environment and a human host for survival.
- Select the true statement regarding head lice.**
 - Cats and dogs play a role in the spread of head lice.
 - If head lice are detected in the home, insecticide sprays are recommended for use on furniture and bedding.
 - Lice eggs will die within one week if not incubated at an appropriate temperature.
 - National organizations such as the American Academy of Pediatrics support "no-nit" policies in schools.
- Head lice are commonly spread _____.**
 - by airborne transmission
 - by direct contact
 - by sharing combs, brushes or hats
 - via waterborne transmission
- A diagnosis of pediculosis is established by _____.**
 - observing the child of lice-infested family members itching his scalp.
 - visualization of a live nymph or louse on the scalp.
 - visualization of egg casings on a hair shaft.
 - visualization of eggs on a hair shaft one inch away from the scalp.
- What is the definition of an ovicide?**
 - An agent that kills a head louse.
 - An agent that kills a nymph.
 - An agent that kills the eggs of a head louse.
 - An agent that paralyzes but does not kill a head louse.
- Which product is available over the counter?**
 - Benzyl alcohol
 - Malathion
 - Permethrin
 - Spinosad
- What product has both pediculicidal and ovicidal activity?**
 - Benzyl alcohol
 - Ivermectin
 - Pyrethrins and piperonyl butoxide
 - Spinosad
- Which product should be used with caution in a patient with chrysanthemum or ragweed allergies?**
 - Dimethicone
 - Malathion
 - Permethrin
 - Pyrethrins with piperonyl butoxide
- Which product use to treat head lice is applied to damp hair?**
 - Benzyl alcohol
 - Dimethicone
 - Ivermectin
 - Permethrin
- Which medication used to treat head lice comes in both a topical and oral formulation?**
 - Ivermectin
 - Malathion
 - Permethrin
 - 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 _____

2019 Quiz #9 - Debugging the Mysteries of Head Lice
ACPE #0128-0000-19-039-H01-P for pharmacists
ACPE #0128-0000-19-039-H01-T for technicians
1.0 Contact Hour - Knowledge Based CPE Activity

The deadline for this quiz is **December 12, 2019.**

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

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