

*Guidelines for the control of public
health pests – lice, fleas, scabies,
bird mites, bedbugs and ticks*

National Environmental Health Monographs

General Series No. 3

Guidelines for the control of public health pests - lice, fleas, scabies, bird mites, bedbugs and ticks

Edited by

Joanne Cammans, Peter Bond, Neil James, Peter Jarrett
Andrew Langley and Sam Mangas

National Environmental Health Forum Monographs
General Series No. 3

National Environmental Health Forum



Copyright © 1998 Department of Human Services

Printed by Glenelg Press

Published by the National Environmental Health Forum.

Prepared for publication by Sam Mangas
Environmental Health Service
Department of Human Services

Price available on application.

National Library of Australia Cataloguing-in-Publication

National Environmental Health Forum.

Guidelines for the control of public health pests - lice,
Fleas, scabies and other mites, bedbugs and ticks.

ISBN 0 7308 9004 X

1. Pests - Control - Australia. 2. Fleas - Control -
Australia. 3. Animals as carriers of disease -
Australia. 4. Scabies - Control - Australia. 5. Bedbugs -
Control - Australia. I. Title (Series: National
Environmental Health Forum monographs. General
series; no. 3).

Contents

Published Monographs	4
FOREWORD	5
Acknowledgments	5
Disclaimer	5
INTRODUCTION	6
PUBLIC HEALTH PESTS	6
Headlice	6
Body Lice	12
Pubic (Crab) Lice	13
Fleas	14
Scabies	15
Bird Mites	18
Bedbugs	19
Ticks	20
REFERENCES	22
TABLES - TREATMENT PRODUCTS	23
APPENDIX 1 ~ CONTACTS	25
South Australia	25
Public Health Units	25
APPENDIX 2 ~ LEGISLATION	27
APPENDIX 3 - RELEVANT PUBLICATIONS	28

Published Monographs

Water Series

1. Guidance for the control of Legionella (1996)
2. Guidance on water quality for heated spas (1996)
3. Guidance on the use of rainwater tanks (1998)

Soil Series

1. Health-based soil investigation levels, 2nd edition (1998)
2. Exposure scenarios and exposure settings, 2nd edition (1998)
3. Composite sampling (1996)

Metal Series

1. Aluminium, 2nd edition (1998)
2. Zinc (1997)
3. Copper (1997)

Air Series

1. Ozone (1997)
2. Benzene (1997)
3. Nitrogen Dioxide (1997)
4. Sulfur dioxide (1999)

General Series

1. Pesticide use in schools and school grounds (1997)
2. Paint film components (1998)
3. Guidelines for the control of public health pests – Lice, fleas, scabies, bird mites, bedbugs and ticks (1999)
4. National standard for licensing pest management technicians (1999)

Indigenous Environmental Health Series

1. Indigenous Environmental Health No. 1 (1999)

Exposure Series

1. Child activity patterns for environmental exposure assessment in the home (1999)

Counter Disaster Series

1. Floods: An environmental health practitioner's emergency management guide (1999)

Foreword

This guideline has been prepared to address the issue of control of public health pests or vermin. It provides information on the identification, life cycles, prevention and control of lice, fleas, mites, bedbugs and ticks. The guideline is primarily intended for use by agencies responsible for the administration of Public Health Acts and Consolidated Regulations. It should also be useful to other agencies, groups and individuals involved in dealing with infestations.

Acknowledgments

These guidelines were developed with assistance from the following organisations:

- Australian Institute of Environmental Health
- Australian Local Government Association
- Child & Youth Health
- Commonwealth Department of Health and Family Services
- Department of Education, Training and Employment (DETE)
- Eastern Metropolitan Regional Health Authority
- Health Department of Western Australia, Environmental Health Service
- The following local government areas:
 - Adelaide Hills Council
 - City of Tea Tree Gully
 - City of Salisbury
 - City of Marion
 - City of Port Adelaide Enfield
 - City of Adelaide
 - Happy Valley, Noarlunga and Willunga Council
- New South Wales Health, Environmental Health Branch
- South Australian Department of Human Services, Environmental Health Branch
- Supported Residential Facilities Association
- Territory Health Services
- The Parks Community Health Service
- The Pharmacy Guild

Special thanks to the following people for their time and comments; Associate Professor Richard Russell, Department of Medical Entomology, University of Sydney, Dr Pippi Mottram, Medical Entomologist, Queensland Health and Mr Geoff Davis, Assistant Director, Environmental Health Unit, Australian Department of Health and Aged Care.

Disclaimer

This document has been prepared in good faith exercising due care and attention. However, no representation or warranty, expressed or implied, is made as to the relevance, accuracy, completeness or fitness for purpose of this document in respect of any particular user's circumstances. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice about, their situation. The NEHF, its participants and the DHS shall not be liable to the purchaser or any other person or entity with respect to any liability, loss or damage caused or alleged to have been caused directly or indirectly by this publication.

Introduction

The purpose of these guidelines is to assist local government with the administration of public health legislation relating to the control of public health pests such as lice, fleas, mites, ticks and bedbugs. These guidelines may also provide assistance to individuals and staff of schools and child care centres, community health centres and residential care and accommodation facilities in dealing with public health pest issues.

Public health legislation provides that a person infested with vermin shall take all reasonable measures to prevent transmission to others. In the case of a child, the parent or guardian is responsible. For the purposes of these guidelines, reasonable measures include:

- effective treatment as outlined in this guideline *or*
- a medical certificate from a medical officer confirming that the individual is free of infestation.

If the treatment has not been effective or is not being carried out, an authorized officer may be asked to intervene. An educational and supportive role is desirable with the enforcement of legislation only when necessary. The authorized officer may be able to co-ordinate a team approach towards achieving a successful outcome.

Lice, fleas, mites, ticks and bedbugs have not been implicated in the transmission of AIDS or hepatitis B and the few diseases which they are capable of transmitting are extremely rare in Australia.

If insects are unusual or difficult to identify, government agencies may be able to assist. (See Appendix 1 - contact details for each State). Pathology laboratories, university departments and museums may also assist in the identification of insects. Laboratory examination of a skin scrape is generally required to confirm scabies mite infestation and needs to be arranged through a medical practitioner.

Public Health Pests

Headlice

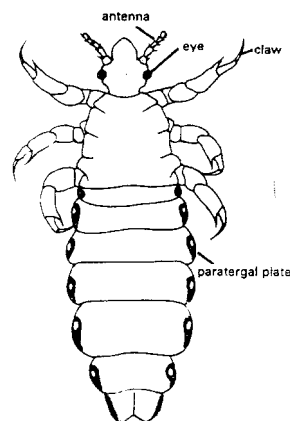


Figure 1: *Pediculus humanus capitis* (Headlice)

(Adapted from: Kettle, 1995)

Headlice (*Pediculus humanus capitis*) are a social pest and are rarely a threat to health however their presence can have social, economic, psychological and educational repercussions. Correct information, treatment and monitoring should ensure they are controlled with minimum impact on individuals and communities.

