Head Lice Treatment Options Today

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FACULTY:
Karen von Koeckritz, PharmD

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Karen von Koeckritz has no actual or potential conflict of interest in relation to this program.

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TARGET AUDIENCE:

This accredited program is targeted **pharmacists, nurses, and pharmacy technicians** practicing in hospital and community pharmacies. Estimated time to complete this monograph and posttest is 60 minutes.

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Program Overview:

To provide nurses, pharmacists, and pharmacy technicians with an understanding of head lice treatment options today.

OBJECTIVES:

After completing this program, pharmacists and nurses will be able to:

- Describe the life cycle of head lice (pediculosis capitis).
- Explain the issues involved in ensuring an accurate diagnosis of an active head lice infestation.
- State the use of the non-prescription and prescription only pediculicides and their warnings.

After completing this program, pharmacy technicians will be able to:

- In general terms, describe the life cycle of head lice.
- Identify the medications uses to treat for head lice
Head lice (pediculosis capitis) are blood-feeding parasitic insects and a common infestation, especially among children 3 to 12 years of age. Head lice cause limited morbidity and do not spread disease, but can cause itching and discomfort to those infested. Also, unless treated, a patient may never be lice-free.

The adult louse is gray-white, has 6 legs, and is 2 to 3 mm long. The eggs, also known as nits, are attached to the base of the hair shaft, and are camouflaged to match the color of the hair shaft. The nits, incubated by the host’s body heat, hatch in 7 to 12 days. A nymph emerges from the shell casing and passes through 3 additional nymph stages. After an additional 9 to 12 days, the nymphs reach the adult stage, at which time the female louse will mate and begin to lay eggs. An adult female can lay up to 10 eggs per day. This entire process can repeat every 3 weeks. Without interventions, the infested host may remain a host indefinitely. To survive, the louse will inject a small amount of saliva with vasodilatory and anticoagulant properties and suck blood from the scalp. Itching may not occur until there is sensitization to components of the saliva, which normally develops about 4 to 6 weeks after a first head lice infestation. In rare cases, scratching may cause skin infections such as impetigo.

Head lice are most commonly transmitted by direct contact with the head of an infected person. Indirect transmission from contact with personal items such as hats, combs and brushes is less likely. Head lice can only crawl; they cannot hop or fly. Reducing the number of lice on the head and reducing head-to-head contact will help control head lice infestations. Head lice are commonly found in much of the world. In the United States, young children (preschool and elementary school age) are mostly affected. Head lice infestations are not due to poor hygiene. Other household members and close contacts can also be at risk of infestation. In the U.S., all socioeconomic groups are affected.

In the past, various treatments were used to control head lice. Head shaving was an effective treatment. Dichloro-diphenyl-trichloroethane (DDT) was effective in treating head lice and is still being used today in some developing countries. DDT was widely used for 3 decades until the 1970s; as its use was discontinued head lice infestations increased. Other pharmacologic agents have been developed to replace DDT due to the environmental effects it caused. Unfortunately resistance has developed to some of these agents.

**Diagnosis**

Misdiagnosis of head lice infestation is common. The diagnosis of head lice infestation is best made by finding a live nymph or adult louse on the scalp or hair. This can be difficult because lice are small, move quickly and avoid light. Nits can be more easily spotted than lice and are firmly attached to the hair shaft at the nape of the neck or behind the ears, within 1 cm of the scalp. Nits found attached more than ¼ inch from the base of the hair shaft are usually hatched or dead. Dandruff, hairspray droplets, dirt particles or other debris have been misdiagnosed as nits. If no live lice are found, and the nits are more than ¼ inch from the scalp, then the infestation is probably no longer active and the patient should not be treated.
Treatment

General Guidelines
The Center for Disease Control (CDC) has put forth guidelines for the treatment of head lice. Treatment for head lice is recommended for patients with an active infestation. All household members and close contacts should be checked for head lice infestation. However, the CDC does not recommend that close contacts be treated prophylactically.\textsuperscript{4}

Retreatment of head lice is usually recommended because none of the approved pediculicides are completely ovicidal. To be most effective, retreatment should occur after all eggs have hatched but before new eggs are produced. The retreatment schedule will vary depending on how effective the pediculicide is at killing the lice and their eggs.

