

Head Lice Management and Treatment

Head lice infestations have been occurring for thousands of years, and although numerous efforts have been tried to prevent them from occurring, nothing has proven to be 100 percent successful. However, when they do occur, head lice infestations can be managed. It is important not to panic and/or to cause undue stress for those infested and others around them.

If head lice are suspected, it is recommended the individual be inspected by a school nurse, a public health nurse, or a medical provider.⁶ It is recognized that not all families, schools, or child-care facilities have access to a school nurse, a public health nurse, or medical provider. In those situations, it is recommended that schools and child-care facilities designate an individual or individuals who will be trained to inspect and assess for head lice on a private and confidential basis.

Management activities include treating close contacts with head lice, and the elimination of lice and nits from the living environment and personal items.

Treatment should be considered only if lice or viable eggs are observed. Once a head lice infestation is determined, there are several treatment options to choose from. Methods include:

1. Treatment with pediculicides (substances used to treat lice)
2. Manual removal
3. Alternative or natural methods

Treatment with Pediculicides

Pediculicides are substances or agents used to kill head lice. There are many medicated products available for treatment of head lice, and they normally come in the form of shampoos. Most are available over the counter, but some are by prescription only and may be reimbursable through insurance. **All products must be used strictly in accordance with label directions to ensure effectiveness and prevent adverse reactions from overuse or misuse.** When used properly, their effectiveness has been reported to be 80-95 percent. Repeat treatment with the pediculicide in 7 to 10 days may be needed if indicated on the product label. (See Treatment Failure section, page 11)



⁶ Frankowski BL, Bocchini JA, (2010). Council on School Health and Committee on Infectious Diseases, “Head Lice,” Pediatrics, 126 (2): 392-403.



Important Things to Know About Pediculicides:

- **Never treat unless there is definite evidence of head lice.**

Pediculicides are to be used for the treatment of head lice only when there are active lice or viable nits present in the hair, or when individuals share the same bed with someone who has live lice or viable nits (AAP, 2010). They should not be used as routine shampoo or conditioner.

- **These products do not prevent someone from getting head lice.**
- No product is 100 percent effective at getting rid of lice and their eggs.
 - Head lice infestations will be resolved more quickly by manually removing or combing nits within one quarter inch of the scalp after treatment. This will prevent eggs not killed during treatment from hatching. Nits further than one quarter inch from the scalp have likely hatched or are not viable.
 - A second treatment may be required as recommended on the product label.
- Non-prescription pediculicidal products generally are effective and safe if used according to the manufacturers' directions. **To ensure proper treatment, follow all recommendations and directions on the label.** All safety precautions listed on the product label should be observed.
- **Pediculicidal products are for external use only, and should only be applied to the scalp. These products are harmful if swallowed or inhaled. If accidental ingestion does occur, contact poison control at (800) 222-1222.**

Treatment Failure

None of the current pediculicides are 100 percent ovicidal (effective at killing nits), and resistance has been reported with pyrethrins and permethrin⁷ products. This is not unusual, as insects can develop resistance to products over time. Resistance will vary from one community to another.

When faced with a persistent case of head lice, consider several possible explanations, including:

- Misdiagnosis (no active infestation or misidentification)
- Noncompliance (not following treatment protocol or directions per manufacturer's label)
- Re-infestation (lice re-acquired after treatment)
- Failure to treat all affected family members or close contacts at the same time
- Resistance of lice to the pediculicide

Many cases of suspected resistance represent either misdiagnosis of old nits as active cases or a re-infestation. Individuals who are chronically infested and have been treated multiple times with pyrethroid shampoos are more likely to have resistant cases.

Although Permethrin 5% lotion has been tried for suspected resistant cases, it is unlikely that an increased concentration or prolonged application time would be effective in cases of true resistance to Permethrin 1%. Studies have shown that resistance to permethrin is not dose-dependent.⁷

Nit Removal after Treatment with a Pediculicide

Because none of the pediculicides are 100 percent ovicidal, manual removal of nits after treatment may be done to reduce worries of another lice infestation or for cosmetic reasons.

⁷ Durand *et al.* (2012). Insecticide resistance in head lice: clinical, parasitological and genetic aspects. *Clin Microbiol Infect.*, (4):338-344.



