Pediculosis Capitis (Head Lice)

Manitoba
Public Health Branch

1. Case Definition

Detection of LIVE head lice (*Pediculus humanus capitis*) on the scalp.

2. Reporting Requirements

Pediculosis is not reportable in Manitoba.

3. Clinical Presentation/Natural History

An infestation of head lice is called pediculosis capitis and usually involves less than 10 lice (1). Itching is the most common symptom of head lice infestation, but many children are asymptomatic (2). Itching occurs if the infested individual becomes sensitized to the antigenic components of the louse saliva that is injected as the louse feeds (1). The first time a person has a head lice infestation, itching may not develop for four to six weeks, because it takes that amount of time for sensitivity to result (3). Adult lice or eggs that are "glued" to the hair shaft are most commonly apparent behind the ears and near the nape of the neck (2). Head lice may also be found on the eyebrows and eyelashes of people (4). Unlike body lice, head lice are not a health hazard, a sign of poor hygiene or a vector for disease, but are more a societal issue (1). Rarely, scratching may cause impetigo or other skin infections, which can lead to local adenopathy (3).

4. Etiology

Head lice (*Pediculus humanus capitis*) are wingless, 2 mm to 4 mm long (adult louse), six-legged, blood-sucking insects that live on the scalp of humans (1, 5).

4.1 Life Cycle of Head Lice

Mature head lice, if untreated, live for three to four weeks on a host (1). After mating, the adult female lays eggs encased in shells (nits) which are "glued" to the hair shaft (1). The adult female louse can produce five to six eggs per day for 30 days (1). The eggs hatch 7–12 days later into nymphs which become mature adults within another nine to 15 days (1, 5). The egg-to-egg cycle averages about 3 weeks (5).

5. Epidemiology

5.1 Reservoir

Lice-infested humans (5). Lice found on combs are likely to be injured or dead (3). Head lice survive less than one or two days if they fall off the scalp and cannot feed (6).

5.2 Transmission

Transmission occurs mainly by direct head-to-head contact with hair of infested people (2). Lice are unable to hop or fly, but can crawl at a rapid pace (1). Transmission by contact with personal belongings, such as combs, hair brushes and hats is uncommon (2). Away from the scalp, head lice survive less than two days at room temperature, and their eggs generally become nonviable within a week and cannot hatch at a lower ambient temperature than that near the scalp (2).

5.3 Occurrence

Worldwide. Outbreaks of head lice are common among children in schools and institutions everywhere (5). The highest prevalence of head lice infestation occurs in children between the ages of three and 11 (7). Girls show a higher prevalence than boys (7).

5.4 Incubation Period

Hatching of nymphs can vary from 7 to 12 days after eggs are laid on the hair shaft of the head (2).

5.5 Host Susceptibility and Resistance

Any person with scalp hair may become infested under suitable conditions of exposure (5).

5.6 Period of Communicability

As long as lice or eggs remain viable on the infested person or on fomites (5). The adult's life span on the host is about one month (5). Away from the scalp, head lice survive less than two days at room temperature, and their eggs generally become nonviable within a week and cannot hatch at a lower ambient temperature than that near the scalp (2).

6. Diagnosis

The definitive diagnosis of head lice requires the detection of a living louse (1, 3, 8). Good light, preferably daylight, is required for detection (8). Lice can be identified with the naked eye; the diagnosis can be confirmed by using a hand lens or microscope (3). Young lice (nymphs) are 1 to 2 mm in length and are difficult to see without a magnifying glass (9). Because head lice avoid light and can move quickly (3), their detection requires expertise and experience (1). Wetting hair with water, oil or a conditioner and using a fine-tooth comb may improve the ability to diagnose (2, 3). One study indicated that combing with a fine-toothed lice comb was four times more effective and twice as fast as direct visual examination for the detection of live head lice (10). Louse detection and removal combs that have flat-faced, parallel-sided teeth are preferred (8).

There is a small probability that individuals with eggs but without lice will develop an infestation (9). It is very difficult to distinguish viable from nonviable eggs with the naked eye (9). A viable egg is more likely to be found close to the scalp (less than 0.6 cm away) (1). On microscopy, a viable egg is intact, containing a well hydrated mass or a discernibly developing embryo (1). The nit is the empty eggshell (egg casing) that remains after the nymph has hatched (9); distinct from the non-hatched egg which may be dead or alive (9). Dead eggs and eggshells (nits) may remain attached to the hair for 12 months after an infestation (9). Nits may be mistakenly identified by the untrained eye as viable, embryonated eggs (7). Nit detection alone is not sufficient to conclude that a person has an active lice infestation (1, 2). The presence of eggs/nits may indicate current, active infestation, or extinct infestation (1). Hair debris such as dandruff and hair casts have been misdiagnosed as lice (3). Nits are more difficult to remove because they are firmly attached to the hair shaft (3). An itching scalp can be due to other causes such as eczema and seborrhoea (8).