Treatment should be initiated when the diagnosis of head lice is confirmed to prevent treating those patients who do not need to be treated. The best first-line treatments are the safe and inexpensive over-the-counter (OTC) products.\textsuperscript{1}

Treatment steps:

1. Remove clothing that can become wet or stained.
2. Apply the pediculicide according to the package directions. Be aware of amounts of pediculicide needed for varying lengths of hair and the amount of time the medication should be left on the hair.
3. Do not use a conditioner or conditioner shampoo/conditioner prior to using the pediculicide.
4. Do not wash hair for 1 to 2 days after the pediculicide is removed.

After treatment:

1. The infested person should put on clean clothing.
2. Check the scalp 8 to 12 hours after treatment.
   a. If a few live lice are on the scalp, but moving more slowly, do not retreat. Use a fine-toothed nit comb to comb out remaining live lice.
   b. If no dead head lice are found, and the live lice are as active as prior to treatment, the medication may not be working. Consult a health care provider; a different pediculicide may be necessary.
3. Use nit combs to comb the nits and lice from the hair shaft.
4. Check the hair and use the nit comb to remove nits and lice every 2 to 3 days for 2 to 3 weeks.
5. Retreatment on day 9 is often recommended for non-prescription and some prescription medications to kill any surviving hatched lice before they are able to produce new eggs. Malathion, which has high ovicidal activity, should only be reapplied if crawling head lice are found on the patient.\textsuperscript{4}

Additional non-pharmacologic measures may be combined with medical treatment for head lice. Hats, scarves, pillow cases, bedding, clothing and towels worn or used by the patient in the 2 days prior to treatment can be washed in hot water and dried in hot air; head lice and eggs are
killed during a 5 minute exposure to temperatures greater than 53.5°C (128.3°F). Items such as towels, hats and brushes/combs should not be shared.4

**Non-Prescription Therapy**

First line therapy for head lice currently includes the pyrethrins with piperonyl butoxide and permethrin. The pyrethrins/piperonyl butoxide and permethrin are safe and effective when used as directed. Both preparations are pediculicides (kill live head lice) but are not completely ovicidal (do not kill the eggs). If live head lice are still seen after a full course of treatment, the healthcare provider must be contacted for further treatment. If the infestation is resistant to the OTC pediculicides, other treatment must be initiated.4

- Pyrethrins with piperonyl butoxide is available under several brand names: A-200™, Pronto™, R&C™, Rid™, and Triple X™. Pyrethrins are naturally occurring pyrethroid extracts from the chrysanthemum flower. People allergic to chrysanthemum or ragweed should not use pyrethrins.4 Pyrethrins with piperonyl butoxide is not approved for use on children under 2 years old.6
  - These products are available as shampoos or mousse formulations; they are applied to dry hair, left on for 10 minutes, and then rinsed out.
  - These products do not offer residual pediculicide activity. A second treatment is necessary to kill the newly hatched nymphs on days 7 to 10, and some new evidence shows that retreatment on day 9 may be optimal based on the lifecycle of lice.1
  - Pyrethrins were initially extremely effective when first introduced in the mid-1980s, but resistance has caused significantly reduced effectiveness against head lice. The prevalence of resistance has not been studied, but varies from country to country and community to community.1

- Permethrin is available as Nix™ 1% Crème Rinse. Permethrin is a synthetic pyrethroid similar to naturally occurring pyrethrins. Permethrin is not approved for use on children under 2 years old.5 Permethrin has been the most studied pediculicide in the United States and is the least toxic to humans. Reported side effects include: pruritus, erythema and edema. Resistance to 1% permethrin has been reported, but the prevalence is unknown. It has been suggested that the conditioners and silicone-based additives in most shampoos impair permethrin adherence to the hair shaft, thereby reducing its residual effect.1

**Directions for Use:**

- To use the medication, the patient’s hair must first be washed with a non-conditioner shampoo and towel dried. Apply the rinse to the hair and leave on the hair for 10 minutes before rinsing off. The residue remaining on the hair is designed to kill 20% to 30% of the emerging nymphs of the remaining eggs.
- The product is to be reapplied in 7 to 9 days to kill the newly hatched nymphs.1
Prescription Therapy

When there is a treatment failure with the OTC products or resistance is suspected, the prescription-only products are the next agents to be used. Malathion, benzyl alcohol and spinosad make up the group of first-line prescription medications; lindane is considered a second-line drug, used for those patients where other products did not kill the head lice.

