

Human Lice

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Historically, human lice have been associated with wars, crowded living conditions, and poverty. Lice do flourish under these circumstances; however, they can affect people across all ages and socioeconomic status. This is particularly true of head lice, which are most common in preschool, kindergarten, and elementary school children. The severity of the louse problem in this group has increased as a result of their growing resistance to common chemical control measures. According to the Centers for Disease Control and Prevention (2017), children aged 3 to 11 suffer 6 to 12 million lice infestations each year in the United States. Though head lice cannot jump or fly, they easily move from one person to another when they are in close contact or share items such as hair brushes, combs, towels, or hats. Lice spread when people store personal items in shared lockers or use a head rest previously used by an infested person—most commonly they transfer by direct head to head contact.

Lice thrive at 82 to 86 degrees F, in favorable humidity, and with a ready food source. They will not leave a host unless they are dislodged or the host's body temperature changes significantly. Lice cannot survive off a host for more than about 24 hours. Lice will die in rugs, carpets, school buses or other non-host environments. The types of lice discussed herein, pierce the skin and feed on blood and can cause persistent skin irritation and itching, leading to restlessness and loss of sleep. Lice are not dangerous, nor do they transmit disease. However, the skin may become sensitized to lice saliva and feces—scratching may open the skin and lead to secondary infections.

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There are three kinds of human lice. Their common names describe their preferred feeding sites: head lice (*Pediculus humanus capitis*); body lice (*Pediculus humanus humanus*); and pubic or crab lice (*Phthirus pubis*). Adult lice are flat, wingless, greyish to brown insects that are 1.5 to 3 mm long. Their legs have claws for clinging to hair shafts, however, human lice do not survive on pets or domestic animals.

Head lice

Adult head lice are 2 to 3 mm long, and their abdomen is distinctly longer than wide. They vary from dirty-white to greyish-black, but usually blend in with the hair color



Figure 1. The head louse.

Source: Clay Scherer



Figure 2. Head lice are small. Source: Clay Scherer

of the host. Head lice on blond people tend to be paler than those on people with black or brown hair.

Head lice prefer to live on the hair of the head, and are rarely found on other parts of the body. In a severe infestation, louse secretions may cause the hair to become matted. This louse has three stages: egg (nit); nymph; and adult. The female lays four to six nits per day or 50 to 150 eggs during her lifetime. The eggs are oval, light tan, and about the size of a fine particle of sand. Nits are glued to the hair shafts near the scalp, usually around the ears and on the back of the head. The eggs hatch in 5 to 7 days under normal conditions.

Newly hatched nymphs are transparent. They must take a blood meal within 24 hours to survive, and may feed two to three times per day. Immature lice pass through three nymphal stages over about 9 days and become straw colored as they mature. Nymphs look much like adults. The life cycle lasts 15 to 21 days, though adults may live up to 30 days.



Figure 3. Normal view of eggs (nits) on dark hair (above), and on light hair (below). Source: Clay Scherer



Figure 4. Closeup of eggs (nits) attached to hair.

The presence of nits does not always mean that a person is currently infested. Nits may be left from a previous infestation. Because eggs are attached to the hair shaft near the scalp, the location of nits on the hair shaft can indicate a current or past infestation. In the week it takes a louse egg to hatch human hair grows about $\frac{1}{4}$ inch, carrying the egg with it. Therefore, eggs more than $\frac{1}{4}$ inch from the scalp have already hatched or never will. Empty (hatched) nits may remain attached to the hair shaft for months. These play no role in the transmission of head lice but should be removed.

Head lice are not known to cause any serious medical condition. Itching is the most common symptom. The greatest concern is the social stigma of louse infestation.

Body lice

The body louse looks like a head louse, but is slightly smaller. It is often referred to as a clothing louse or “cootie.” Infestations of body lice are more prevalent when hygiene is poor and when clothes are worn for several weeks or shared with others. Body lice are found particularly where garments come in close contact with the body, such as the crotch of trousers, the waistline, and the armpits.



Figure 5. Body louse.
Source: Clay Scherer

The body louse's life cycle is similar to that of the head louse, except that a female may lay 270 to 300 eggs during her lifetime or up to 10 eggs per day. Body lice glue their eggs to coarse fibers and inner seams of clothing, and occasionally to coarse hairs of the body. Eggs hatch in about 1 week, and the life cycle completes in about 27 days.

Body lice remain on clothing except when feeding on the host. In underdeveloped countries, body lice can transmit louse-borne typhus and relapsing fever. Body louse infestations are rare in developed countries.

Pubic or crab lice

Crab lice usually live in pubic hair, but may be found on the chest, in the armpits, on eyelashes, and on beards. These lice are easy to recognize by their crab-like appearance. They vary from dark grey to brown and are 1.5 to 2.0 mm long. Their body is nearly as wide as it is long. The second and third pairs of legs are prominent.

Adults live 3 to 4 weeks and a single female will deposit about 26 eggs. These hatch in 6 to 8 days and nymphs immediately feed on the host. Crab lice pass through three nymphal stages before becoming adults. The life cycle is completed in 34 to 41 days. These lice are not known to transmit any diseases, but their bites produce bluish swellings on the skin. Crab lice are spread mainly through intimate physical contact, though it is possible for eggs on hairs left on bedding and toilet seats to spread these lice from one person to another.



