Clinical Practice Update: Pediculosis Capitis

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Pediculosis capitis infestations are a common health problem, with cases ranging in the hundreds of millions worldwide. In the United States, infestations are most prevalent among preschool-aged children attending childcare, elementary school students, and the household members of infested children (Bowden, 2012). Incidence is rising, largely related to increased resistance to treatment with current first-line therapies (Connolly, 2011; Durand et al., 2012). Resistance is also growing due to inadequate and unnecessary treatments. The convenience and availability of over-the-counter pediculicide products to consumers make clinician management very moderation and selectivity very difficult. This review is intended to provide an updated source of information on new products, as well as changes in the efficacy of known treatments. Further, adequate diagnosis, consideration of alternative therapies, environmental recommendations, and general education are cornerstones of Pediculosis capitis management in primary care.

Description of the Parasite

The parasitic louse, Pediculosis capitis, is 1 to 3 mm long (Gunning, Pippitt, Kiraly, & Sayler, 2012). Its color varies based on hair color of the host and ranges from grayish-white to darker shades. Pediculosis capitis only infests humans. The average lifespan of a louse on the human scalp is 30 days; without a host, lice will die within 1 to 2 days. An adult female louse can lay from 8 to 10 nits daily. Nits are eggs that are laid within 1 mm of the scalp to allow for ambient temperature for them to hatch (Centers for Disease Control and Prevention [CDC], 2010). They are difficult to see due to camouflage by hair and are most easily seen along the hairline (Frankowski, Bocchini, & Council on School Health and Committee on Infectious Diseases, 2010). Sometimes mistaken for dandruff, they range in size from 0.3 mm to 0.8 mm. After 7 to 12 days, the nits hatch and release a nymph (Frankowski et al., 2010). Nymphs grow into adult lice 7 days after hatching (CDC, 2010). Lice feed every 3 to 4 hours by injecting saliva that precipitates anticoagulation and vasodilation in the scalp; pruritus is a result of reaction to the injected saliva (Frankowski et al., 2010).

Epidemiology

Worldwide, Pediculosis capitis is a parasite that affects individuals across all age groups. In the United States, preschool and school-aged children have the highest prevalence of infestations (Frankowski et al., 2010), estimated to be 6 to 12 million cases annually (CDC, 2010). In certain areas, such as Brazil, reinfestation can occur 15 to 19 times a year (Feldmeier & Heukelbach, 2008). Head lice infestation is spread by direct contact with an affected person. Head-to-head contact is the most frequent form of transmission. Rarely does transmission occur through use of infested clothing, combs, towels, or bedding (CDC, 2010).
Clinical Manifestations

Head lice and nits are found almost exclusively on the scalp, particularly around and behind the ears, as well as near the neckline. The most common symptom of infestation is scalp pruritus, although this reaction is caused by a delayed hypersensitivity to the enzyme in louse saliva. This normally intensifies 3 to 4 weeks after the initial infestation. Patients with repeat infestations will develop pruritus within 1 to 2 days of exposure. Most patients will present with complaints of scalp itching and irritation most commonly affecting the occipital and postauricular area, a tickling feeling of something moving in the hair, or irritability and difficulty sleeping due to head lice being more active at night (Connolly, 2011). The bite reaction is very mild and can rarely be seen between the hairs. Due to intense itching, secondary erythema, scaling, and excoriation of the skin may occur from scratching. With long standing infestations, the skin may become lichenified and hyperpigmented. In children, head lice infestation is commonly first suspected when the child is observed scratching his or her head vigorously. Listlessness or poor school performance may also be clues, indicating the child’s high level of distraction. In rare cases, the itch-scratch cycle can lead to secondary infection with impetigo, cellulitis, and pyoderma (CDC, 2010).

Diagnosis

There are a few controversial perspectives on the diagnosis of head lice. However, research and expert opinion direct clinicians toward specific recommendations. An individual may be deemed infested if any live lice are found on inspection of the scalp. The presence of nits is often mistakenly used for diagnosis. Nits can be non-viable and often remain present for several days after the eggs have hatched. However, one should consider that nits within 1 cm of the scalp are more likely to be viable. The presence of nits within this close proximity to the scalp should raise the investigator’s index of suspicion and encourage a thorough search for live lice. Diagnosis and treatment should be reserved only for individuals with live lice present (Feldmeier, 2012; Frankowski et al., 2010; Gounedre-Smith, 2011; Gunning et al., 2012; Mumcuoglu, Meinking, Burkhardt, & Burkhardt, 2006; Tebruegge, Pantazidou, & Curtis, 2011).