Description

Adult headlice (refer to Figure 1)

- are small wingless insects, 2-4 mm long with flat bodies and six legs ending with a claw
- vary from light to brown coloured
- feed on human blood once or more often each day
- move away quickly when the hair is parted
- shed skin three times before reaching adulthood and are capable of reproducing two weeks after hatching
- dehydrate quickly and are unlikely to survive off the head for more than 1 or 2 days
- cannot complete their lifecycle on animals, pets, furniture, carpets or toys
- cannot jump, fly or hop
- can be difficult to see in the hair
- can lay more than 100 eggs at a rate of about 6 eggs per day
- prefer temperatures of 28 -32°C

Eggs (nits)

- are firmly attached to the hair shaft at the base, often touching the scalp
- are yellow white and non-transparent
- are about 0.8 mm (the size of a grain of salt)
- hatch 7-10 days after being laid
- are easier to see than headlice
- do not hatch at temperatures of less than 22°C.

Hatched eggs

- are the shells of eggs that remain attached to the hair as it grows
- are no longer capable of reproducing
- are shiny, white and flat
- are often clearly visible.

Unhatched dead eggs

- may appear brown or black.

Transmission

Headlice are mainly transmitted by head-to-head contact with an infested person.

Children are more susceptible because they are more likely to have close contact with other children and adults in homes, playgrounds, schools, kindergartens and childcare centres. Adults and older children may become desensitized to headlice bites, thereby delaying treatment and becoming a source of infestation to others.

Headlice will dehydrate quickly once removed from the head. In humid conditions they may survive for more than 24 hours off the head, however they are unlikely to be able to reinfest another person. In the early stages of dehydration, lice will continue to move or crawl but are unable to feed or lay eggs (nits). For this reason, items such as brushes, headgear, bedclothes and towels are less likely to transmit headlice than close contact although transmission may occur if these items are used immediately following use by an infested person.

Routine checking

Headlice bites irritate the skin and often the first sign of infestation is vigorous scratching of the head. During periods of high headlice prevalence within a community or school, it is recommended that all members of the family, including guests, should undertake daily checking of the head by parting the hair and checking the scalp; paying particular attention to the nape of the neck, behind the ears, around the crown, and under fringes.

Look for headlice and eggs. Live eggs will be located close to the scalp and hatched or dead eggs will be further down the hair strand. Eggs may be easier to see because headlice can move quickly. Eggs may have a gritty feel when running fingers through the hair. Good light and a magnifying glass will assist with the checking procedure.

The 'wet combing' method of detection can help in detecting lice even when numbers are low. This method involves applying an amount of ordinary hair conditioner to dry (unwetted) hair and combing the whole head several times. The conditioner effectively slows the adult lice so that they can be combed out. After each sweep of the hair, the comb should be wiped on a tissue and checked for lice.

Discarded lice skins and black sandy excrement may be seen on pillows and collars.

If headlice or eggs are identified:

- treat as recommended, (see Table 1, p25) and
- advise any close contacts including household members, neighbours, and school or childcare centre staff of the need to check as above.

Treatment

There are a range of headlice treatments (pediculicides) containing active insecticides available and they should be applied as recommended by the manufacturer. Generally, treatment instructions recommend a second application of pediculicide after 7 days. This will ensure that any headlice hatching from surviving eggs are killed.

Most treatments that are available in Australia will contain one of the insecticides from the groups listed below.

Products containing synthetic pyrethroids such as bioallethrin and permethrins:

a shampoo, lotion or spray containing 1% permethrin is applied to the hair, left for ten minutes then rinsed out *or* a spray containing bioallethrin and piperonyl butoxide is applied to the hair, left for 30 minutes and then rinsed out with warm water.

Products containing malathion (maldison):

a lotion containing 0.5% maldison is applied to the hair and washed out after twelve hours with any regular hair washing product *or* a shampoo or foam containing 1% malathion is applied to the hair and rinsed out after ten minutes and the hair dried without heat.

Products containing pyrethrin:

a lotion, shampoo or foam containing pyrethrin and piperonyl butoxide is applied to the hair, left for ten minutes then rinsed out and the hair dried without heat. (At the time of publication, products containing 0.165% pyrethrin are commercially available in Australia although higher strengths are used overseas).

It is important to apply the headlice treatment (pediculicide) directly onto the roots of the hair to achieve effective treatment.

NOTE:

- (1) Treatment of children under 2 years old or pregnant or lactating women should only be undertaken after medical advice.
- (2) Individuals with allergies to ragweed may also react to the components in pyrethroid treatments.

After treatment procedure

After each treatment, the effectiveness of the treatment can be checked using the following steps:-

- Use a headlice comb on the hair, wiping the comb with a tissue after each sweep.
- Repeat until the whole head is combed.
- Examine the tissue and assess whether the lice are dead (no movement) or alive and active. If the treatment is effective, all the lice should be dead. Lice may be alive but moving only slightly immediately after treatment, in which case they are badly injured and unlikely to survive.

(Source: Queensland Health Fact Sheet, 1998; produced by the Child Health Project and Communicable Diseases Unit.)

The eggs can be combed out after the first treatment using a metal comb with fine teeth (0.25 mm apart) available from pharmacies. It is often difficult to remove all the eggs by combing, and the best method to remove remaining eggs is by pinching the hair shaft between two fingernails and physically pulling the eggs off the hair. It is not necessary to remove dead eggs from the hair, other than for aesthetic reasons.

NOTE : *Only use headlice treatments if live eggs or headlice are present.
Never use headlice treatments to routinely prevent infestation.*

Precautions

To prevent unnecessary or repeated exposure to headlice treatment chemicals, the person applying the treatment should wear protective gloves. Avoid contact of the treatment with eyes, nose or throat.

Some headlice treatments contain flammable liquids. Avoid ignition sources such as gas heaters, naked flames and lit cigarettes and other heat sources such as hair dryers during treatment application.

Treatment failure

Headlice treatments are usually effective in killing eggs and lice however occasional failure may occur due to factors such as: incorrect application; reinfestation and misuse of a chemical leading to resistance of the lice. It is important to establish that the headlice treatment was correctly applied and effective, and to check close contacts for possible re-infestation. Daily checking of the head should be conducted for at least 10 days after treatment.

If the headlice appear to be resistant to one of the treatments, another product containing a different active ingredient should be used.

Prevention

Children should be discouraged from sharing hats, combs and other personal items. There are no proven methods of avoiding headlice infestations but regular checking of the head will help to quickly identify an infestation and begin treatment.

Control measures

As headlice are transmitted primarily by head to head contact, it is important to identify contacts and, if infestation is present, treat contacts as recommended above. Fumigation of buildings as a control measure is ineffective and unnecessary.