7. Control

7.1 Management of Cases

General Guidelines:

- Treatment for head lice is recommended for persons diagnosed with an active infestation (6).
- Resistance to permethrin and pyrethrins (used to treat head lice) has been reported and is increasing (5, 11). **Unless resistance to these products has been proven in the community, 1% permethrin or pyrethrins are preferred for treatment of active infestations (where not contraindicated) and are available over-the-counter (1-3).**
- Infested individuals should be treated promptly to minimize spread to others (3). No currently available pediculocide is 100% ovicidal (3).
- All treatment should be applied to the scalp as per product label instructions. All warnings and contraindications should be heeded.
- No product should be applied to open or locally infected skin.
- All pediculocides should be kept out of the eyes. A face cloth may be placed over the face to help prevent treatment from getting into the eyes. If the treatment does get into the eyes, it should be flushed away with water immediately (6).
- Conditioners may prevent the pediculocide from adhering to the hair shaft, reducing effectiveness, and should not be used (6).
- All topical pediculocides should be rinsed from the hair over a sink rather than in the shower or bath to limit skin exposure (3).
- Any remaining lice should be combed out of the hair using a fine-toothed nit comb after treatment (6).

- The infested person should put on clean clothing after treatment (6).
- In general, a course of treatment for head lice should always be two applications of product at least seven days apart to kill lice emerging from any eggs that survive the first application (8). Applying the second treatment too soon or too late will affect treatment success (6). New evidence based on the life cycle of lice suggests that retreatment at day 9 is optimal (3).
- Nit Removal: While it is not required that a child be "nit free" before returning to school, nit removal may be considered for the following reasons:
  - Nit removal can decrease diagnostic confusion;
  - Nit removal can decrease the possibility of unnecessary retreatment;
  - Some experts recommend removal of nits within 1 cm of the scalp to decrease the small risk of self-reinfestation; and
  - Aesthetic reasons (3).

  No clinical benefit has been demonstrated using vinegar or vinegar-based products to assist in nit removal (3). Furthermore, it is not recommended for use with permethrin, because it may interfere with permethrin's residual activity (3).
- Routine management is the responsibility of the parent(s) or guardian(s) and family health care provider. Public health nurses may become involved in problem-solving or providing consultation on difficult cases in children attending school (e.g., repeated infestations despite numerous treatments, highly anxious or distraught parents); but are generally not expected to be involved in the diagnosis and treatment of routine cases.

Specific Treatment:

Pediculocides:

All of the pediculocides listed below are available over-the-counter. For pregnant women and children under four years of age, it is important to consult your doctor or pharmacist about the safety of these products before using them.

Permethrin (1%):

- Permethrin is a topical insecticide that is neurotoxic to head lice. Examples include Nix® Creme Rinse and Kwellada-P®.
- It is applied to damp hair that has been shampooed with a non-conditioning shampoo and towel dried (3). The pediculocide is left on for 10 minutes and then rinsed off (3).
- Reshampooing hair too soon (less than 2 days) after correctly applying and removing permethrin can reduce or eliminate any residual killing effect on the lice (6).
- Permethrin kills live lice but not unhatched eggs (6). It is suggested that a second application be repeated in 7 to 10 days if live lice are seen (3). Many experts now recommend routine re-treatment, preferably on day 9 (3).

Pyrethrins:

- Pyrethrins are topical insecticides that are neurotoxic to head lice. An example is R&C Shampoo®. Pyrethrins generally should not be used by persons who are allergic to chrysanthemums or ragweed (6).
- Pyrethrin products are available in shampoo or mousse formulations that are applied to dry hair and left on for 10 minutes before rinsing out (3).
- Re-treatment in 7–10 days is required to kill newly emerged nymphs hatched from any eggs that survived the first treatment (3). New evidence suggests that retreatment on day 9 is optimal (3).

Dimeticone 100 cSt:

- Products based on dimeticone create a physical barrier around the louse that eventually smothers and kills it, but does not act on the insect's nervous system and is thus unlikely to be affected by other chemicals (8). An example is NYDA®.
- The product is sprayed on dry scalp and hair and massaged in thoroughly. After 30 minutes, hair is combed out with a lice comb to remove the dead lice and detached eggs.

- The product is allowed to dry on hair and continue acting overnight (at least 8 hours). Hair can be washed the next morning with regular shampoo.
- Treatment may be repeated in 8–10 days if necessary to kill newly emerged nymphs hatched from eggs that survived the first treatment.