Detection of live lice is often performed by direct visual inspection, dry combing, or wet combing. Visual inspection involves parting the hair with a screening stick or linear object, such as a tongue depressor or writing utensil, while looking for live lice. This is often performed in haste because it promotes larger sections of hair being turned, thereby decreasing the amount of area searched. Utilization of this method makes it difficult to systematically search the entire scalp. Detection of lice using a fine-tooth louse comb has been shown to be significantly more effective than, and twice as fast as detection using visual inspection (Mumcuoglu, Friger, Ioffe-Uspensky, Ben-Ishai, & Miller, 2001).

The diagnosis of head lice is best made by combing the individual’s hair with a fine-tooth louse comb (Balcigolu et al., 2008; Feldmeier, 2012; Finlay & MacDonald, 2008; Frankowski et al., 2010; Goundrey-Smith, 2011; Gunning et al., 2012; Ibarra, 2010; Jahnke, Bauer, Hengge, & Feldmeier, 2009; Mumcuoglu et al., 2001, 2006; Tebruegge et al., 2011). These combs are specially made for louse detection and have less than 3 mm between teeth. It is recommended to perform combing on wet hair because a wet environment may slow lice, aiding in their detection. The comb should be inserted until it touches the scalp and combed through the hair from root to tip (see Figure 1). After each stroke, the comb should be visualized for any nits or lice. Adequate time should be allotted for thorough combing so live lice are not overlooked. Predilection sites that lice favor include the back of the head, retroauricular areas, and nape of the neck (Feldmeier, 2012; Frankowski et al., 2010; Gunning et al., 2012; Madke & Khopkar, 2012; Shmidt & Levitt, 2012).

Recommended Treatments

Treatment modalities vary, from well-studied pediculicides to unproven home remedies. This update will address recommended and alternative treatment regimens, which include pharmacological and non-pharmacological treatments. Only those most relevant to current practice are discussed; home remedies, such as suffocation with mayonnaise or other household items, are not addressed.

Permethrin. Permethrin (Nix®) was introduced in 1986 by prescription only and then made available over the counter in 1990 (Frankowski et al., 2010). This medication works by inhibiting sodium ion influx, eventually leading to louse paralysis and death (Eisenhower & Farrington, 2012). The surplus of research sup-
porting permethrin’s safety profile secures its place as a first-line agent unless regional resistance is documented (Bowerman, Gomez, Austin, & Wold, 1987; Brandenburg et al., 1986; Diamantis, Morrell, & Burkhardt, 2009; Finlay & MacDonald, 2008; Frankowski et al., 2010; Gunning et al., 2012; Heukelbach, Pilger, Khakban, Ariza, & Feldmeier, 2008; Meinking et al., 2002; Meinking et al., 2007; Taplin, Meinking, Castillero, & Sanchez, 1986). However, in recent research found by DNA typing of lice in several locations in the U.S. and Canada, the rate of T1 mutation (the gene mutation most responsible for permethrin resistance) varied between 84.4% and 99.6%. It is important to keep in mind that the study examined a small number of lice from only 12 U.S. states and studied the potential for resistance, rather than a clinical measurement of actual resistance (Yoon et al., 2014). Information regarding regional resistance, if available, should be accessible from the CDC website or local health department.

For treatment, cream rinse is applied to the hair and scalp for 10 minutes and then rinsed out with water. A second treatment is advised 7 to 10 days later to ensure cure. Permethrin is safe for infants 2 months and older, and is a Pregnancy Category B drug. Stough and colleagues report a 43% to 45% success rate for permethrin (Stough, Shellabarger, Quiring, & Gavrielsen, 2009). Among the available pediculicides, it is the most affordable, along with pyrethrin/peryonyl butoxide at a cost of $20.

Pyrethrin/peryonyl butoxide (PPB). Like permethrin, pyrethrin/ peryonyl butoxide (PPB) 4% (Pronto®, RID®) has also had reports of resistance. Despite this, PPB has a well-established safety profile and continues to be recommended as first-line treatment unless regional resistance is documented (Diamantis et al., 2009; Finlay & MacDonald, 2008; Frankowski et al., 2010; Gunning et al., 2012). A theoretical risk of cross sensitivity with plant allergies, such as ragweed and chrysanthemum, exists, but it is rare (Prescriber’s Letter, 2010). However, in the case of a severe plant allergy, it is reasonable to recommend permethrin in preference to PPB topical. PPB works similarly to permethrin, but the addition of peryonyl butoxide prevents the metabolism of pyrethrin by lice, increasing killing time, and therefore, making it more effective (Eisenhower & Farrington, 2012). Before application, hair should be shampooed and towel dried. The product is then applied and rinsed after 10 minutes. A second treatment is advised 7 days later to ensure cure. PPB may be used in children 2 years and older and is a Pregnancy Category C drug. Like permethrin, cost of treatment is approximately $20.