SAFETY AND PRECAUTIONS



Pediculicides are substances that kill live lice and can be dangerous if misused or overused.

Do not use pediculicide products if the following conditions are present. In these instances, consult a school nurse or other healthcare professional for safe alternative treatments:

- Known sensitivity to any component of a product (read package insert thoroughly).
- A child younger than the age recommended on the product label. For very young infants and children, lice and nits may need to be removed manually using a lice comb. (see page 15 for nit removal instructions)
- The person has an infestation of the eyebrows or eyelashes. Many lice medications cannot be used near the eyes. This can also be indicative of a pubic or body louse infestation.

The following people should consult their healthcare provider before treating themselves or another person for head lice using a pediculicide:

- Pregnant women and nursing mothers.
- Individuals with cancer.
- Individuals with asthma or other breathing difficulties (some pediculicidal products can cause breathing difficulties or asthmatic episodes in some individuals).
- Individuals who are allergic or sensitive to ragweed or chrysanthemums may have allergic reactions to some of the pediculicides.



Always read the medication/product label before applying medication to the head. If there are questions about contraindications or product safety, contact your healthcare provider.

The following pages will describe active ingredients, brief instructions, and precautions for over-the-counter pediculicides, prescription pediculicides, manual removal of lice, alternative or natural methods, other substances, and oral treatments for head lice.



Over the Counter (OTC) Pediculicides

Permethrin (1%) - Nix

- Manufactured as a synthetic pyrethroid, permethrin 1% is currently the recommended treatment of choice by the American Academy of Pediatrics (AAP) for head lice in newly diagnosed cases.
- It is indicated in treatment of head lice for those individuals aged two months and older.
- Permethrin has low toxicity and does not cause allergic reactions in individuals with plant allergies.
- The product is a cream rinse applied to hair that is first shampooed with a non-conditioning shampoo and then towel dried. It is left on for 10 minutes and then rinsed off. It leaves a residue on the hair that is designed to kill nymphs emerging from the 20-30 percent of eggs not killed with the application. In order not to remove the residue, the hair should be rinsed with plain water after application in a sink rather than the bathtub to limit exposure and with cool rather than hot water to minimize chemical absorption through the scalp.
- It is suggested that the application be repeated if live lice are seen 7 to 10 days later. Many experts recommend routine re-treatment (preferably on day 9).

Pyrethrins plus piperonyl butoxide - RID, A-200, R & C, Pronto, Clear Lice System

- Manufactured from natural extracts from the chrysanthemum, pyrethrins plus piperonyl butoxide has low toxicity for people, but is neurotoxic to lice.
- It is indicated in treatment of head lice for those individuals aged two years and older.
- Pyrethrins should be avoided in persons allergic to chrysanthemums or who suffer from asthma.
- The labels warn against possible allergic reaction in patients who are sensitive to ragweed, but modern extraction techniques minimize the chance of product contamination, and reports of true allergic reactions are rare.
- These products are mostly shampoos that are applied to dry hair and left on for 10 minutes before rinsing. All topical pediculicides should be rinsed from the hair over a sink rather than in the shower or bathtub to limit exposure. Rinsing should be done with cool rather than hot water to minimize chemical absorption through the scalp.
- None of these natural pyrethrins are totally ovicidal (have the ability to kill a louse through the egg before hatching), as newly laid eggs do not have a nervous system for several days; 20-30 percent of the eggs may remain viable after treatment.
- A second treatment is necessary 7 to 10 days after first treatment to kill newly emerged nymphs hatched from eggs that survived the first treatment.

Prescription Pediculicides

Malathion (0.5%) - Ovide

- The organophosphate (cholinesterase inhibitor) 0.5% malathion was reintroduced to the U.S. market as a head lice treatment in 1999.
- It is indicated in treatment of head lice for those individuals aged six years and older.
- Available as a lotion that is applied to the hair, left to air dry, then washed off after 8 to 12 hours (although some studies suggest effectiveness when left on for as short a time as 20 minutes).
- Malathion has high ovicidal activity and a single application is adequate for most individuals, but the product should be reapplied if live lice are still seen in 7 to 9 days.
- A concern about this product is its high alcohol content (78% isopropyl alcohol), making it potentially flammable. Users should be instructed not to use hair dryers, curling irons or flat irons while the hair is wet, and not to smoke near a person receiving treatment.
- There is a risk of severe respiratory depression if accidentally ingested, although no such cases have been reported.

