Head lice and its treatment

What are head-lice?
Head lice are parasitic insects found on people’s scalp and hair. Having head lice is very common, and as many as 6-12 million people worldwide get head lice each year. Head lice have infested humans for thousands of years and can affect people from all walks of life, regardless of their socioeconomic status. However, preschool and primary school children (3-10 years old) and their families are most often affected. Girls tend to get head lice more often than boys, and women more than men due to their longer average hair length.

Head lice are tan-to greyish-white insects - about the size of a sesame seed (approx. 3mm long) (see Figure 1). They grip onto the hair with small claws, and can quickly move from hair to hair, and head to head, when these are in close proximity.

The head louse (singular, Pediculus humanus capitis) feeds on the blood obtained after injecting saliva into the scalp. The louse will feed up to 5 times a day and it is this continuous feeding that causes the itching and irritation of the scalp, which can lead to dermatitis in heavily infested cases (see Figure 2). Fortunately, head lice are not known to carry any diseases affecting humans. However, infection of the scalp due to scratching is common.

Head-lice lay oval shaped eggs (also known as nits, see Figure 3) on the hair shaft, so that the warmth of the scalp will incubate them. The eggs are cemented there and will hatch after 7-8 days. The empty egg shells are a translucent white, and are therefore more easily seen compared to the unhatched eggs which are yellowish-white with a dark centre. The louse emerging from the egg is called a nymph (which looks like the adult but is smaller) and reaches maturity about 10 days after hatching. If mating occurs, a female louse can lay up to 6 eggs daily (head lice can live up to 30 days on a person’s head!). An infestation generally consists of only 10-12 lice per head at any one time, but hundreds of eggs can be present. To live, adult lice need to feed on blood and therefore if the louse falls off a person, it dies within two days. On the other hand, a nit can stay alive for up to a month off the body (on clothes, hairbrushes, or carpets, for example) as the nutrition for development is present within the egg.

How can you get head lice?
Head-lice do not fly or jump and therefore close contact, shared use of bedding, clothes, hats, hairbrushes, etc. are necessary for spread between people.

What are the signs and symptoms of head lice infestation?
- Tickling feeling of something moving in the hair.
- Itching, caused by an allergic reaction to the bites.
- Irritability (mood).
- Sores on the head caused by scratching. These sores can sometimes become infected.

Where are head lice most commonly found?
Head lice are commonly found on the scalp behind the ears and near the neckline at the back of the neck. Head lice hold
on to hair with hook-like claws found at the end of each of their six legs. Head lice are rarely found on the body, eyelashes, or eyebrows.

How are head lice infestations diagnosed?
Infestations can be diagnosed by looking closely through the hair and scalp for nits, nymphs, or adults. Finding a nymph or adult may be difficult; there are usually few of them and they can move quickly from searching fingers. If crawling lice are not seen, finding nits within a 1/4 inch of the scalp confirms that a person is infested and should be treated. If you only find nits more than 1/4 inch from the scalp, the infestation is probably an old one, and may not need to be treated. If you are not sure if a person has head lice, the diagnosis should be made by a health care provider (e.g. GP) or school nurse.

How to treat head lice
Head lice spread quickly and are highly contagious, and the presence of as little as one egg warrants immediate attention. Head lice may be treated in a variety of ways, which include physical removal, non-prescription medications, and prescription medications. Non-prescription medications available at most pharmacies include shampoos and lotions containing a variety of active ingredients, including permethrin, an insecticide; while prescription medications include insecticides such as organophosphates.

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. Treatment is generally repeated and 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 method of treatment used. Generally, a mixture of physical and medication-based treatments works best.

When treating head lice, supplemental measures can be combined with pharmacologic treatment. For example, hats, scarves, pillow cases, bedding, clothing, and towels worn or used by the infested person can be machine washed using hot water (e.g. 60°C) and hot air cycles (for 20 minutes), because lice and eggs are killed by 5 minute exposure 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 hair that might still have viable nits attached.

To remove nits from the hair-shaft, special fine-toothed combs are available. Removing the eggs may prevent a re-infestation, even when the live lice have been killed.

If non-prescription products fail to get rid of the head lice, your doctor should be able to prescribe another insecticide. However, use all head lice medications exactly as directed on the package instructions. Do NOT use products designed for animal treatment only (e.g. flea and tick treatment) as these can be highly toxic to humans. Do NOT use a two-in-one shampoo/conditioner before applying any head lice treatment as this can render the treatment ineffective.

General guidelines for treatment
Physical methods
Physical methods are based on the use of fine-toothed combs for the removal of head lice and eggs.