Some individuals, including adults, become desensitised to the bite of the headlice and may be unaware that they have an infestation. They may then become a source of re-infestation to others. It is important that *all* close contacts are checked regardless of symptoms.

Physical Controls

Frequent brushing of the hair with a close bristled brush will injure and weaken any headlice that may be present on the head, making it more difficult for them to complete their lifecycles. Specialised combs are also available for nit and lice removal.

The ‘wet combing method of detection’ (see *Routine checking*) can also be useful in controlling headlice infestations.

Items such as combs, brushes and headgear belonging to the affected person should be washed in hot water. Bed linen (sheets and pillow cases) should be washed in hot water (60°C for 20 minutes) and dried in the sun or hot air clothes dryer for 20 minutes to destroy eggs and lice.

Alternative treatments

There are various alternative treatments for headlice available, including the use of herbal lotions and vegetable oils. Some people report success with these products however their efficacy is yet to be proved. Vigilance (checking of the head daily) is the most important component in controlling any headlice infestation and should always be used in conjunction with other chemical or non chemical treatment.

Roles of various organisations

School staff

Where it is suspected that a child may have headlice, and providing that the parents and child do not object, school staff may examine a child’s head. Examinations need to be performed in a sensitive and confidential manner. If evidence of a headlice infestation is found, the child can be sent home with a note requesting that the headlice be treated. If the parent or the child objects to school staff checking the child’s head for headlice, the child should be sent home with a note requesting that parents check the child and treat if necessary.

NOTE: *It is important that schools adopt a coordinated approach and act promptly in the event of a headlice infestation*

Nominated centre or school staff may be unwilling, and are not obliged, to examine children’s heads for headlice, nor can they ensure that they will find all cases of headlice or eggs (nits). If staff are not confident in identifying headlice, assistance and advice can be sought from the environmental health officer at the local council or shire.

To prevent possible transfer of headlice from head to head, it is advisable for the person undertaking the head examination, to wash their hands after checking each person’s head. Alternatively, a disposable item such as a ‘paddle pop stick’ can be used to part the hair. A new stick should be used for each person.

If there are *reasonable grounds for suspecting that the child has headlice and is not receiving treatment*, the school may request that a medical certificate be provided to show that the child has been checked and is considered to be free of headlice.

Department of Education policies concerning the identification and treatment of headlice vary between different States and Territories. Generally, children suspected of having headlice are excluded from school until treatment has commenced and it is considered to be responsibility of the parent or guardian to detect and treat headlice infestations.

In South Australia, the recommended treatment products are available to government and some non-government schools and preschools from Services SA. The school may provide the headlice treatment free to approved School Card students and at the lowest possible cost to other students. Where the family of a student is affected, additional supplies may be available from the school, or otherwise purchased from a pharmacy. In households where there is no money for purchase of headlice treatment, Family and Community Services may be able to assist.

In Victoria and Queensland, local schools may provide school nurses to examine the children for head lice (with permission from the parents). It is advised that the recommended commercial products for scalp treatment be used strictly in accordance with the directions on the package.

In New South Wales and Western Australia, children suspected of having headlice are sent home from school at the end of the day with a note advising parents to check and treat as necessary. Once treatment has proceeded, children are readmitted to school. Headlice treatments are not available through the schools.

In Western Australia, the policy is to exclude children from school only when live lice are found on the head. The presence of nits alone is not cause for exclusion.

In Tasmania, in accordance with the Education Department's (1994) policy on headlice, school principals allocate treatment lotions. Head examinations and treatment is coordinated by the school and health care nurses. There is no longer a central allocation of headlice lotion. The State has established a Headlice Working Party and is reviewing the 1994 policy to develop an effective, coordinated inter-departmental approach to headlice management.

Out-of-school-hours care, preschool, kindergarten and childcare centres

Out-of-school-hours care, preschool and childcare centres should follow the same procedures as schools regarding examinations of children, treatment notifications and exclusion.

Staff may examine the children's heads when there are reasons to suspect headlice may be present. A suspected or confirmed case may be excluded from the centre and re-admitted after appropriate treatment has commenced.

Local pharmacy

Most recognised pharmacies sell the products mentioned in these guidelines and can provide assistance to members of the public.

Local council or shire

Environmental health officers are authorized under relevant Acts and can provide assistance and advice on the management of headlice. Councils and shires may also have information on agencies in their area which are able to assist with specific problems related to headlice.

When dealing with headlice outbreaks, authorized officers should ensure that resource information is freely available to all families, schools and childcare centres. Workshops, public displays, internet websites and seminars may be a useful means of sharing information and establishing contacts to assist.

Schools can be a focus during times of perceived headlice 'outbreaks' and may require the assistance of an authorized officer to develop a coordinated approach to the problem. Suggested strategies are outlined below.

Accurate information should be made available to staff and parents regarding:

- how to identify headlice and eggs (nits)
- Department of Education policy regarding exclusion from school and confirmation that the student has been effectively treated before returning to school
- which treatment to use
- where to obtain supplies
- how to apply treatment
- how to assess the effectiveness of treatments
- how to trace contacts.

Authorized officers may assist school staff by co-ordinating the approach in dealing with persons who fail to effectively rid themselves or their children from headlice. In some cases, a home visit may be useful. An educative and supportive role is desirable with the enforcement of legislation only when necessary.

Further information

Information on headlice can be obtained from:

- local councils/shires
- schools
- child & youth health services
- Community Health Centres
- Departments of Health
- Departments of Education
- pharmacies

Also see Appendix 3 – Relevant publications.

Body Lice

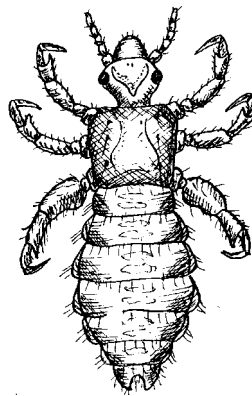


Figure 2: *Pediculus humanus corporis* (Body lice)

(Adapted from: Hadlington and Gerozisis, 1985)

Body lice (*Pediculus humanus corporis*) are normally associated with crowded and unhygienic living conditions but are also transmitted through any close contact with an affected person.

Body lice (refer to Figure 2) are similar to head lice but the region of occurrence is important in their identification. They are found mainly in clothing, often in the seams, but also on the body surface, especially the armpits and around the waist. In Australia, they are less common than headlice or pubic lice.

Body lice are flat wingless insects with six legs ending in a claw. They may be greyish or brown in colour and range in size from 2 – 5 mm. They feed on human blood and their bites can cause irritation. Secondary infections can occur if louse faeces are introduced into the skin by the affected person scratching.

Transmission

Body lice can be transmitted in clothing and bedding as well as by close physical contact.