Malathion 0.5% (Ovide™), an organophosphate cholinesterase inhibitor, was taken off the market in the United States in 1986 but reintroduced in 1999. Malathion (Ovide™) is currently approved by the FDA as a first-line prescription therapy for head lice. Due to the high amount of isopropyl alcohol in the product, it is flammable.

- Ovide™ is available as a lotion, which is applied to dry hair, left to air dry, then washed off after 8 to 12 hours.
- Ovide™ has good ovicidal activity and a single application is often effective for most patients.
- If live lice remain visible, Ovide™ should be reapplied in 7 to 9 days.
- Ovide™ has a high alcohol content (78% isopropyl alcohol), which makes this product highly flammable. It is important that patients and their families do not use a hair dryer, curling iron, flat iron and do not smoke while using this product.
- The safety and efficacy of this product for children under 6 has not been studied; this product is contraindicated in children under 24 months old.

Directions for use:
- Ovide™ is applied to dry hair to thoroughly wet the hair and scalp. The hands should be washed after application.
- Allow the hair to dry naturally.
- Shampoo the hair after 8 to 12 hours.
- Using a fine toothed comb, remove the dead lice and nits.
- Repeat in 7 to 9 days if live head are still present.

- Benzyl alcohol 5% (Ulesfia™) was approved for use by the FDA in 2009. It is non-neurotoxic and approved for patients 6 months old and older. The proposed mechanism of action of Ulesfia is that the benzyl alcohol inhibits the lice from closing their respiratory spiracles, which allows the vehicle to obstruct the spiracles and cause lice asphyxiation. The product is not ovicidal. Approximately 75% of patients are free of lice 14 days after the second application.

- Ulesfia is applied to dry hair, enough to saturate the hair and scalp. Rinse off after 10 minutes and repeat in 7 days.
- The amount of Ulesfia required for one treatment is dependent upon the patient’s hair length. Patients with very short hair may only need 1-2 bottles, but patients with long hair may need up to 8 to 12 bottles for each application.
Ulesfia Lotion Usage Guideline

<table>
<thead>
<tr>
<th>Hair Length</th>
<th>Amount of Ulesfia Lotion per Application</th>
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<tbody>
<tr>
<td></td>
<td>Ounces</td>
</tr>
<tr>
<td>Short</td>
<td></td>
</tr>
<tr>
<td>0-2 inches</td>
<td>4-6 oz</td>
</tr>
<tr>
<td>2-4 inches</td>
<td>6-8 oz</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>4-8 inches</td>
<td>8-12 oz</td>
</tr>
<tr>
<td>8-16 inches</td>
<td>12-24 oz</td>
</tr>
<tr>
<td>Long</td>
<td></td>
</tr>
<tr>
<td>16-22 inches</td>
<td>24-32 oz</td>
</tr>
<tr>
<td>Over 22 inches</td>
<td>32-48 oz</td>
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</tbody>
</table>

Table reference Ulesfia™ Highlights of Prescribing Information

- Natroba™ (spinosad) 0.9 % Topical Suspension is the most recent addition to the list of prescription only head lice products. Spinosad is derived from the fermentation of a soil bacterium, *Saccharopolyspora spinosa*. Spinosad causes neuronal excitation; after periods of hyperexcitation, the lice are paralyzed and die. Spinosad is ovicidal and nit combing is not necessary. The product contains benzyl alcohol which has been implicated in gasping syndrome in neonates and infants. Spinosad has been approved for patients 4 years old and older.

Results from 2 multicenter controlled studies, studying 1038 subjects 6 months of age and older with head lice infestation showed superior results with the use of spinosad compared to permethrin. At day 14, more than 84% of patients treated with spinosad were free of live lice. Of the patients treated with permethrin, less than 45% of patients were free of live lice at day 14.