Malathion. Malathion 0.5% lotion (Ovide®) is a prescription ovicidal agent. It is a weak organophosphate that inhibits cholinesterase activity of head lice, resulting in acute toxicity followed by cell death (Taro Pharmaceuticals, 2013). It has been shown to be safe and effective with low observed resistance for those 6 years of age and older (Chosidow et al., 2009; Frankowski et al., 2010; Lebwohl, Clark & Levitt, 2004, 2007; Meinking et al., 2004, 2007; Nofal, 2011; Taro Pharmaceuticals, 2013). The use of malathion lotion is contraindicated for neonates and infants because of increased permeability of the scalp, which may lead to increased absorption (Taro Pharmaceuticals, 2013). It is a Pregnancy Category B drug (Taro Pharmaceuticals, 2013).

Malathion lotion should be applied on dry hair in a sufficient amount to thoroughly wet the hair and scalp. Malathion is flammable, and hair dryers or other heat-producing appliances must not be used. It is therefore recommended that after application of the lotion, the hair should be allowed to air dry. After 8 to 12 hours, the hair should be shampooed, rinsed, and a fine-toothed (nit) comb should be used to remove dead lice and eggs. A second application should be repeated in 7 to 9 days (Lebwohl et al., 2007; Taro Pharmaceuticals, 2013). Ovide® costs $185 per bottle.

Benzyl alcohol 5% lotion. Benzyl alcohol 5% lotion (Ulefsia®) has been an approved treatment by the U.S. Food and Drug Administration (FDA) for the indication of head lice in individuals 6 months of age and older since 2009 (FDA, 2009a). It works by suffocating lice because it prevents the closing of the respiratory spiracles via obstruction, leading to asphyxiation (Lexi-Comp Online, 2012; Shionogi Pharma, Inc., 2012). This prescription product provides the first non-neurotoxic pediculical alternative for parents who are concerned about the use of those agents. In terms of safety, benzyl alcohol is classified as a Pregnancy Category B. If treated with benzyl alcohol, neonates could be at risk for gasping syndrome as a result of both a potentially immature skin barrier and a high ratio of skin surface area to body mass (Shionogi Pharma, Inc., 2012). Although expected systemic exposure of benzyl alcohol from proper use is substantially lower than those reported in association with the gasping syndrome, the minimum amount of benzyl alcohol at which toxicity may occur is not known (Shionogi Pharma, Inc., 2012).

Benzyl alcohol lotion should be applied to dry hair until completely saturated. After 10 minutes, the lotion should be completely rinsed from the hair and scalp with water. Hair may then be shampooed, and if desired, a lice comb may be used to remove the dead lice. Benzyl alcohol lotion kills lice but is not ovicidal, so a second application is needed one week after the initial application (Meinking et al., 2010; Shionogi Pharma, Inc., 2012). This medication is a Pregnancy Category B. Research reports a success rate of 75% to 76.2% for benzyl alcohol lotion at 14 days after the final application (Meinking et al., 2010). Each 8-ounce bottle costs $63 to $81, and up to 6 bottles may be necessary per application based on the length of hair.

Spinosad. Spinosad (Natroba™) is a new topical pediculicide approved for effective and convenient treatment of head lice (Stough et al., 2009). Spinosad is a fermentation product of Saccharopolyspora spinosa, first identified and developed from soil samples taken in the Caribbean in 1982. It has been used in insecticide products since 1997 (Cole & Lundquist, 2011). Spinosad has ovicidal properties in nit embryos (Cole & Lundquist, 2011), and provokes hyperexcitation and eventual death by paralysis in live lice (Gunning et al., 2012). Spinosad does not require nit combing because of its ovicidal properties (Stough et al., 2009). This drug is indicated for children 6 months and older, and is to be avoided in infants younger than 6 months because it contains benzyl alcohol; studies with children 6 months of age and above indicate there is no systemic absorption of active ingredients (ParaPRO, 2015). It is Pregnancy Category B and prescription only. Because it is a suspension, it is necessary to shake the
bottle well before application. Gunning et al. (2012) advises providers to instruct patients to apply a sufficient amount of product to dry hair for 10 minutes, rinse off, and repeat in 7 days only if live lice seen. Spinosad has demonstrated treatment success rates of 84% and 87% (Stough et al., 2009). The cost of this prescription treatment is approximately $220.