Prevention & control measures

Avoid close contact with infested persons, their clothing and bedding. Check the seams of any second-hand clothing or bedding for the presence of body lice. Clothing and blankets recently used by an infested person should be laundered in hot water (greater than 60°C) and preferably tumble dried or ironed with all seams turned outwards. Items which cannot be laundered or dry cleaned can be ironed paying special attention to seams, or sealed in a plastic bag for four days. Thoroughly vacuum mattresses paying attention to seams, creases and under buttons.

Treatment

Unlike head lice, body lice visit the human body only to feed and spend the rest of the time in clothing or bedding where they lay their eggs. There is therefore no need to treat the person infested.

Pubic (Crab) Lice

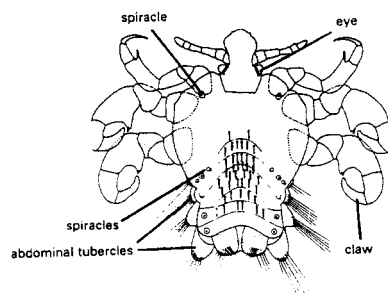


Figure 3: *Phthirus pubis* (Pubic lice)

(Adapted from: Kettle, 1995)

Pubic lice (*Phthirus pubis*) are not associated with the spread of disease but their bites can cause irritation. Scratching of the irritation may lead to localized infection.

The pubic (crab) louse (refer to Figure 3) is a small 1-2 mm, light brown, round, flat, six-legged insect that clings to the pubic hairs, sucks blood for nourishment, and fixes its eggs (nits) to the pubic hairs. As its name suggests it looks very much like a tiny crab. The life cycle lasts about two to three weeks. Small red sores and itching may occur as a reaction to the injection of saliva from the louse. They are mainly found in the pubic hair but may also be found on other hairy parts of the body e.g. eyebrows or armpits.

Transmission

Pubic lice are transmitted mainly by close body contact, including sexual activity and, occasionally, by clothing, bedding or towels recently used by an infested person.

Prevention

Avoid close body contact with affected individuals until after treatment is completed and avoid sharing their clothing, bedding or towels.

Treatment

Various lotions are available containing maldison or permethrin (see Table 1, p25). These treatments should be applied to clean, cool dry skin. Treatment of pregnant or lactating women or infants or young children should only be taken after medical advice.

A soft paintbrush or shaving brush can be used to apply a thin layer of the lotion over the entire skin area from chest to knees. Assistance from another person will ensure that the treatment is correctly

applied. The treatment chemical is left on for the recommended time, then washed off thoroughly. Areas such as eyelashes can be treated by applying petroleum jelly twice daily for 8-10 days.

Some insecticides, particularly those containing a high proportion of alcohol, may cause irritation or dermatitis due to the sensitivity of the genital region. In this case, shaving the hair from the affected area can be an effective alternative to chemical preparations.

Itching may persist for a few days after successful treatment. Calamine lotion may be used for relief.

Sexual partners, family members and other very close personal contacts should also be checked for lice and treated if necessary.

Control measures

Clothing, bedding and towels used while the infestation was present should be washed in hot water and tumble dried if possible. Dry-cleaning can also be used. Items which cannot be laundered or dry-cleaned should be ironed or sealed in a plastic bag for four days.

Fleas

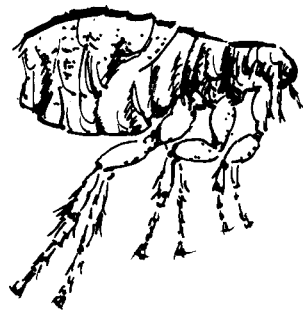


Figure 4: *Ctenocephalides felis* (Cat flea)

There are several species of fleas in Australia although the cat flea (*Ctenocephalides felis*- refer to Figure 4) is the most common. Adult fleas are blood suckers and live on animals, but they may bite and seek a blood meal from humans.

Fleas are small, brown insects about 1.5 mm to 4 mm in size, markedly flattened on each side and have stiff bristles pointing backwards. They are wingless but have long hind legs that enable them to jump up to 200 mm to reach a host. Adult fleas attach to an animal and feed on its blood. They sometimes excrete almost undigested blood which dries into dark granules.

Fleas often lay their eggs in or near cracks and crevices on the floor or amongst dust, dirt and debris. Sometimes eggs are laid on the host animal. These eggs usually fall to the ground and accumulate in large numbers in and around animal bedding and resting places. Eggs are oval, whitish and about 0.5 mm long. In her lifetime, the adult female lays several hundred eggs in batches of 4-8.

Eggs hatch after 2-14 days and the larvae feed on organic debris such as food crumbs, human and animal skin scales and partly digested blood excreted from the adult flea. The larval period usually lasts 2 or 3 weeks but may be extended to several months in unfavorable conditions.

When larval development is complete, a cocoon is formed. Cocoons are covered in dust and other particles from the floor so it is very difficult to distinguish them from other particles.

The larvae pupates within the cocoon and this stage usually lasts one to two weeks or longer depending on the ambient temperature. After emerging from the pupa, the adult flea delays its escape from the cocoon until it senses vibrations from the movements of the host. Without these vibrations, such as in the case of an unoccupied house, the adult flea will remain in its cocoon. This is why an uninhabited house may appear to suddenly become infested with fleas on re-occupation.

Disease transmission

Flea bites cause irritation and inflammation of the skin, usually on the lower legs and feet in humans. Humans and animals often become sensitive to the bites. Diseases such as Murine typhus which is mainly associated with rats and mice, can occasionally be transmitted to humans, although such transmission in Australia is uncommon. Fleas can also carry tapeworms that affect dogs, cats and rodents. Humans, particularly young children, can become infected with tapeworms by swallowing fleas whilst playing with pets. The fur around the neck or belly of the dog or cat should be checked regularly for fleas.

Prevention

Regular vacuuming of floors and any areas where animals rest will help to prevent infestation. Animal bedding should be laundered in hot water, ironed or treated with appropriate insecticides. Checking and treating animals for fleas and keeping them out of the house will also reduce the risk.

Control measures

If pets or other animals are infested with fleas, they should be treated with a suitable veterinary insecticidal preparation. Their bedding and the rest of the premises *must* be treated at the same time to completely eliminate fleas and so avoid animals being reinfested. Animals with fleas should also be treated for tapeworm.

Animal bedding and other areas where they rest should be treated with insecticide to destroy adult fleas and eliminate eggs and larvae. Where possible, low toxic pesticides such as pyrethroids should be used in conjunction with an insect growth regulator such as methoprene, which prevents eggs developing into reproductive adults.

Flea cocoons are not easy to kill with insecticide so treatment should be repeated every 2 weeks for 6 months to kill adult fleas as they leave their cocoons. Cleanliness is important for prevention and control. Floors should be washed and floor coverings thoroughly vacuumed with insecticide powder added to the dust bag of the vacuum cleaner and the contents emptied into a plastic bag, sealed and placed in a garbage container. An effective alternative is to place the dust bag in the freezer for 24 hours prior to disposal.

