



Head Lice: Overview of Treatments and Interventions

Ovicides kill nits (eggs) and Pediculicides kill live lice. Some preparations kill both. Information below is from the [American Academy of Pediatrics Clinical Report on Head Lice](#) (Pediatrics May 2015, Volume 135 / Issue 5)

1. Topical agents – shampoos, creams, lotions

- a. Permethrin and Pyrethrin - Pediculicidal (kills live lice) only, not ovicidal (does **not** kill eggs/nits)
 - i. Permethrin and Pyrethrin are neurotoxic to lice. They are not ovicidal because newly laid eggs do not have a nervous system for several days, thus 20% to 30% of eggs remain viable after treatment, which necessitates a second treatment to kill newly emerged nymphs hatched from eggs that survived the first treatment.
 - ii. Repeat the application sometime between days 7 to 10 after treatment if live lice are seen, new evidence based on the life cycle of lice suggests that retreatment at day 9 is optimal.
 1. An alternate treatment schedule on days 0, 7, and 13 to 15 has been proposed on the basis of the longest possible life cycle of lice for this and other non-ovicidal agents
 - iii. Although Permethrin and Pyrethrin were extremely effective when introduced, recent studies indicate that efficacy has decreased substantially because of development of resistance. The prevalence of resistance has not been systematically studied but seems to be highly variable from community to community and country to country.
 - iv. **Permethrin 1% (Nix)** – introduced in 1986 by prescription and approved for OTC in 1990
 1. Applied to damp hair that is first shampooed with a non-conditioning shampoo and then towel dried. Left on for 10 minutes and then rinsed off.
 2. Permethrin leaves a residue on the hair that is designed to kill nymphs emerging from the 20% to 30% of eggs not killed with the first application.
 3. Conditioners and additives present in almost all currently available shampoos impair Permethrin adherence to the hair shaft and reduce its residual effect.
 4. Resistance to Permethrin has been reported but its prevalence is unknown.
 - v. **Pyrethrin Plus Piperonyl Butoxide (RID)** - OTC
 1. Natural extract from chrysanthemums
 2. Available in shampoo or mousse formulations that are applied to dry hair and left on for 10 minutes before rinsing out.
 3. No residual pediculicide activity remains after rinsing.
- b. Benzyl Alcohol 5% (Ulesfia) – available by Prescription
 - i. Is not neurotoxic to the lice, but kills them by asphyxiation. Not ovicidal.
 - ii. Should be applied topically for 10 minutes and repeated as stated previously for Permethrin
 - iii. Should not be used in neonates (< 6 months)
- c. Malathion 0.5% (Ovide) – Reintroduced in 1999 – available by prescription, pediculicidal and ovicidal



- i. Lotion applied to dry hair, left to air dry, then washed off after 8 to 12 hours, although some study results have suggested effectiveness when left on for as short a time as 20 minutes
 - ii. Head lice in the United Kingdom and elsewhere have shown resistance to malathion preparations, which have been available for decades in those countries. The current US formulation of malathion differs from the malathion products available in Europe in that it contains terpineol, dipentene, and pine needle oil, which themselves have pediculicide properties and may delay development of resistance.
 - iii. Malathion has high ovicidal activity and a single application is adequate for most but should be reapplied in 7 to 9 days if live lice are still seen.
 - iv. The high alcohol content of the product (78% isopropyl alcohol) makes it highly flammable; therefore, patients and their parents should be instructed to allow the hair to dry naturally; not to use a hair dryer, curling iron, or flat iron while the hair is wet; and not to smoke near a child receiving treatment.
 - v. Safety and effectiveness of malathion lotion have not been established in children younger than 6 years
- d. Spinosad 0.9% (Natroba) - available by prescription
- i. Neurotoxic to live lice and lingers long enough to exert toxic effects on larvae after they develop nervous system
 - ii. Applied to dry hair by saturating the scalp and working outward to the ends of the hair, (which may require a whole bottle), then rinsed 10 minutes after application.
 - iii. A second treatment is given at 7 days if live lice are seen.
 - iv. Safety in children younger than 4 years has not been established. Should not be used in neonates (<6 months)
- e. Vermeectin 0.5%(Sklice) approved in 2012 – available by prescription
- i. Neurotoxic to live lice and, while not ovicidal per se, when the treated eggs hatch, the lice are not able to feed as a result of paralysis and die
 - ii. One application is required
 - iii. Should not be used in neonates (<6 months)
- f. Lindane 1% - no longer recommended by the American Academy of Pediatrics
- g. Permethrin 5% cream (Elimite) - not currently approved by the FDA for use as a pediculicide but is used off-label for the treatment of head lice that seem to be refractory to other treatments. One study suggested that lice resistant to 1% Permethrin will not succumb to higher concentrations. Prescription only.
- h. Crotamiton 10% lotion (Eurax) - not currently approved by the FDA for use as a pediculicide but is used off-label for the treatment of head lice that seem to be refractory to other treatments. One study showed it to be effective against head lice when applied to the scalp and left on for 24 hours before rinsing out. Other reports have suggested that 2 consecutive nighttime applications safely eradicate lice from adults. Safety and absorption in children, adults, and pregnant women have not been evaluated. Prescription only

