

Head Lice

Epidemiology & Risk Factors

In the United States, infestation with head lice (*Pediculus humanus capitis*) is most common among preschool- and elementary school-age children and their household members and caretakers. Head lice are not known to transmit disease; however, secondary bacterial infection of the skin resulting from scratching can occur with any lice infestation.

Getting head lice is not related to cleanliness of the person or his or her environment.

Head lice are mainly spread by direct contact with the hair of an infested person. The most common way to get head lice is by head-to-head contact with a person who already has head lice. Such contact can be common among children during play at:

- school,
- home, and
- elsewhere (e.g., sports activities, playgrounds, camp, and slumber parties).

Uncommonly, transmission may occur by:

- wearing clothing, such as hats, scarves, coats, sports uniforms, or hair ribbons worn by an infested person;
- using infested combs, brushes or towels; or
- lying on a bed, couch, pillow, carpet, or stuffed animal that has recently been in contact with an infested person.

Reliable data on how many people get head lice each year in the United States are not available; however, an estimated 6 million to 12 million infestations occur each year in the United States among children 3 to 11 years of age. Some studies suggest that girls get head lice more often than boys, probably due to more frequent head-to-head contact.

In the United States, infestation with head lice is much less common among African-Americans than among persons of other races. The head louse found most frequently in the United States may have claws that are better adapted for grasping the shape and width of some types of hair but not others.

Disease

Head lice are not known to transmit any disease and therefore are not considered a health hazard.

Head lice infestations can be asymptomatic, particularly with a first infestation or when an infestation is light. Itching (“pruritus”) is the most common symptom of head lice infestation and is caused by an allergic reaction to louse bites. It may take 4–6 weeks for itching to appear the first time a person has head lice.

Other symptoms may include:

- a tickling feeling or a sensation of something moving in the hair;

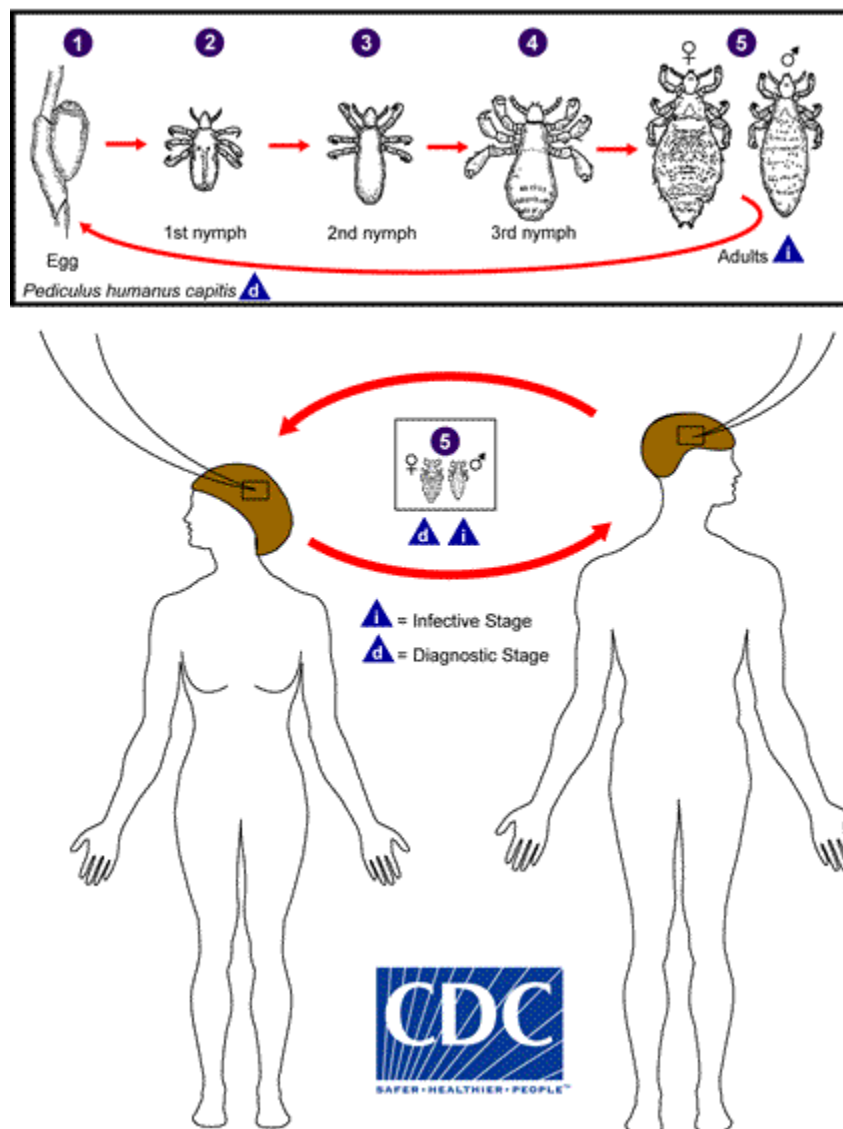
- irritability and sleeplessness; and
- sores on the head caused by scratching. These sores caused by scratching can sometimes become infected with bacteria normally found on a person's skin.