Floors and floor coverings in infested areas should be treated with a residual insecticide and this should only be cleaned off after the period recommended by the insecticide manufacturer. Attention to sub-floor and outdoor areas is frequently required. It is advisable to wet outdoor areas with a hose before applying insecticide. See Table 2 (p26), for examples of suitable insecticide preparations for flea control. For persistent or extensive infestations it is advisable to consult a pest control operator.

Scabies

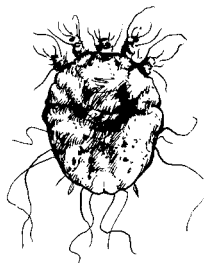


Figure 5: Dorsal view of female *Sarcoptes scabiei*

Scabies mites (*Sarcoptes scabiei*) are transmitted from person to person by close skin contact lasting 15 – 20 minutes. The first indication of infestation is intense itching. Infestation is *not* an indication of poor hygiene although insanitary habits may disguise symptoms for an extended period, allowing the condition to worsen.

The scabies mite (refer to Figure 5), sometimes called the ‘itch mite’, is about 0.5 mm long and barely visible to the naked eye. It is pearly white with brownish legs and mouth parts.

The male mite lives mainly on the skin surface. The female mite lives on the skin surface until fertilized by the male. She then burrows into the skin and lays eggs. After 3-4 days the eggs hatch and the larvae migrate to the surface of the skin where they feed, grow, molt and reach the nymph stage. About fourteen days later the mite becomes an adult and is ready to repeat the cycle.

Scabies mites are usually found between the fingers, on the front of the wrists, and in the folds of the elbows, wrists, armpits, buttocks and genitalia. In women, mites may be found burrowing beneath and around the breasts and nipples. Thread-like “tunnels” may be present in the skin, but these are often very difficult to identify. Small red lesions and scratch marks may be visible.

Diagnosis is usually by laboratory examination of a diagnostic skin scrape for mites and eggs, using a microscope.

Scabies mites are primarily transmitted by prolonged skin to skin contact or less readily by undergarments or bed clothes which have been freshly contaminated by direct contact of an infested person. Mites can only survive for two days off the human body although high temperatures will kill them more quickly.

Itching begins 2-6 weeks after infestation in individuals not previously exposed to scabies and within 1-4 days for individuals previously exposed. The irritation can be intense, particularly when the skin is warm, e.g. in bed or after a bath.

Prevention

Avoid skin contact with infested individuals and contaminated bedding or items of clothing.

Treatment

Scabies mites can reproduce and be transmitted to others before the affected person is aware of the infestation. For this reason, all close personal contacts (e.g. family members, sexual partners) of a person with confirmed scabies should be chemically treated in addition to that person. Non chemical treatment of clothing and linen should also be carried out.

Treatment involves application of insecticidal cream, lotion or solution as recommended by a medical practitioner. Some examples of treatments available from pharmacies are shown in Table 3 (p27). The treatment should be applied to a clean, cool dry skin.

***CAUTION:** Skin irritation caused by scabies mites can be easily confused with other skin diseases and in babies, pregnant women or people who may already have other forms of skin disease, treatment should not be undertaken until the diagnosis of scabies in the individual or a close contact has been confirmed. Assistance with diagnosis can be obtained from medical practitioners, dermatologists and outpatient clinics.*

Secondary reactions to the presence of the mites include an itchy rash over various parts of the body which is not always indicative of the burrowing site. It is therefore important that the whole skin surface is treated from, and including, the soles of the feet to the jaw line (exclude head and face except when directed by a medical practitioner). Particular attention to body crevices, such as buttocks, external genital area and under breasts is necessary.

Assistance from a second person is necessary to achieve effective application of the product. Wash off after the recommended contact time. Skin irritation after treatment may lead some people to believe they still have a scabies infestation. Products containing crotamiton or calamine lotion may be used to relieve irritation. Follow up treatment after one week can also be applied.

Control measures

Individuals infested with scabies mites should be excluded from childcare, school or work, and may return on the day following treatment.

Non chemical control

Clothing and bed linen should be washed in hot water (at least 60°C). Placing items in a clothes dryer for ten minutes will also kill scabies mites.

Transmission of the scabies mite via furniture is unlikely. In cases of persistent or chronic infestations, bed mattresses and upholstered furniture should be vacuumed or gently ironed.

Scabies mites outbreaks in residential care facilities

In the elderly and chronically ill, reduced immunological reactions in the skin can mean that an infestation may be present for several months before a significant itch or skin reaction occurs. Diagnosis may be difficult and may not be confirmed until caregivers or close contacts become infested and complain of severe itching. By this time there may be several cases amongst residents in the residential care facility.

If an aged or infirm person has a skin problem that does not respond to simple treatments, a dermatologist should be consulted. Where scabies is confirmed, treatment should be carried out as prescribed by a medical practitioner or dermatologist.

The most likely source of persistent scabies infestation is an individual who has had inadequate or no treatment. It is recommended that all caregivers and residents plus close contacts be treated simultaneously regardless of symptoms. Where the case appears isolated, it may be adequate to restrict treatment to direct caregivers and those residents who share living quarters with the affected person.

NOTE: *When close personal contact is required with a person who has a scabies infestation or any unidentified, itchy rash, caregivers should wear gloves and gowns until treatment of the individual has been completed.*

In the event of transfer of an affected resident to other premises it is recommended that staff at this destination are advised of possible exposure to scabies mites.

Crusted Scabies

Occasionally, very ill, infirm or immunologically compromised individuals develop an extensive infestation of scabies mite; a condition known as *Crusted or Norwegian Scabies*. In this condition, large numbers of scabies mites form crusted scabs all over the body including the head. It is important that advice from a dermatologist is sought regarding additional measures required to minimize the risk of transmission. Thorough treatment of the environment including vacuuming and insecticide spraying or fumigation is often necessary in cases of *crusted scabies*.

Bird Mites

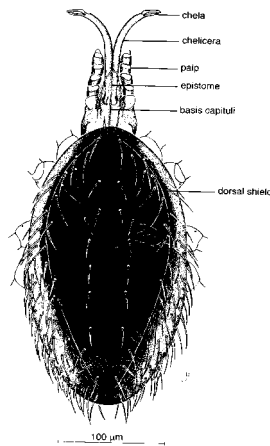


Figure 6: Dorsal view of female *Ornithonyssus bursa*

(Adapted from: Kettle, 1995)

There are several species of bird mites but the one most commonly affecting humans is the domestic starling mite (*Ornithonyssus bursa*, family Dermanyssidae, refer to Figure 6).

Starling mites are commonly found in buildings where bird nests are located, usually around the eaves or in attics. Their life cycle is very short and complete development to the adult stage may occur in 7 days, if conditions are favorable.