- Apply Natroba to dry scalp and dry hair, up to 120 ml (one bottle)
- Leave on for 10 minutes, and then rinse off with warm water.
- If live lice are seen at day 7, repeat treatment.

### Proportion of Subjects Free of Live Lice 14 Days after Last Treatment

<table>
<thead>
<tr>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natroba N=91</td>
<td>Permethrin 1% N=89</td>
</tr>
<tr>
<td>77 (84.6%)</td>
<td>40(44.9%)</td>
</tr>
<tr>
<td>Natroba N=83</td>
<td>Natroba N=84</td>
</tr>
<tr>
<td>72(86.7%)</td>
<td>36(42.9%)</td>
</tr>
</tbody>
</table>

Natroba™ Prescribing Information
• Lindane 1% shampoo has been marketed in the United States for the treatment of lice and scabies since 1951. Lindane is an organochloride with central nervous system toxicity in humans. Several cases of seizures in children have been reported. For these reasons, the FDA has stated that lindane is to be considered a second line agent in the treatment of head lice, and is only to be used when the first line products have failed. Resistance to lindane has been reported worldwide and has low ovicidal activity. The American Academy of Pediatrics and The Medical Letter no longer endorse the use of lindane as a pediculicide. California has banned the use of lindane for use in humans.\(^1\) Lindane has been associated with drug interactions. The following drugs lower the seizure threshold and concurrent use of lindane should be done cautiously.

• Antipsychotics
• Antidepressants
• Theophylline
• Cyclosporine, mycophenolate mofetil, tacrolimus capsules
• Penicillins, imipenem, quinolone antibiotics
• Chloroquine sulfate, pyrimethamine
• Isoniazide
• Meperidine
• Radiographaic contrast agents
• Methocarbamol
• Centrally active anticholinesterases\(^9\)

**Directions for use:**

♦ Caregivers applying lindane to patients should wear gloves such as nitrile, latex, neoprene or sheer vinyl. Natural latex gloves are permeable to lindane and should be avoided.
♦ Lindane is applied to dry hair.
♦ Only a small amount is applied, just enough to lightly coat the hair and scalp. Most people only need 1 ounce, though the product is available in 2 ounce containers.
♦ After 4 minutes, add small amounts of water to form lather.
♦ Rinse all lather away, taking care to avoid other body surfaces.
♦ Towel briskly and remove remaining nits.
♦ Do not reapply lindane
♦ Discard the remaining into a trash can, out of reach of children.
♦ Avoid oil treatments immediately before or after lindane treatment since oils can enhance lindane absorption.
♦ A Lindane Shampoo Medication Guide must be given to the patient each time lindane is dispensed.\(^9\)

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## Comparison of Prescription only Pediculicides

<table>
<thead>
<tr>
<th></th>
<th>Directions for Use</th>
<th>Mechanism of Action</th>
<th>Side Effects</th>
<th>Ages</th>
<th>Precautions</th>
</tr>
</thead>
</table>
| **Ovide™** | • Apply to dry hair  
• Allow hair to dry naturally  
• Shampoo after 8-12 hours | • Organophosphate cholinesterase inhibitor | • Skin and scalp irritation  
• 6 years and older  
• Safety and efficacy for children under 24 months not established | • Flammable  
• Do not use hair dryers or other hot items near hair being treated |
| **Ulesfia™** | • Apply to dry hair  
• Rinse off after 10 minutes  
• Repeat in 7 days | • Non-neurotoxic  
• Obstructs the spiracles and causes lice asphyxiation  
• FDA approved for patients 6 months and older | • Site irritation, Pruritus, Erythema, Ocular irritation  
• Amount needed dependent on hair length | • Amount needed dependent on hair length |
| **Natroba™** | • Apply to dry hair  
• Leave on 10 minutes | • Causes neuronal excitation, paralysis of lice | • Redness, Irritation  
• 4 years older and older  
• Benzyl alcohol may cause gasping syndrome in infants and neonates | |
| **Lindane™** | • Leave on hair for 4 minutes  
• Rinse off with warm water  
• Do not reapply | • Parasiticide and ovice  
• Directly absorbed into the lice and nits | • Dizziness, Seizures, Dermatitis, Pruritus, Urticaria, Death  
• Caution in infants, children, elderly, and pts < 110 lbs (50kg)  
• Contraindicated in patients with seizure disorders  
Black box warning – Seizures and deaths have been reported following lindane shampoo use Caution in infants, children, elderly, and pts < 110 lbs (50kg) | |