Biology

Causal Agent:

Pediculus humanus capitis, the head louse, is an insect of the order Psocodea and is an ectoparasite whose only host are humans. The louse feeds on blood several times daily and resides close to the scalp to maintain its body temperature.

Life Cycle:



The life cycle of the head louse has three stages: egg, nymph, and adult.

Eggs: Nits are head lice eggs. They are hard to see and are often confused for dandruff or hair spray droplets. Nits are laid by the adult female and are cemented at the base of the hair shaft nearest the scalp **1**. They are 0.8 mm by 0.3 mm, oval and usually yellow to white. Nits take about 1 week to hatch (range 6 to 9 days). Viable eggs are usually located within 6 mm of the scalp.

Nymphs: The egg hatches to release a nymph **2**. The nit shell then becomes a more visible dull yellow and remains attached to the hair shaft. The nymph looks like an adult head louse, but is about the size of a pinhead. Nymphs mature after three molts (**3**, **4**) and become adults about 7 days after hatching.

Adults: The adult louse is about the size of a sesame seed, has 6 legs (each with claws), and is tan to grayish-white **5**. In persons with dark hair, the adult louse will appear darker. Females are usually larger than males and can lay up to 8 nits per day. Adult lice can live up to 30 days on a person's head. To live, adult lice need to feed on blood several times daily. Without blood meals, the louse will die within 1 to 2 days off the host.

Life cycle image and information courtesy of [DPDx](#).

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 of a person.

Because adult and nymph lice are very small, move quickly, and avoid light, they may be difficult to find. Use of a fine-toothed louse comb may facilitate identification of live lice.

If crawling lice are not seen, finding nits attached firmly within ¼ inch of the base of hair shafts suggests, but does not confirm, the person is infested. Nits frequently are seen on hair behind the ears and near the back of the neck. Nits that are attached more than ¼ inch from the base of the hair shaft are almost always non-viable (hatched or dead). Head lice and nits can be visible with the naked eye, although use of a magnifying lens may be necessary to find crawling lice or to identify a developing nymph inside a viable nit. Nits are often confused with other particles found in hair such as dandruff, hair spray droplets, and dirt particles.

If no nymphs or adults are seen, and the only nits found are more than ¼ inch from the scalp, then the infestation is probably old and no longer active — and does not need to be treated.

Treatment

General Guidelines

Treatment for head lice is recommended for persons diagnosed with an active infestation. All household members and other close contacts should be checked; those persons with evidence of an active infestation should be treated. Some experts believe prophylactic treatment is prudent for persons who share the same bed with actively-infested individuals. All infested persons (household members and close contacts) and their bedmates should be treated at the same time.

Some pediculicides (medicines that kill lice) have an ovicidal effect (kill eggs). For pediculicides that are only weakly ovicidal or not ovicidal, routine retreatment is recommended. For those that are more strongly ovicidal, retreatment is recommended only if live (crawling) lice are still present several days after treatment (see recommendation for each medication). To be most effective, retreatment should occur after all eggs have hatched but before new eggs are produced.