Dry combing
- Use a metal fine-toothed comb (also known as nit comb). Combs that have individually tool rounded teeth that are evenly spaced and set in a plastic handle are recommended.
- Fingernails can also effectively remove eggs. Individual strands of hair can be cut to remove eggs that are difficult to dislodge.
- Some combs will extract adult head lice only and leave behind the eggs; the closer together the teeth of the comb are, the more successful combing will be.
- You can use an ordinary comb to remove knots prior to use of a fine-toothed comb.

For the combing:
Drop the chin down on your chest and brush firmly up and over from the nape of your neck. Then brush behind the ears right through to the top of your head. Repeat from the other side. Clean the combs by soaking in hot water for 10 minutes after use. Keep long hair tied back and comb hair twice daily. Check for head lice weekly.

Electric battery operated combs are also available. These are claimed to stun or kill the head lice so they let go of the hair and can be combed out. Clean the teeth after each stroke of the comb. Electric combs should be used on alternate days for two or three weeks to break the breeding cycle. People with epilepsy, heart disease or pacemakers should not use them.

Wet combing
This method, using any kind of hair conditioner, is for detection and removal of head lice and eggs. It is recommended that this treatment be repeated on alternate days for three weeks. The idea is to smother the head lice with conditioner, preventing them moving away, and to allow manual removal. Do not use conditioner within a day of using a chemical treatment; it will make the chemical treatment ineffective.
- Apply enough conditioner (much more than usual) on dry hair to thoroughly cover the whole scalp and all the hair from the roots to the tips. Keep the conditioner on the hair, as the conditioner stuns the insects for about 20 minutes.
- Comb the hair straight and get knots out with an ordinary comb.
- Use a fine-toothed comb to systematically comb the hair. Comb the full length of each hair. Wipe the comb with a clean tissue after each stroke of the comb.
- After thorough combing and inspection, wash the conditioner out.
- Clean the combs by soaking in hot water for 10 minutes.

Haircuts
Short hair is easier to comb, requires less time to treat, and makes detection easier. It should not be necessary to shave heads. However, hairdressers may refuse to cut infested hair.

Chemical treatment
The use of any chemical (non-prescription or prescription medications) in or on the body carries risk. Some older treatments for head lice are no longer available because the risk they posed is now considered unacceptable. The chemicals used are insecticides, and should be used with care and strictly as directed by the manufacturer. Chemicals are also expensive. Do NOT treat babies with chemicals.
There are three chemicals that are most commonly used:

**Pyrethrins** are naturally occurring pyrethroid extracts from chrysanthemum flowers, and attack the insects' nervous system. These are usually combined with piperonyl butoxide for greater effectiveness. Pyrethrins are safe and effective when used as directed. Pyrethrins can only kill live lice, not unhatched eggs (nits). A second treatment is recommended 10 days later to kill any newly hatched lice before they can produce new eggs. Treatment failures can be common, depending on whether lice are resistant to pyrethrins in the patient’s geographic location. Pyrethrins generally should not be used by persons who are allergic to chrysanthemums or ragweed.

**Pyrethroids** are synthetic pyrethrins that are more stable in sunlight. Permethrin is a common synthetic pyrethroid used in head lice medications and is safe and effective when used as directed. Permethrin, like other synthetic pyrethrins, kills live lice but not unhatched eggs. Permethrin may continue to kill newly hatched lice for several days after treatment. A second treatment is often necessary 10 days later to kill any newly hatched lice before they can produce new eggs. Treatment failures can be common, depending on whether lice are resistant to permethrin in the patient’s geographic location. Permethrin should NOT be used on children less than 2 years old.

**Maldison** is an insecticide containing malathion. Malathion is an organ-ophosphate that attacks the insects’ nervous system. The formulations of malathion-based insecticides approved for the treatment of head lice are generally available as 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 are still present, 7-9 days after treatment. Malathion can be irritating to the skin and scalp; contact with the eyes should be avoided. Malathion lotion is flammable, so 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. Products containing organic or synthetic pyrethrins can generally be purchased through the pharmacist. However, products containing organophosphates require a medical prescription. Apply the treatment strictly in accordance with the manufacturer’s instructions, or specific medical advice given by your physician.

**Recommendations:**

1. If the infested person has very long hair (longer than shoulder length), it may be necessary to use a second bottle of insecticide. Pay special attention to the 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 off.

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

3. Have the infested person put on clean clothing after treatment.

4. 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.

5. If, after 8-12 hours of treatment, no dead lice are found and lice seem as active as before, the treatment may not be working. Do NOT retreat until speaking with your health care provider; a different lice medication (pediculicide) may be necessary.

6. 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.