*Table based on various references.*
Off-Label Medications for Head Lice
Several medications have been studied and used off-label to treat head lice. Permethrin 5% Cream (Elimite™) is indicated for scabies, not head lice. There is no evidence that the higher concentration permethrin 5% is effective for head lice when permethrin 1% is not. Crotamiton Lotion 10% (Eurax™) is also indicated for scabies. There are reports that it is effective for head lice treatment; however, safety has not been evaluated and it is not currently FDA approved for this indication.1

Ivermectin (Stromectol™) is an anthelmintic agent which has been studied as an agent to kill head lice.1 Recently a study compared the efficacy of ivermectin to malathion in the treatment of head lice. A total of 812 patients who were unsuccessful in eradicating the lice infestation in the prior 2 to 6 weeks were enrolled in the study. The patients received ivermectin tablets (400 mcg/kg of body weight) or 0.5% malathion lotion. Of the subjects treated with ivermectin, 95.2% were lice-free at day 15. In contrast, 85% of the subjects treated with the malathion lotion were lice-free at day 15. The researchers concluded that oral ivermectin, given twice at 7-day intervals, was superior in treating head lice to topical malathion. Additionally, the researchers found that the patients preferred the tablets (78.3%) to the topical lotion (13.0%).10 Currently, ivermectin is not approved by the FDA for head lice, but some prescribers will prescribe ivermectin off-label. Several dosing schedules are listed on Lexi-Comp:
- Ivermectin 200 mcg/kg once daily on days 1, 2, and 10
- Ivermectin 200 mcg/kg once daily on days 1 and once again on day 7-14
- Ivermectin 300 mcg/kg once daily dose on days 1 and once after day 7 11

Sulfamethoxazole/trimethoprim has been cited as an effective treatment against head lice. It is theorized that the antibiotic kills symbiotic bacteria in the louse gut, or that it has a direct toxic effect against the louse. Studies performed looking into the effectiveness of this drug have been small.1

Alternative Treatment Options
Alternative treatments for head lice have become popular. Some users may consider that the effectiveness, safety, cost or ease of application of an alternative treatment make it preferable to a standard lice treatment. Occlusive agents, essential oils, and electronic combs are among the treatments recommended but not conclusively evaluated for safety and effectiveness.

Occlusive agents are applied to the hair and scalp with the intent of suffocating the lice. The proposed mechanism of action of the occlusive agents is blockade of air exchange by obstruction of the respiratory spiracles of the adult louse and of the holes in the operculum of the eggs. These products have not been proven to be effective but are commonly used. They may also be the only option for use in children less than 6 months old.1

One popular occlusive treatment uses Cetaphil Cleanser™. The product is applied to the hair, dried with a hand-held hair dryer, left on overnight, and washed out the next morning. The process is repeated weekly for 3 weeks. The initial promoter of the treatment reported a 96% success rate. However, there are no well-controlled studies evaluating this treatment and the product is not FDA approved for head lice.1
Other occlusive agents include mayonnaise, tub margarine, herbal oils, olive oil, melted butter, vinegar and petroleum jelly. Treatment with petroleum jelly overnight may be effective but can leave a residue in the hair that requires many washings to remove.¹

**Conclusion**
The infested patient or a caregiver has a number of choices for treating a lice infestation. After an accurate diagnosis is made, the choice is dependent upon availability, local resistance, willingness to follow treatment protocols and economic resources. The pharmacist is often the first person the patient or caregiver consults and is in a good position to help educate about the treatments available and help reduce the anxiety associated with a head lice infestation.
References

www.natroba.com/media/Prescribing-Patient-Information.pdf.