When treating head lice, supplemental measures can be combined with recommended medicine (pharmacologic treatment); however, such additional (non-pharmacologic) measures generally are not required to eliminate a head lice infestation. For example, hats, scarves, pillow cases, bedding, clothing, and towels worn or used by the infested person in the 2-day period just before treatment is started can be machine washed and dried using the hot water and hot air cycles because lice and eggs are killed by exposure for 5 minutes to temperatures greater than 53.5°C (128.3°F). Items that cannot be laundered may be dry-cleaned or sealed in a plastic bag for two weeks. Items such as hats, grooming aids, and towels that come in contact with the hair of an infested person should not be shared. Vacuuming furniture and floors can remove an infested person's hairs that might have viable nits attached.

Treat the infested person(s): Requires using an Over-the-counter (OTC) or prescription medication. Follow these treatment steps:

1. Before applying treatment, it may be helpful to remove clothing that can become wet or stained during treatment.
2. Apply lice medicine, also called pediculicide, according to the instructions contained in the box or printed on the label. If the infested person has very long hair (longer than shoulder length), it may be necessary to use a second bottle. Pay special attention to instructions on the label or in the box regarding how long the medication should be left on the hair and how it should be washed out.

WARNING:

Do not use a combination shampoo/conditioner, or conditioner before using lice medicine. Do not re-wash the hair for 1–2 days after the lice medicine is removed.

- Have the infested person put on clean clothing after treatment.
- If a few live lice are still found 8–12 hours after treatment, but are moving more slowly than before, do not retreat. The medicine may take longer to kill all the lice. Comb dead and any remaining live lice out of the hair using a fine-toothed nit comb.
- If, after 8–12 hours of treatment, no dead lice are found and lice seem as active as before, the medicine may not be working. Do not retreat until speaking with your health care provider; a different pediculicide may be necessary. If your health care provider recommends a different pediculicide, carefully follow the treatment instructions contained in the box or printed on the label.
- Nit (head lice egg) combs, often found in lice medicine packages, should be used to comb nits and lice from the hair shaft. Many flea combs made for cats and dogs are also effective.
- After each treatment, checking the hair and combing with a nit comb to remove nits and lice every 2–3 days may decrease the chance of self-reinfestation. Continue to check for 2–3 weeks to be sure all lice and nits are gone. Nit removal is not needed when treating with spinosad topical suspension.
- Retreatment is meant to kill any surviving hatched lice before they produce new eggs. For some drugs, retreatment is recommended routinely about a week after the first treatment (7–9 days, depending on the drug) and for others only if crawling lice are seen during this period. Retreatment with lindane shampoo is not recommended.
- **Supplemental Measures:** Head lice do not survive long if they fall off a person and cannot feed. You don't need to spend a lot of time or money on housecleaning activities. Follow these steps to help avoid re-infestation by lice that have recently fallen off the hair or crawled onto clothing or furniture.

1. Machine wash and dry clothing, bed linens, and other items that the infested person wore or used during the 2 days before treatment using the hot water (130°F) laundry cycle and the high heat drying cycle. Clothing and items that are not washable can be dry-cleaned

OR

sealed in a plastic bag and stored for 2 weeks.

2. Soak combs and brushes in hot water (at least 130°F) for 5–10 minutes.
3. Vacuum the floor and furniture, particularly where the infested person sat or lay. However, the risk of getting infested by a louse that has fallen onto a rug or 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 at the same temperature as that found close to the human scalp. Spending much time and money on housecleaning activities is not necessary to avoid reinfestation by lice or nits that may have fallen off the head or crawled onto furniture or clothing.
4. Do not use fumigant sprays; they can be toxic if inhaled or absorbed through the skin.

Prevent Reinfestation:

Over-the-counter Medications

Many head lice medications are available “Over-the-counter” without a prescription at a local drug store or pharmacy. Each Over-the-counter product approved by the FDA for the treatment of head lice contains one of the following active ingredients. If crawling lice are still seen after a full course of treatment contact your health care provider.

5. **Pyrethrins** combined with piperonyl butoxide;
Brand name products: A-200*, Pronto*, R&C*, Rid*, Triple X*.

Pyrethrins are naturally occurring pyrethroid extracts from the chrysanthemum flower. Pyrethrins are safe and effective when used as directed. Pyrethrins can only kill live lice, not unhatched eggs (nits). A second treatment is recommended 9 to 10 days after the first treatment to kill any newly hatched lice before they can produce new eggs. Pyrethrins generally should not be used by persons who are allergic to chrysanthemums or ragweed. Pyrethrin is approved for use on children 2 years of age and older.