Ivermectin topical. Ivermectin 5% lotion (Sklice®) was also recently approved by the FDA for use in head lice treatment. It works by binding selectively to glutamate gated chloride channels in nerve and muscle cells of parasites, resulting in paralysis and death of lice (Meinking, Mertz-Rivera, Vellar, & Bell, 2012). Approval was granted in 2012 for the indication of head lice in adults and children aged 6 months and older. Use of topical ivermectin should be avoided in infants less than 6 months of age due to the risk for increased absorption across their immature skin barrier (Eisenhower & Farrington, 2012). Further, because it was not studied in pregnant women, it is considered a Pregnancy Category C drug (Eisenhower & Farrington, 2012). Although side effects are very mild when used topically, if accidentally ingested, patients may require parenteral fluids and electrolytes, respiratory support, presor agents, and/or gastric lavage (Eisenhower & Farrington, 2012).

Ivermectin lotion should be applied to dry hair in an amount sufficient to fully coat the hair and scalp. It should then be rinsed off in 10 minutes. Manufacturer information instructs that treatment must not be repeated without first contacting a health care provider (Eisenhower & Farrington, 2012). Ivermectin has a success rate of 73.8% on day 15 post-treatment (Pariser, Meinking, Bell, & Ryan, 2012). Like Spinosad, this product is available by prescription only and costs approximately $270 per treatment.

Alternative Treatment

Lindane. Lindane 1% (Kwell®) is an organochloride and slow killer of lice. It is no longer recommended as a pediculicide by the American Academy of Pediatrics (AAP) (Eisenhower & Farrington, 2012). Since 1995, lindane has been designated as a second-line treatment, meaning it should be used only when other first-line treatments for lice have failed (Thomas et al., 2006; FDA, 2009b; Frankowski et al., 2010). The FDA determined that benefits of lindane outweigh the risks when used appropriately (FDA, 2009b). However, overuse, misuse, or accidental ingestion of lindane may be toxic to the central nervous system (CDC, 2010). The FDA issued a public health advisory deterring the use of topical lindane in neonates and infants, children, the elderly, persons weighing less than 50 kg, persons with HIV, persons with a seizure disorder, and women who are pregnant or breastfeeding (Eisenhower & Farrington, 2012; FDA, 2009b). It has been classified as a Pregnancy Category C drug (Humphreys et al., 2008; Meinking et al., 2010). Labeling for lindane products includes a boxed warning that emphasizes its use as a second-line treatment and states that these products are to be used with caution in the populations listed above.

To use, apply 1 ounce or 30 mL (2 ounces or 60 mL maximum for long or thick hair) of lindane to dry hair. After 4 minutes, add water and work into a lather. Immediately and thoroughly rinse off with warm, not hot, water. Avoid unnecessary contact to other body parts, especially the eyes. Following treatment, the hair should be wet-combed with a fine-tooth comb to remove nits. Do not use again for retreatment. Based on the lifecycle of a louse and ova, a single eradication would not reliably eradicate lice, 2 to 3 treatments would be required, and the FDA has concluded this would not be safe (Lebwohl et al., 2007). Lindane costs $126 to $137 for a 60 mL bottle.

Ivermectin oral. Oral ivermectin (Stromectol®) is not approved by the FDA for treatment of Pediculus capitis (CDC, 2010; Frankowski et al., 2010). It is an anthelmintic drug that is FDA-approved for onchocerciasis and strongyloidiasis, both parasitic diseases. It has been used off-label in a single oral dose of 200 micrograms/kg, repeated in 7 to 10 days, and has been demonstrated to be effective against head lice (Ameen et al., 2010; Chosidow et al., 2010; Currie, Reynolds, Glasgow, & Bowden, 2010; Dourmishev, Dourmishev & Schwartz, 2005). However, given its potential neurotoxicity when crossing the blood-brain barrier, it has been recommended that ivermectin be avoided in children weighing less than 15 kg (Eisenhower & Farrington, 2012; Martinez-Diaz & Mancini, 2010). It is also not recommended for pregnant or lactating mothers (Madke & Khopkar, 2012), and is a Pregnancy Category C drug. The cost of treatment cost is $20 to $60, depending on patient weight.