Benzyl alcohol lotion (5%) - Ulesfia

- Approved in 2009, this product kills head lice by asphyxiation.
- It is indicated in treatment of head lice for those individuals aged six months and older.
- The product is to be applied topically to the scalp for 10 minutes and repeated in 7 days (retreating in 9 days is optimal).
- The most common adverse effects include pruritis, erythema, pyoderma, and ocular irritation.
- Benzyl alcohol is not ovicidal (have the ability to kill a louse through the egg before hatching).

Ivermectin lotion (0.5%) – Sklice

- Applied as a topical lotion, this product affects the nerve cells of lice, causing paralysis and death.
- It is indicated in treatment of head lice for those individuals aged six months and older.
- Applied to dry hair in an amount sufficient (up to one tube) to thoroughly coat the hair and scalp for 10 minutes and then rinsed with plain water.
- Ivermectin is both pediculicidal and partially ovicidal.
 - Sklice may be a one-time treatment – retreatment may not be necessary. In a study, 73.8 percent of individuals who received one treatment remained lice free after 15 days.
- Common side effects include eye redness or irritation, dandruff, dry skin, or burning sensation of the skin.

Spinosad suspension (0.9%) – Natroba

- Topical suspension with active ingredient of spinosad which causes neuronal excitement leading to paralysis and death of lice.
- It is indicated in treatment of head lice for those individuals aged four years and older.
- Product is applied to dry hair and scalp. Once washed off, a fine-toothed comb may be used to remove treated lice and nits from the hair and scalp.
- Use product in one or two treatments that are one week apart. If live lice are seen one week (7 days) after first use, re-treat.
- Contains benzyl alcohol. Common side effects include eye and scalp redness and irritation.

Topical Reactions to Pediculicide Treatment

Itching or mild burning of the scalp caused by inflammation of the skin in response to topical therapeutic agents can persist for many days after lice are killed and are not a reason for re-treatment. Topical corticosteroids (i.e., hydrocortisone creams) and oral antihistamines (i.e., Benadryl®) may be beneficial for relief of these symptoms. Please consult with the child’s physician/pharmacist before starting any topical therapies.



Image © Melanie Martinez

Manual Removal of Lice and Nits

Manually removing lice and nits may be effective at quickly resolving a head lice infestation. Pediculicide treatment may not be 100 percent ovicidal. For this reason, removing viable eggs may prevent the need for a second treatment. Whether using a pediculicide or manual removal as a stand-alone treatment, the more lice and nits that are combed from the hair, the faster the infestation will be resolved.



To manually remove lice after pediculicide treatment or as a stand-alone treatment:

1. Work in an area with good visibility and light, such as from a lamp or natural sunlight through a window.
2. Make sure a standard comb moves through the hair without difficulty before attempting to use a fine-toothed lice comb. Combing may be easier if the person's hair is slightly wet.
3. Part the hair into sections and hold sections in place with rubber bands or hair clips.
4. Sit behind the person and use a bright light (and magnification if available) to inspect and comb through the hair, one small section at a time. Remove nits using the comb, fingernails, or by cutting the strands of hair.
5. Clean the louse comb frequently to remove any caught lice or eggs using soapy water or paper towel. It may require several hours each night for several nights to successfully remove all nits and lice. An entertaining video may help keep children occupied during this exercise.
6. Combing may be repeated daily until no lice are seen. Continue monitoring for two to three weeks.

Many types of fine-toothed combs may be included within packages of pediculicides, or they may be purchased from most drug stores or internet retailers. The effectiveness depends on their composition (metal or plastic) and construction (length and spacing) of the comb teeth, the texture of the hair to be combed, combing technique, and the time and care expended in the effort.

Electronic combs may be useful for detection (if vision is limited), since they emit a sound when a live louse is present.



Alternative or Natural Methods

Several products are marketed as alternative or natural methods of treatment. A number of shampoos and rinses contain herbs, oils, or enzymes believed to aid in lice removal. The majority of alternative or natural products are suffocants or enzymes.