6. **Permethrin lotion, 1%**;
Brand name product: Nix*.

Permethrin is a synthetic pyrethroid similar to naturally occurring pyrethrins. Permethrin lotion 1% is approved by the FDA for the treatment of head lice. Permethrin is safe and effective when used as directed. Permethrin kills live lice but not unhatched eggs. Permethrin may continue to kill newly hatched lice for several days after treatment. A second treatment often is necessary on day 9 to kill any newly hatched lice before they can produce new eggs. Permethrin is approved for use on children 2 months of age and older.

Prescription Medications

The following medications, in alphabetical order, approved by the U.S. Food and Drug Administration (FDA) for the treatment of head lice are available only by prescription. If crawling lice are still seen after a full course of treatment, contact your health care provider.

- **Benzyl alcohol lotion, 5%;**
Brand name product: Ulesfia lotion*

Benzyl alcohol is an aromatic alcohol. Benzyl alcohol lotion, 5% has been approved by the FDA for the treatment of head lice and is considered safe and effective when used as directed. It kills lice but it is not ovicidal. A second treatment is needed 7 days after the first treatment to kill any newly hatched lice before they can produce new eggs. Benzyl alcohol lotion is intended for use on persons who are 6 months of age and older and its safety in persons aged more 60 years has not been established. It can be irritating to the skin.

- **Ivermectin lotion, 0.5%;**
Brand name product: Sklice*

Ivermectin lotion, 0.5% was approved by the FDA in 2012 for treatment of head lice in persons 6 months of age and older. It is not ovicidal, but appears to prevent nymphs (newly hatched lice) from surviving. It is effective in most patients when given as a single application on dry hair without nit combing. It should not be used for retreatment without talking to a healthcare provider.

Given as a tablet in mass drug administrations, oral ivermectin has been used extensively and safely for over two decades in many countries to treat filarial worm infections. Although not FDA-approved for the treatment of lice, ivermectin tablets given in a single oral dose of 200 micrograms/kg or 400 micrograms/kg repeated in 9-10 days has been shown effective against head lice. It should not be used in children weighing less than 15 kg or in pregnant women.

- **Malathion lotion, 0.5%;**
Brand name product: Ovide*

Malathion is an organophosphate. The formulation of malathion approved in the United States for the treatment of head lice is a lotion that is safe and effective when used as directed. Malathion is pediculicidal (kills live lice) and partially ovicidal (kills some lice eggs). A second treatment is recommended if live lice still are present 7–9 days after treatment. Malathion is intended for use on persons 6 years of age and older. Malathion can be irritating to the skin. Malathion lotion is flammable; do not smoke or use electrical heat sources, including hair dryers, curlers, and curling or flat irons, when applying malathion lotion and while the hair is wet.

- **Spinosad 0.9% topical suspension;**
Brand name product: Natroba*

Spinosad is derived from soil bacteria. Spinosad topical suspension, 0.9%, was approved by the FDA in 2011. Since it kills live lice as well as unhatched eggs, retreatment is usually not needed. Nit combing is not required. Spinosad topical suspension is approved for the treatment of children 6 months of age and older. It is safe and effective when used as directed. Repeat treatment should be given only if live (crawling) lice are seen 7 days after the first treatment.

For second–line treatment only:

- **Lindane shampoo 1%;**
Brand name products: None available

Lindane is an organochloride. The American Academy of Pediatrics (AAP) no longer recommends it as a pediculocide. Although lindane shampoo 1% is approved by the FDA for the treatment of head lice, it is not recommended as a first–line treatment. Overuse, misuse, or accidentally swallowing lindane can be toxic to the brain and other parts of the nervous system; its use should be restricted to patients for whom prior treatments have failed or who cannot tolerate other medications that pose less risk. Lindane should not be used to treat premature infants, persons with HIV, a seizure disorder, women who are pregnant or breast–feeding, persons who have very irritated skin or sores where the lindane will be applied, infants, children, the elderly, and persons who weigh less than 110 pounds. Retreatment should be avoided.