Trimethoprim-sulfamethoxazole. Oral trimethoprim-sulfamethoxazole (Bactrim®, Septra®, Sulfa-trim®), which reportedly kills symbiotic bacteria in the gut flora of the head louse, thereby interfering with its ability to synthesize B vitamins, has been suggested as an effective agent against head lice. However, the FDA has not evaluated it for this use (AAR, 2009; Frankowski et al., 2010; Frankowski & Weiner, 2002; Hipolito, Mallorca, Zuniga-Macaraig, Apolinar, & Wheeler-Sherman, 2001). Use of trimethoprim-sulfamethoxazole should be weighed against the risk of severe, life-threatening allergic reactions, such as Stevens-Johnson or drug hypersensitivity syndromes (Martinez-Diaz & Mancini, 2010). It is also a Pregnancy Category C medication. Treatment cost is approximately $10 to $15.

Essential oils (tea tree oil, lavender oil, eucalyptus oil). There are no formal controlled clinical trials demonstrating efficacy, potential side effects, or toxicity of eucalyptus, lavender, and tea tree oil. Therefore, these cannot be recommended as a treatment option (Connolly, 2011; Eisenhower & Farrington, 2012; Tebruegge et al., 2011).

Wet combing. The wet combing method for eradication of head lice can be used in combination with topical pediculicides or as monotherapy. Randomized controlled studies evaluating its effectiveness as monotherapy are limited. However, a meta-analysis of 5 studies on the use of wet combing for treatment of Pediculus capitis showed variable cure rates from 38% to 57% when carried out every 3 to 4 days (Tebruegge & Runnacles, 2007). Although much more time-consuming and labor-intensive, not to mention less effective, than standard treatment with a pediculicide, it is a cheap, non-invasive, non-chemical alternative that may be preferred by patients or parents who wish to avoid the use of chemicals (Connolly, 2011; Gunning et al., 2012).

To perform wet combing, hair should be wet, and a lubricant of choice applied to facilitate the process; conditioner, vinegar, or olive oil has been suggested (Connolly, 2011). Hair should be systematically combed...
from root to tip with a lice comb. Combing should be performed every 3 days for 2 weeks, although combing for up to 24 days may increase the cure rate (Gunning et al., 2012). No adverse effects have been documented regarding wet combing. It is regarded as an affordable and accessible option.

LouseBuster™. The LouseBuster™ is a custom built medical device designed to kill lice and lice eggs (Rush, Rock, Jones, Malenke, & Clayton, 2011). It offers a non-chemical alternative treatment for head lice, and was developed based on the observation that hot water and hot air kill lice/eggs on fomites. The University of Utah first tested this premise in children 6 years and older with safety and efficacy; the LouseBuster™ was later developed (Eisenhower & Farrington, 2012). The LouseBuster™ costs $2,000, and each individual treatment costs $11. Lice desication is noted to be as high as 94.8% when the device is used by an experienced operator and 93.6% when used by novice operators (Rush et al., 2011). An advantage of LouseBuster™ is the lack of resistance (Madke & Khopkar, 2012), and the only adverse effect reported was discomfort experienced during treatment, which was relieved by removal of heat (Goates et al., 2006). The LouseBuster™ appears to offer a safe and effective alternative to pharmacological treatments; however, studies are limited, and local availability is unknown.

Prevention

The focus for prevention of Pediculus capitis involves better detection, control, and treatment of affected individuals to prevent the spread of infestation. Environmental management is also a factor, as are standard hygienic practices.

To prevent further transmission, education about detection of current infestations needs to be promoted. Clinicians, school nurses, and community workers should educate the community on signs and symptoms of Pediculus capitis. Parents and clinicians need knowledge about screening and diagnosis. To decrease transmission, the community and children should also be taught general hygienic practices, such as not sharing combs, brushes, hats, headgear, and pillows.

When an individual is found to be infested, proper management following evidence-based guidelines should be implemented. Children identified as having head lice should be referred for treatment and excluded from school only until the day after the recommended treatment has been completed (AAP, 2009). The clinician recommending a treatment regimen should be mindful of failed treatment regimens locally because these may indicate resistant infestations. “No nit policies” that require children to be free of nits before returning to schools and child-care institutions should be abandoned. Only a small number of children with nits on their scalp are also infested with living lice. Excluding all children with nits leads to unnecessary treatment and loss of school/work days (Frankowski et al., 2010; Gunning et al., 2012; Mumcuoglu et al., 2006). Utilization of “no nit policies” has not been effective in controlling transmission and is therefore not recommended (AAP, 2009).