2. Oral agents

- a. Ivermectin (Stromectol) - Anti-parasitic agent (antihelmintic), used for roundworm infections. A single oral dose of 200 µg/kg, repeated in 10 days, has been shown to be effective against head lice. Most recently, a single oral dose of 400 µg/kg, repeated in 7 days, has been shown to be more effective than 0.5% malathion lotion. Ivermectin may cross the blood/brain barrier and block essential neural transmission; young children may be at higher risk of this adverse drug reaction. Therefore, oral ivermectin should not be used for children who weigh less than 15kg.



- h. **Highly flammable substances, such as gasoline or kerosene, or products intended for animal use, are never appropriate in treatment of head lice in humans.**

5. Environmental Interventions

- a. If a person is identified with head lice, all household members should be checked for head lice, and those with live lice or nits within 1 cm of the scalp should be treated.
- b. It is prudent to treat family members who share a bed with the person with infestation, even if no live lice are found.
- c. Fomite transmission (inanimate object/substance) is less likely than transmission by head-to-head contact⁷; however, it is prudent to clean hair care items and bedding used by the individual with infestation.
- d. Only items that have been in contact with the head of the person with infestation in the 24 to 48 hours before treatment should be considered for cleaning, given the fact that louse survival off the scalp beyond 48 hours is extremely unlikely. Such items may include clothing, headgear, furniture, carpeting, and rugs. Washing, soaking, or drying items at temperatures greater than 130°F will kill stray lice or nits. Furniture, carpeting, car seats, and other fabrics or fabric-covered items can be vacuumed.
- e. Although head lice are able to survive for prolonged periods in chlorinated water, it is unlikely that there is a significant risk of transmission in swimming pools. One study revealed that submerged head lice became immobile and remained in place on 4 people infested with head lice after 30 minutes of swimming.
- f. Viable nits are unlikely to incubate and hatch at room temperatures; if they did, the nymphs would need to find a source of blood for feeding within hours of hatching.
- g. Although it is rarely necessary, items that cannot be washed can be bagged in plastic for 2 weeks, a time when any nits that may have survived would have hatched and nymphs would die without a source for feeding.
- h. Exhaustive cleaning measures are not beneficial.

6. School Interventions

- a. Screening - routine classroom or school wide screening is discouraged due to lack of efficacy
 - i. Screening for nits alone is not an accurate way of predicting which children are or will become infested, and screening for live lice has not been proven to have a significant effect on the incidence of head lice in a school community over time. In addition, such screening has not been shown to be cost-effective.
 - ii. In a prospective study of 1729 schoolchildren screened for head lice, only 31% of the 91 children with nits had concomitant live lice. Only 18% of those with nits alone converted to having an active infestation during 14 days of observation.
 - iii. Although children with at least 5 nits within 1 cm of the scalp were significantly more likely to develop an infestation than were those with fewer nits (32% vs 7%), only one-third of the children at higher risk converted to having an active infestation. School exclusion of children with nits alone would have resulted in many of these children missing school unnecessarily.
 - iv. Head lice infestations have been shown to have low contagion in classrooms.
 - v. The results of several descriptive studies have suggested that education of parents in diagnosing and managing head lice may be helpful.
 - vi. Parents are encouraged to check their children's heads for lice regularly and if the child is symptomatic. School screenings do not take the place of these more careful parental checks.
- b. Criteria for Return to School
 - i. A child should not be restricted from school attendance because of lice, because head lice have low contagion within classrooms.



- ii. “No-nit” policies that exclude children until all nits are removed may violate a child’s civil liberties and are best addressed with legal counsel for schools. However, most health care professionals who care for children agree that no-nit policies should be abandoned.
- iii. International guidelines established in 2007 for the effective control of head lice infestations stated that no-nit policies are unjust and should be discontinued, because they are based on misinformation rather than objective science.
- iv. The American Academy of Pediatrics and the National Association of School Nurses discourage no-nit policies that exclude children from school.
- c. Support by specially trained school staff
 - i. Nit removal may decrease diagnostic confusion, decrease the possibility of unnecessary retreatment, and help to decrease the small risk of self-reinfestation and social stigmatization.
 - ii. School staff familiar with lice infestations, if present, can perform a valuable service by rechecking a child’s head if requested to do so by a parent.
 - iii. Extra help may be offered to families of children who are repeatedly or chronically infested. In rare instances, it may be helpful to make home visits or involve public health nurses if there is concern about whether treatment is being conducted effectively.
 - iv. Parent education by school health professionals can reinforce similar goals for the home