When treating head lice

12. Do not use extra amounts of any lice medication unless instructed to do so by your physician and pharmacist. The drugs used to treat lice are insecticides and can be dangerous if they are misused or overused.
13. All the medications listed above should be kept out of the eyes. If they get onto the eyes, they should be immediately flushed away.
14. Do not treat an infested person more than 2–3 times with the same medication if it does not seem to be working. This may be caused by using the medicine incorrectly or by resistance to the medicine. Always seek the advice of your health care provider if this should happen. He/she may recommend an alternative medication.
15. Do not use different head lice drugs at the same time unless instructed to do so by your physician and pharmacist.

Prevention & Control

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 onto which lice have crawled or nits attached to shed hairs may have fallen. 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 at the same temperature as that found close to the scalp.

The following are steps that can be taken to help prevent and control the spread of head lice:

- Avoid head-to-head (hair-to-hair) contact during play and other activities at home, school, and elsewhere (sports activities, playground, slumber parties, camp).
- Do not share clothing such as hats, scarves, coats, sports uniforms, hair ribbons, or barrettes.
- Do not share combs, brushes, or towels. Disinfest combs and brushes used by an infested person by soaking them in hot water (at least 130°F) for 5–10 minutes.
- Do not lie on beds, couches, pillows, carpets, or stuffed animals that have recently been in contact with an infested person.
- Machine wash and dry clothing, bed linens, and other items that an infested person wore or used during the 2 days before treatment using the hot water (130°F) laundry cycle and the high heat

drying cycle. Clothing and items that are not washable can be dry-cleaned OR sealed in a plastic bag and stored for 2 weeks.

- Vacuum the floor and furniture, particularly where the infested person sat or lay. However, spending much time and money on housecleaning activities is not necessary to avoid reinfestation by lice or nits that may have fallen off the head or crawled onto furniture or clothing.
- Do not use fumigant sprays or fogs; they are not necessary to control head lice and can be toxic if inhaled or absorbed through the skin.

To help control a head lice outbreak in a community, school, or camp, children can be taught to avoid activities that may spread head lice.

Resources for Health Professionals

- Both over-the-counter and prescription medications are available for treatment of head lice infestations.
- Treatment for head lice is recommended for persons diagnosed with an active infestation. All household members and other close contacts should be checked; those persons with evidence of an active infestation should be treated. Some experts believe prophylactic treatment is prudent for persons who share the same bed with actively-infested individuals. All infested persons (household members and close contacts) and their bedmates should be treated at the same time.
- Retreatment of head lice usually is recommended because no approved pediculicide is completely ovicidal. To be most effective, retreatment should occur after all eggs have hatched but before new eggs are produced. The retreatment schedule can vary depending on the pediculicide used.
- Removal of all nits after successful treatment with a pediculicide is not necessary to prevent further spread. Removal of nits after treatment with a pediculicide may be done for aesthetic reasons, or to reduce diagnostic confusion and the chance of unnecessary retreatment. Because pediculicides are not 100% ovicidal (i.e. do not kill all the egg stages), some experts recommend the manual removal of nits that are attached within ¼ inch of the base of the hair shaft.
- Treatments for head lice are generally safe and effective when used correctly. Some treatments may cause an itching or a mild burning sensation caused by inflammation of the skin on the scalp. Most products used to treat head lice are pesticides that can be absorbed through the skin. Therefore, all medicines used for the treatment of lice should be used with care and only as directed.
- When treating head lice, supplemental measures can be combined with recommended medicine (pharmacologic treatment); however, such additional (non-pharmacologic) measures generally are not required to eliminate a head lice infestation. For example, hats, scarves, pillow cases, bedding, clothing, and towels worn or used by the infested person in the 2-day period just before treatment is started can be machine washed and dried using the hot water and hot air cycles because lice and eggs are killed by exposure for 5 minutes to temperatures greater than 53.5°C (128.3°F). Items that cannot be laundered may be dry-cleaned or sealed in a plastic bag for two weeks. Items such as hats, grooming aids, and towels that come in contact with the hair of an infested person should not be shared. Vacuuming furniture and floors can remove an infested person's hairs that might have viable nits attached.
- Both topical and oral ivermectin have been used successfully to treat lice; however, only topical ivermectin lotion currently is approved by the U.S. Food and Drug Administration (FDA) for treatment of lice. Oral ivermectin is not FDA-approved for treatment of lice.