Research involving schools that promote periodic whole-school “bug-busting” days have been shown to reduce the incidence of infestation and the demand on staff for management support. This enables health staff to focus on supporting families with persistent infestations. The studies reviewed promoted entire school home screening on a specific louse detection day. This led to simultaneous detection and treatment of active infestations, thereby decreasing transmission. Parents were instructed to screen their children via wet combing with a special louse comb. Infested individuals were provided with treatment recommendations. This method was both effective and widely accepted by parents (Ibarra et al., 2007).

When an individual is diagnosed with an infestation and started on a treatment regimen, all household members and close contacts should also be examined for infestation. These contacts should be treated only if live lice are discovered (Frankowski et al., 2010; Feldmeier, 2010; Gunning et al., 2012; Madke & Khopkar, 2012; Mumcuoglu et al., 2006; Tebruegge et al., 2011).

Environmental Management

Although the primary mode of transmission is head-to-head contact, there is ongoing debate about the potential for reinfection from fomite sources. For this reason, disinfection of the environment is recommended to adequately de-bug and prevent relapse. It is advisable to launder clothes, towels, and bed linen used within two days at a minimum temperature of 60° Celsius, or to place the items in a dryer at high heat for at least 40 minutes. Combs and brushes may be immersed in 60° Celsius water for at least 10 minutes to kill lice and eggs (Canyon & Speare, 2010; Diamantis et al., 2009; Eisenhower & Farrington, 2012; Finlay & MacDonald, 2008; Gunning et al., 2012; Ibarra, 2010; Izri & Chosidow, 2006; Lebwohl et al., 2007; Speare, Cahill, & Thomas, 2003; Takano-Lee, Edman, Mullens, & Clark, 2005; Tebruegge et al., 2011). Items that cannot be laundered or placed in a dryer can be sealed in a plastic bag for 2 weeks (Diamantis et al., 2009; Finlay & MacDonald, 2008; Frankowski et al., 2010; Lebwohl et al., 2007).

It is unnecessary to fumigate carpets, car seats, pillows, and mattresses because lice are unable to live away from human hosts for more than 48 to 55 hours. Avoiding use of these items for this period of time is advised. Vacuuming is a safe alternative to fumigation (Diamantis et al., 2009; Eisenhower & Farrington, 2012; Frankowski et al., 2010; Finlay & MacDonald, 2008; Lebwohl et al., 2007; Shmidt & Levitt, 2012).
**Figure 2.**
Clinical Algorithm for the Treatment and Management of Head Lice

- **Diagnosis:** Comb hair with louse comb to inspect for live lice.
- **Live lice detected**
  - **Yes**
  - **No**

  - **Regional resistance to pediculicides**
    - No
    - Yes
      - **Age greater than 2 months, less than 2 years**
        - Permethrin
      - **Age greater than 2 years**
        - Pyrethrin or permethrin

  - **Return to school**

  - **Environmental Decontamination**
    - Items that cannot be laundered or placed in dryer can be sealed in a plastic bag for 2 weeks.
    - Presence of eggs within 1 cm of scalp should raise index of suspicion and prompt further examination with louse comb.

  - **General Recommendations**
    - Household members/close contacts should be examined for infestation; treat only if live lice discovered.
    - Pediculicidal treatments should be rinsed with cool water.

- **Recommended treatments**
  - Malathion
  - Benzyl alcohol
  - Spinosad
  - Topical ivermectin

  - **Alternatives**
    - Lindane
    - Oral ivermectin
    - Bactrim
    - Wet combing
    - LouseBuster™

- **Permethrin**
- **Pyrethrin or permethrin**

- **Benzyl alcohol**
- **Spinosad**
- **Topical ivermectin**

- **Follow up and special considerations also addressed in the guideline.**

*Refer to guideline for further information on each pediculicide, including cost, contraindications, and age appropriateness.*
Conclusion

Head lice are a worldwide pest costing Americans money, work productivity, and school time. The wide availability of pediculicides and alternative treatments can be difficult to navigate for the clinician, not to mention the lay person. An algorithm (see Figure 2) was developed to include new and alternative therapies, environmental decontamination, and general recommendations. This guideline is intended to be interpreted by primary care clinicians in light of individual patient circumstances, needs, and desires.

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Goal
The purpose of this learning activity is to provide an overview of the primary treatment modalities of head lice, including new and alternative therapies.

Objectives
1. Define Pediculosis capitis.
2. Identify the process for diagnosing lice.
3. Discuss treatment options for lice.

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