Natural or herbal products are not required to meet FDA efficacy and safety standards. These products do not have licenses for the treatment of head lice, and in some cases, have little or no data to support their effectiveness. Although natural products are often perceived as being intrinsically safe, the **State of Michigan cannot recommend these treatments without further evidence of their effectiveness.** Please contact your local health department or family physician to make sure there are no potential health consequences of alternative or natural methods.

Suffocants – petroleum jelly, mayonnaise, plant-based oils, or Cetaphil

- Suffocants can obstruct the respiration of adult lice as well as suffocate lice eggs by blocking efficient air exchange.
- For all products except Cetaphil, the product is massaged on the entire surface of the hair and scalp, covered with a shower cap, and left on for at least eight hours (see safety precautions page 19). The suffocant can then be used as a lubricant to aid in nit removal by combing.
- Cetaphil is massaged on the entire surface of the hair and scalp, the excess product is combed out, hair is dried with a hair dryer, and the hair is washed eight hours or more later.⁸
- Diligent shampooing is usually necessary for at least the next 7 to 10 days to remove the residue.
- To date, little scientifically published information is available on the effectiveness of these methods.

Enzymes – LiceLogic, Lice B Gone, Lice R Gone

- Treatment products containing “enzymes” claim to dissolve or soften the glue that attaches the nit to the hair shaft, thereby providing easier removal of lice and nits when combing. To date, only anecdotal information is available on their effectiveness.

Desiccation (Heat Treatment) – LouseBuster, hair dryers, etc.

- The LouseBuster is a custom-built machine that uses one 30-minute application of hot air in an attempt to desiccate active lice and their eggs.
- One study has shown that subjects had nearly 100 percent mortality of eggs and 80 percent mortality of hatched lice.
- The LouseBuster is expensive and requires training in its use. Some businesses offer convenient heat treatments for a fee (normally not covered by insurance).
- A home hair dryer should not be used in the same way. Studies have also shown that using home hair dryers, commercial (salon) dryers, and drying bonnets are not as effective as the steady and diffused heat offered by professional products.



⁸ Pearlman, DL (2004). A simple treatment for head lice: Dry-on, suffocation-based pediculicide, *Pediatrics*, 114 (3): 275-279.

Other Substances

Flammable or toxic substances, such as gasoline or kerosene, **should never be used**. Products intended for animal use (e.g., flea collars or topical insecticides) **should not be used** to treat head lice in humans.

Oral Treatments (Used Off-label for Lice)

A promising oral treatment method, oral Ivermectin (Stromectol), is an anti-parasitic agent similar to a macrolide antibiotic but without antimicrobial activity. Other agents used off-label are currently being researched, however, the Federal Drug Administration (FDA) has not approved any oral drugs for the treatment of head lice infestations.

Table 1. Comparison of various head lice treatments including over-the-counter, prescription, and alternatives.

Treatment	Active Ingredient	Advantages	Disadvantages
Over-the-Counter			
Nix	Permethrin lotion 1%	Most studied and least toxic to humans. Generally effective and safe if used according to the manufacturer's directions. Does not cause allergic reactions in individuals with plant allergies. For use in children over 2 months of age.	Non-ovicidal; adverse effects include pruritis, erythema, and edema. Repeat treatments are often required or recommended by the manufacturer.
A-200, Pronto, R&C, Rid, Triple X	Piperonyl butoxide (4%) Pyrethrum extract (equivalent to 0.33% pyrethrins)	Generally effective and safe if used according to the manufacturer's directions. For use in children over 2 years of age.	Non-ovicidal; avoid in people who are allergic to ragweed or chrysanthemums. Repeat treatments are often required or recommended by the manufacturer.
Prescription			
Ovide	Malathion lotion (0.5%)	Single application is adequate for most patients; partially-ovicidal. Malathion is approved for use in children over 6 years of age.	Due to isopropyl alcohol content, Ovide is potentially flammable; use caution. May cause skin irritation or stinging sensation.
Ulesfia lotion	Benzyl alcohol lotion (5%)	Not neurotoxic and kills head lice by asphyxiation. For use in children over 6 months of age.	Non-ovicidal; contains benzyl alcohol which may cause eye and scalp redness and irritation.
Sklice	Ivermectin lotion (0.5%)	May be both pediculocidal and ovicidal. Approved for use in children over 6 months of age.	Side effects may include eye redness or irritation, dandruff, dry skin, or burning sensation of the skin.
Natroba	Spinosad lotion (0.9%)	For use in children over 4 years of age.	Non-ovicidal; contains benzyl alcohol which may cause eye and scalp redness and irritation.