7. Do not use hairdryers on treated hair. The heat may break down the active chemical.

8. Retreatment is generally recommended for most prescription and non-prescription (over-the-counter) medications after 9-10 days in order to kill any surviving hatched lice before they produce new eggs. However, certain prescription medications may require retreatment after 7-9 days, ONLY if crawling lice are found. Check carefully the product instructions.

9. Check all members of the household daily for a period of three weeks.

**Herbal remedies**

Several herbal preparations are available; however the effectiveness of these is not clearly established. Tea tree oil used as directed by a pharmacist or health care provider can be effective as an alternative treatment. However, as with non-herbal preparations, it too may cause irritation or an allergic response to the scalp.

**Preventing reinfestation**

- Do not share clothing such as hats, scarves, coats, sports uniforms, or hair ribbons.
- Do not share infested combs, brushes, or towels.
- Do not lie on beds, couches, pillows, rugs, carpets, or stuffed animals that have recently been in contact with an infested person.
- 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.

**Which treatment is best?**

If you aren’t sure which treatment to use, which medicine to use or how to use a particular medicine, ask your GP, pharmacist, or other health care provider. ARPHS does not make recommendations about specific products.

References:
- [http://www.dhhs.gov/lia/Headtreatment.html](http://www.dhhs.gov/lia/Headtreatment.html)
- [http://www.westchestergov.com/HEALTH/Head_lice.htm](http://www.westchestergov.com/HEALTH/Head_lice.htm)
- [http://www.northnewbrighton.school.nz/admin/lice.html](http://www.northnewbrighton.school.nz/admin/lice.html)
Radio interview on air pollution from domestic fires

Paul Fakalago and Sioeli Takataka (HPOs with ARPHS) have recently been interviewed on Pacific radio stations to provide information in Tongan and Samoan on the health effects of air pollution from domestic fires. This was done in collaboration with Auckland Regional Council as part of their domestic fires campaign. The interviews were aired on 531PI (in Tongan and Samoan) and Radio Samoa (in Samoan). Paul and Sioeli talked about Auckland’s air quality in the contexts of housing, heating and health. Below we provide a short extract with some useful information for outdoor fires and on heating homes with fires/wood burners.

Home heating and outdoor cooking guidelines

If you heat your home with a fire (including a wood burner), or use a fire for your outdoor cooking, then there are some simple ways to lower the amount of air pollution going out your chimney. These include:

- Only burn firewood that is dry because wet or green wood creates a lot of smoke with less heat. Dry wood is significantly better for your health and can be dried by keeping it under cover for a year. Dry wood should have large cracks at the ends. Wet wood is denser.
- Do not use wood that has been painted or treated with chemicals (e.g. that has a green stain).
- Use logs that have been split into pieces no larger than 11cms thick (or the diameter of a large can of baked beans) as these burn better and create less smoke.
- Have your chimney cleaned, once a year.

What shouldn’t you put in your fire?

You breathe what you burn so you should avoid burning plastic, disposable nappies, electrical cables, painted or treated timber (this is the timber with a green stain), particle board, rubber products (e.g. tyres), and waste oils in your open fire or wood burner. This is because they give off nasty chemicals when burned, for example, treated wood may release toxins such as copper, chromium and arsenic into the air when it is burned. You also shouldn’t burn rubbish, glossy paper or magazines, and wrappers in your wood burner or open fire. They also produce harmful chemicals, creosote build-up, and cause offensive smoke.

Are you allowed to burn rubbish outside? And what about outdoor cooking?

Under regional rules if you live in an urban part of the Auckland region you are not allowed to burn rubbish outside. Also, you should not burn old tyres or waste oil on your fire as they give off noxious gases when burned. If you live in rural Auckland there are still rules around outdoor burning. You can contact your local council to find out about the rules in your area.

The ban on burning outside does not include cooking (i.e. an umu, hangi or barbeque). Remember though, where you choose to light your fire is important. You can be fined for causing excessive smoke and nuisance to your neighbours if the smoke escapes across your boundary. Think about wind direction and pick a place on your section that is least likely to annoy your neighbours. To cause less pollution when cooking outside, you should follow the guidelines provided above.

Ken Zhu

Ken Zhu joined the Healthy Environments Team (HET) in May 2007, after six years as a Health Protection Officer (HPO) with the Food Safety and Disease Investigation Team. Ken trained as a public health doctor in China, working in Guang Zhou Epidemic Prevention and Surveillance Station in China. He moved to New Zealand in 1996, training in Applied Science (Environmental Health) in Wellington. He has a Bachelor of Preventive Medicine, Bachelor of Applied Science, and National Diploma in Drinking Water (in training). He shares the HET portfolios of drinking water, hazardous substances, and Biosecurity with other HPOs.