Bird mites are generally associated with moist or humid conditions and are often encountered in the late spring and summer months. During these seasons, mite populations are high and young birds begin to leave their nests.

When the original blood source (i.e. the bird) has deserted the nest, the hungry mites will wander away from the nests in search of food and filter down (climbing on walls, ceilings and bedding) into the living space to feed on humans. Bird mites are unable to complete their lifecycles on humans so the infestation is usually self limiting once the bird host has gone.

The bites of bird mites cause itching, swelling and raised reddish spots on the skin.

Prevention & control measures

Applying insect repellents containing diethyl meta-toluamide (DEET) or 3-methyl-n,n-diethylbenzamide, will prevent bird mites from biting.

The best approach to controlling an infestation in the house, is to locate the nests (around the eaves, in attics, in chimneys, wall voids, in basements, around porches and foundations) and treat all nesting material with a suitable pesticide (eg. those containing chlorpyrifos or pyrethrins) and then remove the material from the roof space. It is recommended that persons handling items that have been in contact with birds (e.g. nests, feathers, bird excrement) should wear a mask and gloves to prevent contraction of mites and bacterial disease, particularly psittacosis.

Entry holes into the roof and any openings into the living space should be blocked and sealed. Fumigation of the whole roof space by a registered pest controller may be necessary, especially if the nesting material is inaccessible.

NOTE:

(1) Repellents containing more than 20% DEET should not be used on infants and young children.

(2) DEET should be used with caution during pregnancy.

Bedbugs

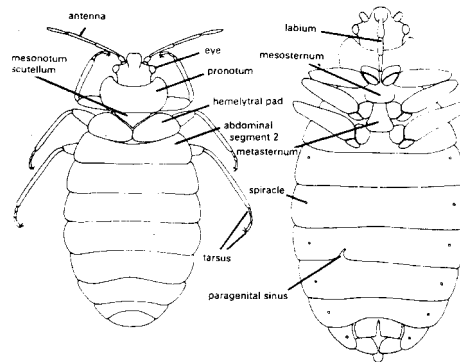


Figure 7: Female *Cimex lectularius* (Bedbug) Dorsal view (left). Ventral view (right)

(Adapted from Kettle, 1995).

Bedbugs (*Cimex lectularis*) are not usually associated with transmission of disease, but are annoying to humans because of the intense irritation caused by their bites.

Bedbugs (refer to Figure 7), are oval, wingless red brown coloured insects 5-6 mm long and 3 mm across. They are blood sucking insects which feed at night on any warm blooded animal but their most important host is humans. After a blood meal, bedbugs become expanded and purplish brown in colour. The intense irritation of the bites is often the first sign of an infestation.

They live and lay their eggs in folds and seams of bedding, cracks and crevices of furniture, skirtings, walls, loose wall-papers and floors, and in close proximity to human or animal sleeping areas. Small dark brown or black marks on mattresses and around crevices are indications of possible infestation. When bedbugs are squashed there is a distinctive odour.

A female bedbug can lay 200-500 eggs in her lifetime. She cements the eggs to rough surfaces in batches of up to 10 or more. The eggs hatch in 7 to 30 days and the emerging nymphs seek a blood meal in order to grow. They molt about 5 times before reaching adulthood.

Bedbugs and their eggs are sensitive to extremes in temperature and will not survive in environments above 36°C or below 9°C.

Bedbugs can survive for up to twelve months without feeding and can be transported from place to place in luggage, backpacks, sleeping bags, bedding and furniture. Frequent checks should be made in casual overnight lodging and boarding house accommodation.

Prevention & control measures

Unlike most insects, bed bugs spend most of their time in hiding. The extent of an infestation can therefore be determined by checking locations where bedbugs may live including any small crevices in floors, walls, furniture, skirting boards, door frames, picture rails and curtain rods. Also check seams and folds in bedding including under mattress buttons, under carpets and behind loose wallpaper. Mattresses should be removed in order to completely check bed frames.

Infested areas can be treated with an insecticide. See Table 4 (p27) for examples of appropriate insecticide preparations available for bedbug control. For heavily infested premises it may be advisable to engage a pest control operator.

Cleanliness is important for both prevention and control. Remove all visible dirt and vacuum the area. The contents of the vacuum cleaner should be sealed in a plastic bag and placed in a garbage container for removal. Infested mattresses should be vacuumed, sealed in black plastic and left in the hot sun for several hours.

It is also important to eliminate hiding places. This is done by fixing cracks and crevices, nailing closed skirting boards and generally ensuring walls and furniture are kept well maintained.

Ticks

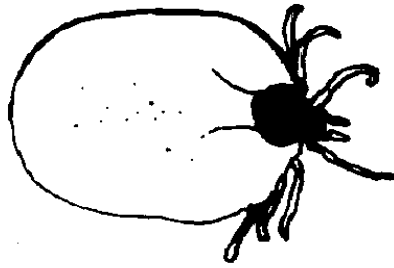


Figure 8: Female paralysis tick (*Ixodes holocyclus*)

(Adapted from: Buckett and Di Marco, 1997)

In Australia there are approximately 70 species of tick and they are often encountered in the Australian bush. Ticks can be divided into two families, the soft ticks (family, Argasidae) and the hard ticks (family, Ixodidae). The soft ticks have a wrinkled appearance and only a few species are found in Australia. Most of the ticks found in Australia are hard ticks. These have a hard dorsal plate and elongated mouth parts that have rows of backward pointing teeth.

The main medically important tick, the paralysis tick (refer to Figure 8), is found on the eastern coastline of Australia from Queensland to Victoria.

There are four developmental stages in the paralysis tick – egg, larva, nymph and adult. A blood meal is required between each stage. The life cycle is complete at 12 months and the continuity of growth depends on the tick obtaining a blood meal.

During feeding, a tick may extract up to 8 ml of blood and can take up to 100 times their body weight in blood. The adult female must have a blood meal before it can produce eggs. It can lay up to 3000 eggs, which hatch in 40-60 days, depending on temperature and humidity.

The adult body of the paralysis tick is 3 to 5 mm in length and it is pale brown in colour but the female becomes grey-blue after feeding. The female can also be distinguished by the size of the dorsal plate, which covers about one-third of the upper surface. In the male tick, the dorsal plate covers the entire upper body surface.

The female tick becomes attached to its host by inserting its sharp mouth parts. At the same time an anticoagulant substance is injected from the salivary glands of the tick; this prevents the coagulation of blood, which would cause the mouth parts to become clogged. It is this substance that is toxic to animals and can cause fatal paralysis.

When a tick has become gorged with blood, it falls from its host and shelters amongst foliage to digest the blood. It then waits and will attach to a new host, which may be a human or a native animal, that brushes against it.

Another prevalent tick species, is the kangaroo tick (*Amblyomma triguttatum*), which is found in many areas across drier inland parts of Australia where there is uncleared scrub and high populations of bush kangaroos. Kangaroo ticks will grip onto the skin of kangaroos and can also infest dogs, sheep and other animals, including humans. The bite of the kangaroo tick will cause less severe symptoms than the paralysis tick, although it can cause localized skin lesions.