Figure 6. Crab louse.

Source: Clay Scherer

Integrated Pest Management

Integrated Pest Management, or IPM, uses multiple methods to control pests. This comprehensive approach reduces the risk of failure associated with using only one control option. Lice control methods include prevention, chemical control, and physical control. Early detection is important for quickly controlling the problem.

Monitoring and inspection

Head lice spread principally from person to person and are not associated with uncleanliness. Children, however, should be encouraged not to share combs, hats, head-phones, ear-buds, blue-tooth devices, or other personal belongings.

Periodic inspection to detect head lice early can prevent advanced infestations which are much more difficult to control. It is best to inspect children during the early weeks of school (August–November) when outbreaks are most common. September is “National Head Lice Prevention Month.”

An adult louse can move 6 to 30 cm per minute—they are hard to see and very difficult to remove. Nits are easier to spot, especially at the nape of the neck or behind the ears. Unhatched eggs will be within 1 cm of the scalp. In general, nits found more than 1 cm from the scalp are unlikely to be viable. In warmer climates viable nits can occur farther from the scalp.

Active lice on a student's head is the only definitive indication that should trigger treatment. If an active infestation is noted, the child's parent or guardian should be notified immediately, and treatment options suggested. Other members of the family should inspect each other along with children who regularly sleep-over or share hair apparel (hair clips, head-sets, hats, etc.). Parents and school nurses should be encouraged to recheck the student's head for lice after treatments if the child is still showing signs of infestation.

Nonchemical control measures

Because head lice can survive off the head for only a short time, transmission occurs most commonly with head-to-head contact. This should be avoided. To further reduce potential transmission, discourage sharing of combs, brushes, headbands, barrettes, pillows, hats, scarves, coats, helmets, backpacks, or other objects that may touch the head. Where possible, place hats, scarves, and coats on widely spaced hooks or in separate lockers or cubbies to avoid contact. If hooks are shared or clustered, have children place their coats and hats in sealed plastic bags, especially if head lice are present. Hats and scarves can also be stored inside backpacks.

Sanitation and cultural control

During outbreaks of head lice, it is useful for students to bag their hats and coats between use or keep them in personal lockers or at their chairs. Though head lice do not survive long away from a human host, they can crawl short distances such as from one hat to another on a hat rack.

Bean bag chairs, nap mats, or other stuffed furniture that children share should be removed from classrooms during outbreaks. Sharing sports helmets and audio headphones can also contribute to the spread of head lice.

Physical and mechanical control

When an infestation is detected, all clothes should be washed in soapy water and dried at a dryer's "high heat" setting. Pillow cases, sheets, blankets, and other bedding material should also be washed and placed in dried at high heat for at least 20 minutes to kill the lice and their eggs. Carpets, furniture, car seats and any non-washable items such as children's toys should be thoroughly vacuumed, and the vacuum bag immediately discarded outside of the home. Anything that cannot be vacuumed may be tightly sealed in plastic bags and placed in a bright sunny area for 7 to 10 days. This elevates the temperature in the bag and kills all stages of the lice.

Chemical control

Because of the biology of the head louse and its increasing resistance to available lice-killing (pediculicide) shampoos, relying on these products alone is unlikely to be effective. Pesticides applied to classrooms, lockers or buses are ineffective, unnecessary, and can be harmful to students and teachers. The best approach to managing infestations is to integrate the preventative measures mentioned above with regular head inspections by school nurses, advisories encouraging parents to do daily head checks, manual lice removal with special louse and nit combs, and the judicious use of pediculicides. Educating students and parents about these pests and their control is essential to any IPM program for head lice.

Always read and follow the label directions on lice-killing shampoos and chemicals carefully. Never



Figure 7. Removing head lice and nits. Source: Clay Scherer

deviate from the directions and always wear the appropriate personal protective equipment if you are applying pediculicide shampoos. Improper use can harm people.

Regular screening

The school health professional can play a very important role in screening students for head lice. Generally, about 30 percent of school children with nits will also have adult lice. However, screening for nits alone is not an accurate way determine which students will need head treatments. Again, the presence of active lice on a student's head is the only definitive indication that should trigger a head treatment. If an active infestation is noted, the child's parent or guardian should be notified immediately.

Parents and school nurses should be encouraged to recheck the student's head for lice after treatments have occurred if the child still has signs of an infestation.

The American Academy of Pediatrics and the National Association of School Nurses discourage "no nit" policies in schools. There is no need to send students home. For more information about head lice and other public health pests, visit the National Association of School Nurses website for current fact sheets at: <https://schoolnursenet.nasn.org>.

Parents of all students using the room with any child with confirmed head lice should be notified and given basic information including descriptive information, signs and symptoms, and strategies to eliminate headlice. Include where to go for additional help.

Head lice and nit removal services

Several companies offer services to remove head lice and nits from children and adults. These services are typically not prohibitively expensive but the price may vary depending on the services requested. As with any type of treatment, do your research and weigh your options. Head lice can happen to any of us—be thorough with your cleaning and remember to inspect every person in the family.

For further information

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