50 % Isopropyl Myristate:

- Isopropyl myristate is a hair rinse that dissolves the exoskeleton of the louse, leading to dehydration and death (3). An example is Resultz®.
- The product is applied to dry hair and thoroughly massaged into the scalp, hair, and sides and nape of the neck. The product is rinsed off with warm water after 10 minutes. Hair can be washed if desired.
- A second treatment is usually required at least 7 days later to kill newly emerged nymphs hatched from eggs not killed with the first treatment.

Non-pediculocide Treatment:

If resistance to available over-the-counter products has been proven in the community, if the patient is too young, if there are other contraindications or if parents do not wish to use a pediculocide (e.g., the cost may be prohibitive), consider recommending mechanical removal, also known as "wet-combing" or "bug busting" (3, 7, 8). Wet hair appears to slow down the lice, facilitating their removal (3). Louse detection and removal combs that have flat-faced, parallel-sided teeth are preferred (8). They are designed to pull through the hair and pull out lice and their eggs (12). Wet hair should be combed every third or fourth day for a period of two weeks (1, 3). The process is labour intensive (30 minutes or longer) (7). The advantages include low cost and the fact that the process can be repeated over and over again without any side effects (13).

Some data indicate the effectiveness of desiccation (hot dry air, e.g., LouseBuster®) in killing lice and their eggs (12). However, the device is expensive, requires operator training, and is therefore not practical for individual household use.

Although effective for removing lice and eggs, shaving the head generally is not recommended, because it can be distressing to a child and/or parent (3).

There is insufficient evidence on which to assess the safety, effectiveness and efficacy of natural remedies such as vinegar, olive oil, mayonnaise, melted butter, petroleum jelly, tea tree oil or eucalyptus oil (1, 3, 8).

Insecticides and other chemicals not specifically labeled for use on humans or for the treatment of head lice should not be used (9).

Environmental Cleaning:

- Excessive cleaning is not warranted (1). Away from the scalp, head lice survive less than two days at room temperature, and their eggs generally become nonviable within a week and cannot hatch at a lower ambient temperature than that near the scalp (2). Routine vacuuming of floors and furniture is sufficient to remove lice or eggs that may have fallen off the head of an infested person (6).
- Washing items that have been in prolonged or intimate contact with the head within the 48 hour period prior to the start of treatment (e.g., hats, pillowcases, brushes, combs) in hot water and drying in a hot dryer for 15 minutes, or storing in an air and water tight plastic bag for two weeks will kill lice and eggs (1, 6, 11). Freezing temperatures can kill head lice and eggs; however, several days may be necessary depending on temperatures and humidity (6). Non-washable items can also be dry cleaned (6).
- Treatment of dogs, cats or other household pets is not indicated because they do not play a role in the transmission of human head lice (2).
- Environmental insecticide sprays are not recommended as they increase chemical exposure of household members and have not been helpful in the control of head lice (2).

Infection Control Measures:

- For cases in health care facilities, refer to page 91 of the Manitoba Health document *Routine*

Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care available at:
http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf .

Post-treatment Follow-up:

- Scalp itchiness can occur following application of a topical pediculocide and does not indicate that resistance to treatment or a reinfestation has occurred (1). Topical corticosteroid and oral antihistamine agents may relieve signs and symptoms of scalp itching or burning caused by inflammation of skin in response to the pediculocide (2).
- Because pediculocides kill lice shortly after application, detection of living lice on scalp inspection 24 hours or more after treatment suggests incorrect use of pediculocide, hatching of lice after treatment, reinfestation, or resistance to therapy (2). Improper application of a pediculocide should be considered first as a cause of treatment failure (3). However, health care professionals should consider the following when faced with a persistent case of head lice after using a pharmaceutical pediculocide:
  - Misdiagnosis (no active infestation or misidentification);
  - Lack of adherence (patient unwilling or unable to follow treatment protocol);
  - Inadequate treatment (not using sufficient product to saturate hair);
  - Reinfestation (lice reacquired after treatment);
  - Lack of ovicidal or residual killing properties of the product (eggs not killed can hatch and cause self-reinfestation); and/or
  - Resistance of lice to the pediculocide (3).
- After excluding incorrect use, immediate retreatment with a different pediculocide, followed by a second treatment 7–10 days later is recommended (2). Diagnosis of an active reinfestation requires detection of live lice (1).

7.2 Management of Contacts

Identifying contacts may be challenging as people often do not want to admit to their friends and relatives that they or their children have head lice because of the embarrassment and social stigma attached (7).