Disease transmission

In most cases tick bites are uneventful but some can result in life threatening diseases including paralysis and tick typhus and can cause severe allergic reactions. The toxin released from the bite of the paralysis tick has killed many domestic animals, particularly cats and dogs, as well as causing discomfort and illness during summer.

Tick paralysis is most likely to be seen in children. The symptoms of tick paralysis may include an increased weakness of the limbs, multiple rashes, headache, fever, flu like symptoms and partial facial paralysis. There have been only a few cases of tick paralysis, and these have been mostly in children.

Tick typhus is an infection caused by the bacteria-like Rickettsia organism which is transmitted by Ixodid ticks as a vector from native animals (e.g. small marsupials and wild rodents). Clinical symptoms of the disease include headaches, multiple rashes, swollen glands, fever and flu-like symptoms. The disease is rarely fatal and can be treated with antibiotics.

Lyme disease, an infection caused by spirochete bacteria, has also been associated with ticks. Symptoms vary and include rashes, fever, muscle pain and arthritis. The disease is also treatable with antibiotics. Despite some clinical cases reported from the early 1980s, there is little evidence to suggest that the disease is prevalent in Australia.

Prevention & control measures

The best method of controlling and avoiding ticks, is to stay away from tick infested areas. Ticks remain outdoors and do not normally infest houses. People in fringe metropolitan suburbs and the country are most likely to be affected by ticks. To minimize the transmission of ticks, native animals (such as bush kangaroos and bandicoots) should be discouraged and the undergrowth should be reduced in these areas.

If visiting outdoor areas (i.e., bushwalking, camping or picnicking), light coloured clothing should be worn to detect ticks more easily. An insect repellent containing diethyl meta-toluamide (DEET) or dibutylphthalate (DBP) should also be applied or smeared onto clothing and skin before bush walking.

In the event of severe tick infestations it may be necessary to apply a pesticide treatment in some areas adjacent to the bush. Registered pesticides which can be used against ticks include fenthion, malathion and pyrethrins.

Children and pets should be examined for ticks after visiting a tick-infested area (e.g. bushland). All clothing should be removed and the body searched for ticks especially behind the ears and on the back of the head.

The tick should be removed as close to the skin's surface as possible with the aid of a fine pair of forceps using a firm grip. Caution should be taken not to grasp and pull the body of the tick as this can cause the tick to inject more toxin into the host. To minimize this from occurring, a small amount of petroleum jelly or repellent containing DEET can be applied onto the body of the tick to kill it prior to its removal from the skin. Any mouth parts which still remain embedded will eventually slough off. If there are any residual symptoms from the tick bite, it is recommended that a medical practitioner be consulted.

NOTE:

(1) Repellents containing more than 20% DEET should not be used on infants and young children.

(2) DEET should be used with caution during pregnancy.

References

- Buckett K.J., Di Marko P.N., 1997 "Pesticide use in schools and school grounds" National Environmental Health Forum Monographs. General Series No. 1. Published for the National Health Forum by the South Australian Health Commission (Department of Human Services).
- Burgess I., 1993 "The Function of a Repellent in Head Louse Control." *The Pharmaceutical Journal*, p. 674- 675, May
- Hadlington P., Gerozisis J., 1988 *Urban Pest Control*. New South Wales University Press.
- Maunder, J.W., 1991 "Strategic aspects of insecticide resistance in headlice". *J. Roy. Soc. Health* February, p. 24- 26.
- Kettle D.S., 1995 *Medical and Veterinary Entomology*, 2nd Edition. CAB International, Wallingford, U.K.
- Lee D.J., 1975 *Arthropod bites and stings: and other injurious effects*. School of Public Health and Tropical Medicine, University of Sydney.
- MIMS Australia, 1995 MIMS Annual Nineteenth Edition, Tien Wah Press, Singapore.
- Olkowski W., Daar S., Olkowski H., 1991 *Common-Sense Pest control*. Taunton Press, Newtown.
- Public and Environmental Health Act, 1987 and Regulations (SA)*.
- Reilly S., Cullen D., Davies M., 1985 "An outbreak of scabies in a hospital and community" *British Medical Journal* Vol. 291 October.
- South Australian Health Commission, 1992 *You've got what?! - Control of Infectious Diseases in Children and Adults.*, Communicable Disease Control Unit, Epidemiology Branch, Public and Environmental Health Division.
- Weinstein P., 1992 *Headlice - a guide to their natural history and management*. South Australian Health Commission.
- Queensland Health Fact Sheet, 1998; produced by the Child Health Project and Communicable Diseases Unit, Queensland Health Department.

Tables - Treatment products

Table 1: Lice - Head lice & Pubic lice

<i>Insecticide</i>	<i>Type of treatment</i>	<i>Type of chemical</i>	<i>Formulation</i>	<i>Comments</i>
Malathion (Maldison)	<i>Lotion or shampoo</i>	Organo-phosphorus	<i>0.5% or 1.0% (depending on formulation)</i>	Products are available from pharmacies without prescription.
Pyrethrin plus Piperonyl butoxide	<i>Shampoo, mousse or lotion</i>	Botanical extract plus synergist	<i>0.165% or greater</i>	Schools may be able to make bulk purchases to reduce treatment cost. See section on <i>Treatment</i> . Also refer to product label for information regarding application, treatment time and safety directions.
Permethrin Bioallethrin	<i>Lotion or mousse</i>	Synthetic pyrethroids	<i>1.0% 0.66%</i>	

NOTE: Medical advice should be sought before treating pregnant or lactating women or infants less than 24 months of age.

Table 2: Fleas

<i>Active ingredient</i>	<i>Type of treatment</i>	<i>Type of chemical</i>	<i>Formulation</i>	<i>Comments</i>
Propoxur	<i>Surface spray</i>	Carbamate	<i>Pre-mixed spray, emulsifiable concentrate, wettable powder</i>	
Propoxur	<i>Dust</i>	Carbamate	<i>Powder</i>	
Carbaryl	<i>Surface spray</i>	Carbamate	<i>Emulsifiable concentrate, wettable powder</i>	
Permethrin	<i>Surface spray</i>	Synthetic pyrethroid	<i>Wettable powder</i>	
Delta-methrin	<i>Surface spray</i>	Synthetic pyrethroid	<i>Suspension concentrate</i>	Available only in commercial quantities.
Dichlorvos	<i>Space spray</i>	Organo-phosphorus	<i>High pressure aerosol or mix for misting/fogging</i>	Cover plastics before spraying.
Pyrethrins with piperonyl butoxide	<i>Space spray</i>	Botanical extract plus synergist	<i>High pressure aerosol or mix for misting/fogging</i>	No residual effect - may need to be repeated.
Permethrin	<i>Dust</i>	Synthetic pyrethroid	<i>Powder</i>	Available in small packs for domestic applications.
Malathion	<i>Veterinary treatment</i>	Organo-phosphorus	<i>Liquid concentrate</i>	Use as directed.
Lufenuron	<i>Veterinary treatment</i>	Insect growth regulator	<i>Tablet</i>	Use as directed.
Methoprene with Permethrin	<i>Veterinary treatment</i>	Insect growth regulator plus synthetic pyrethroid	<i>Powder or shampoo</i>	Also available in a ready-to-use misting pack for carpets and areas. The insect growth regulator will give protection for several months.