Treatment	Active Ingredient	Advantages	Disadvantages
Alternative or Natural			
Petroleum jelly (Vaseline)	Viscous material which potentially asphyxiates head lice.	“Non-chemical;” perceived as a natural option.	Effectiveness unknown; very difficult to remove from hair.
Mayonnaise	Viscous material which potentially asphyxiates head lice.	“Non-chemical;” perceived as a natural option.	Effectiveness unknown; difficult to remove from hair.
Oil (vegetable, olive, mineral)	Viscous material which potentially asphyxiates head lice.	“Non-chemical;” perceived as a natural option.	Effectiveness unknown; difficult to remove from hair.
Cetaphil	Viscous material which potentially asphyxiates head lice.	“Non-chemical;” perceived as a natural option.	Not approved by the FDA for use as a pediculicide.
Desiccation (Heat)	Controlled, heated air causes desiccation in head lice and eggs.	“Non-chemical;” perceived as a natural option. Ovicidal; one-time treatment usually effective.	Expensive equipment; individual providing treatment must be trained and competent.
Enzyme Products		“Non-chemical;” perceived as a natural option.	Effectiveness unknown.
<i>Note: The use of brand names in this document is for identification purposes only, not for product endorsement.</i>			



NEVER USE:

Treatment should never consist of toxic and/or flammable household products such as kerosene, gasoline, paint thinner, turpentine, or any other household cleaners. Pesticides intended for use on insects or bugs other than head lice, or pesticides intended for use on animals, should never be used on humans. **Every year children are seriously injured as a result of these types of products.**

CAUTION:

Use caution when putting small children to bed wearing a shower cap. Shower caps may be a suffocation risk.

Cleaning of Personal Items and Environment

Head lice are spread most commonly by direct head-to-head (hair-to-hair) contact. However, much less frequently they are spread by sharing clothing or belongings. The risk of getting infested by a louse that has fallen onto a carpet or furniture is very small. Head lice survive less than 1-2 days if they fall off a person and cannot feed; nits cannot hatch and usually die within a week if they are not kept near body temperature.⁹ Items that have been in contact with the head of the person with infestation in the 24-48 hours **before treatment** should be considered for cleaning.

Check everyone in the household at the same time



Check everyone in the household at the same time, prior to cleaning the environment. This includes grandparents, younger and older siblings, and parents. Statistics have suggested that 60 percent of people with head lice don't know they have them and have no symptoms. They may be unintentionally infecting others and continuing the cycle.



Laundry any personal items that could be infested with head lice

Personal items to be laundered include clothing, bedding, towels, cloth toys, etc. Items should be washed for at least 10 minutes in hot water and/or dried on high heat for at least 30 minutes. For items that cannot be washed, seal in a plastic bag and store for 14 days at room temperature or 24 hours in below freezing temperatures.



Vacuum

Items that should be vacuumed include bare mattresses, carpets, floors, stuffed animals, coat collars, hats, couches, chairs, and car upholstery. There is no need to discard the vacuum bag after cleaning, except for aesthetic purposes. Head lice cannot survive without a blood meal.



Inspect hairbrushes, combs, hair ties, and barrettes

For washable accessories, wash and dry (on high heat) for at least 30 minutes. Soak combs, brushes and barrettes in water hotter than 130°F. If items cannot be exposed to high heat, soak them in Lysol® or rubbing alcohol for one hour.



DO NOT spray or “fog” a home with insecticides or pediculicides. They are not necessary to control head lice and may be harmful if used in a poorly ventilated area. The CDC, the AAP, and the Michigan Department of Community Health strongly discourage the use of these spray products for the control of head lice.

⁹ Centers for Disease Control and Prevention, Parasites – Lice – Head Lice – Prevention and Control, www.cdc.gov (2013).