- If one member of a household has a current infestation, detection combing of all members should be undertaken, and only those found to be infested should be treated (8). Some sources recommend that household contacts who have no live lice but who have eggs/nits within 1 cm of the scalp also be treated (3).
- It is recommended that bedmates of infested people be treated prophylactically at the same time as the infested household members and contacts even if no live lice are found (2, 3). Prophylactic treatment of other non-infested contacts is not recommended (2).
- Other contacts demonstrating symptoms should be checked and treated if lice are present (3).
- Contacts of cases in which head-to-head touching may have occurred merit examination to detect active infestation and, if present, treatment (1).

7.3 Cases of Head Lice Identified in Children and Vulnerable Populations

Most of the concerns regarding head lice that are brought to the attention of Manitoba Health, Healthy Living and Seniors are from schools.

- As the definitive diagnosis (refer to Section 6, *Diagnosis*) of head lice requires the detection of at least one live louse, the detection of "nits" is not enough to conclude that the person has lice and that treatment is indicated (1).
- The parent/guardian of a child should be informed when there is a clear diagnosis of head lice. Treatment should be recommended as described above.
- Where there are challenges in purchasing a pediculocide or in carrying out the required steps, a public health nurse may facilitate this with the family, resources permitting.

- Close head-to-head contact with other people should be avoided pending treatment (1, 2).
- No otherwise healthy child should be excluded from or allowed to miss school time because of head lice (3). A child with an active head lice infestation likely has had the infestation for one month or more by the time it is discovered, and poses little risk to others from the infestation (3). **For a child with head lice, the risks associated with not attending school are greater than the risk of a child transmitting head lice to others in the school setting.**
- If a student or child care facility attendee is demonstrating symptoms of head lice, staff should advise the parent/guardian to check the child's head. Detection combing (refer to Section 6 *Diagnosis*), for children attending school, should be done by a family member. If there is uncertainty on whether what is found in the hair is a louse, the suspect louse can be stuck on paper with clear adhesive tape (8) and shown to a health care provider or other person trained to identify live head lice.
- Whether or not to alert the families of other children in the classroom when an active case of head lice has been diagnosed is controversial. There is currently no evidence available on the efficacy of "alert letters". Some experts feel that "alert letters" cause unnecessary public alarm (3, 8). Some schools design guidelines that they believe best meet the needs of their student population, understanding that although head lice may not pose a public health risk, it may create a public relations dilemma for a school (3). Alert letters might not be that helpful when there is a single case in a school but might be of benefit when there are multiple cases in a single classroom or when there are cases in multiple classrooms. Any communications to other parents should indicate what to look for, how to manage if their child acquires active lice and preventive measures they can take. Parents should be reassured that head lice are not a health hazard, a sign of poor hygiene or a vector for disease (1).
- It is recommended that schools and child care facilities take a proactive approach and routinely provide head lice information to parents/guardians through newsletters throughout the year.

Note: Manitoba Health does not support "no-nit' policies requiring that children be free of nits before they return to a child care facility or school. Such policies have not been effective in controlling head lice transmission and are not recommended (2).

7.4 Management of Outbreaks

As per this protocol.

7.5 Preventive Measures

- Avoiding head-to-head contact with an infested person and contact with items that have been in contact with the hair of an infested person (e.g., hats, scarves, combs, brushes, pillowcases, towels, etc.) (5).
- Reminding parents of the importance of carefully checking a child's head before and after a sleepover experience may be helpful (3). Head-to-head contact may be more likely in those situations (3).
- Head lice screening programs have not been proven to have a significant effect over time on the incidence of head lice in the school setting and are not cost-effective (3). Most active infestations are of only a few lice and routine head inspections are ineffectual at identifying these (8).
- Household contacts of those known to be infested with lice should be examined and treated if lice are present (5). Parents/guardians of children with head lice should notify close contacts such as relatives and the parents/guardians of playmates.
- Soaking all combs and brushes used by a case of head lice in isopropyl alcohol or 2% Lysol® solution (11) or hot water (at least 130°F [55°C]) for 5–10 minutes (6).
- Individuals should not lie on beds, couches, pillows, carpets or stuffed animals that have recently been in contact with an infested person (6).

- Clothing and items that have been in contact with an infested person in the 48 hours before treatment should be washed in hot water and dried in a hot dryer for 15 minutes (1, 6, 11). Items that are not washable can be dry cleaned or sealed in plastic bag and stored for two weeks (6). This will kill any lice that already are present or that might hatch from any eggs that may be present on the items (6). Freezing temperatures can kill head lice and eggs as well; however, several days may be necessary depending on temperatures and humidity (6).

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