Table 3: Scabies

<i>Type of treatment</i>	<i>Active ingredient</i>	<i>Type of chemical</i>	<i>Concentration</i>	<i>Comments</i>
Lotion	<i>Benzyl Benzoate</i>	Hydrocarbon	25% w/v	May cause skin irritation. Apply to a small area of skin. If tingling or pain is experienced try an alternative product.
Cream	<i>Permethrin</i>	Synthetic pyrethroid	5% w/w	

NOTE: Medical advice should be sought before treating pregnant or lactating women or infants less than 12 months of age.

Table 4: Bedbugs

<i>Type of treatment</i>	<i>Active ingredient</i>	<i>Type of chemical</i>	<i>Formulation</i>	<i>Comments</i>
Surface spray	<i>Propoxur</i>	Carbamate	<i>Pre-mixed spray, emulsifiable concentrate, wettable powder.</i>	
Surface spray	<i>Permethrin</i>	Synthetic pyrethroid	<i>Wettable powder</i>	Available in small packs for domestic applications.
Surface spray	<i>Malathion</i>	Organo-phosphorus	<i>Emulsifiable concentrate</i>	
Space spray	<i>Dichlorvos</i>	Organo-phosphorus	<i>High pressure aerosol or mix for misting/fogging.</i>	Cover plastics before spraying.
Space spray	<i>Pyrethrins with piperonyl butoxide</i>	Botanical extract plus synergist	<i>High pressure aerosol or mix for misting/fogging</i>	No residual effect - may need to be repeated.
Dust	<i>Permethrin</i>	Synthetic pyrethroid	<i>Powder</i>	Available in small packs for domestic applications.
Dust	<i>Propoxur</i>	Carbamate	<i>Powder</i>	

Appendix 1 ~ Contacts

South Australia

Child & Youth Health (formerly Child Adolescent and Family Health Service - CAFHS)

Information regarding management of headlice can be obtained from the Child & Youth Health Parent Helpline (ph. 1300 364 100) or from the local Child & Youth Health nurse.

S.A. Museum Information Centre

North Terrace, Adelaide SA 5000.

Phone: (08) 8207 7404 Facsimile: (08) 8207 7523

Public Health Units

South Australia

Environmental Health Branch, Department of Human Services

PO Box 6 Rundle Mall, Adelaide SA 5000.

Phone: (08) 8226 7100 Facsimile: (08) 8226 7102

New South Wales

NSW Department of Health

Locked Bag 961, North Sydney NSW 2059.

Phone: (02) 9391 9000 (Refer to local NSW Public Health Units)

Victoria

Environmental Health Unit, Department of Human Services

GPO Box 4057, Melbourne VIC 3001.

Phone: (03) 9616 7777 (switchboard)

Queensland

Environmental Health Unit, Queensland Health

GPO Box 48, Brisbane QLD 4001.

Phone: (07) 3234 0938 Facsimile: (07) 3234 1480

Tasmania

Public and Environmental Health Branch, Department of Community and Health Services

GPO Box 125B, Hobart TAS 7001.

Phone: (03) 6233 3762 Facsimile: (03) 6233 6620

Western Australia

Environmental Health Service, Health Department of Western Australia
PO Box 8172, Stirling Street, Perth WA 6849.
Phone: (08) 9388 4997 Facsimile: (08) 9388 4975

Northern Territory

Medical Entomology Branch, Territory Health Services
PO Box 40596, Casuarina NT 0811.
Phone: (08) 8922 8333 Facsimile: (08) 8922 8820

ACT

Health Protection Service, ACT Department of Health & Community Care
Frewin Place, Scullin ACT 2614
Phone: (02) 6205 1700 Facsimile: (02) 6205 1705

Appendix 2 ~ Legislation

Legal responsibilities

In different States and Territories, Public Health Consolidated Regulations (e.g. ACT Consolidated Regulations 1991- Public Health (General Sanitation) - Regulation 13; NSW Consolidated Regulations 1991- Public Health Regulation – Section 82), state that it is the responsibility of the occupier or owner to take reasonable measures to keep the premises free from disease-carrying insects and other vermin and remove those conditions which are favourable to their breeding and existence.

Section 12a. (2)(c)(ii) of the SA. Public & Environmental Health Act -1987, provides that it is the duty of a local council to take reasonable steps to prevent an infestation or spread of vermin or other pests within its area.

Section 43a (1) of the SA Public & Environmental Health Act - 1987 provides that a person infested with vermin (lice) must take all reasonable measures to prevent transmission to others. Non-compliance with the measures set out in this guide may be deemed to be a breach of the legislation and subject to a penalty as prescribed in Section 43a (1) and (2) of the Act. In the case of a child, the parent is responsible and could be liable for a penalty if reasonable measures are not taken.

For the purposes of that legislation, reasonable measures include:

- effective treatment as recommended, *or*
- a medical certificate presented on return to school or a childcare centre confirming that the child is free of infestation.

Definitions - S.A. Public and Environmental Health Act - 1987

<i>the Act</i>	means the Public and Environmental Health Act - 1987.
<i>authorized officer</i>	means a person holding an appointment as an authorized officer under Part 11 of the Public and Environmental Health Act.
<i>child</i>	means a person under the age of 16 years, as defined by the Act.
<i>parent</i>	means a person who is directly responsible for the care of a child.
<i>reasonable measures</i>	include effective treatment as outlined in this guideline or a medical certificate confirming that the individual is free of infestation of headlice.
<i>the Regulations</i>	means the Public and Environmental Health Regulations, 1991.
<i>vermin</i>	includes lice, fleas, mites and bedbugs as defined by the Act.

Appendix 3 - Relevant publications

South Australian Health Commission (SAHC), Department of Human Services - Publications

The South Australian Health Commission publication “Headlice facts”

The reference document: Weinstein, P., 1992 *Headlice - A guide to their natural history and management*, available from the South Australian Health Commission.

SAHC Publication; *You’ve got what?! - Control of Infectious Diseases in Children and Adults*, 1992, available from the Communicable Disease Control Branch, SAHC.

Health Department of Western Australian

Breaking the Cycle – A Guide for community nurses on managing headlice, 1998, available from Disease Control Services, Health Department of Western Australia.