

# Eradicating head lice in a nursing home

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Pediculosis is usually thought of as an infection of childhood. However, any adult who has head to head contact with a person infected with head lice is at risk of acquiring the infection. The elderly occasionally acquire head lice, usually from grandchildren, and in this age group, pediculosis can sometimes become quite severe. In this report we describe a pediculosis epidemic in a nursing home in north Queensland and its control by use of effective management and treatment strategies. The infection was detected in an index case admitted to hospital and the parasitosis was traced back to the nursing home. The episode didn't finish until after the cure of a very resistant case of pediculosis in a child who frequently visited the nursing home.

## Case report: the initial case

Mrs NF, a 57 year old resident of a nursing home was admitted to a public hospital for medical reasons. Hospital nursing staff detected active pediculosis (lice infestation) and administered treatment with 0.2% permethrin lotion (Orange Medic, Emerald Forest Pty Ltd) on four occasions over 2 days, followed by a 1% permethrin lotion (Quellada Creme Rinse, Stafford-Miller). They noted minimal killing effect on the lice. Examination 4 hours after the Quellada treatment produced live lice, indicating that the infection was resistant to permethrin. A herbal head lice lotion, Lice Blaster (Emerald Forest Pharmaceuticals

Pty Ltd) which is a leading product for this condition in north Queensland was applied to coat all scalp hairs from root to tip, left in situ for 20 minutes and then combed off using a plastic fine tooth comb, and the product wiped onto paper tissue. Resistant cases to this product had not previously been found. Many dead lice and three immobilised lice were recovered from the combings 20 minutes after application. 'Immobilised' lice are not dead, but are showing signs of toxicity and unable to walk. 'Immobilised' lice usually die within 1 hour of removal from the head. A further application of Lice Blaster was made 2 days later, and one 2nd instar nymph (head lice have three juvenile stages called nymphs [Figure 1]) was collected in the combings. The standard retreatment schedule was accelerated in this case from 7 days to 2 days since the patient was due for transfer to another hospital. In subsequent examinations of Mrs NF at the second hospital the nursing staff did not detect head lice.

## Contact tracing in the nursing home

Pediculosis had been noted at Mrs NF's nursing home over the previous 12 months, and individual residents had been treated with a range of topical preparations including permethrin and benzyl benzoate. Two weeks after Mrs NF's problem was detected, all residents of the same nursing home were examined

visually using a light to detect any evidence of pediculosis, active or inactive. Of 20 residents aged between 8 and 60 years, five (25%) had signs of pediculosis. Four were treated topically with Lice Blaster. One (UD) refused either topical treatment or a detailed examination although on cursory examination old hatched eggs were obvious. Of the four treated topically, one (TO) had an inactive infection with eggs only, while the remaining three had active infections with lice (Table 1). Lice Blaster killed or immobilised all lice in these three patients. On retreatment at day 7, no lice were recovered from patient FB, while instars were recovered from patient BN. These had hatched from eggs after the initial treatment. On retreatment of the latter patient at day 14, no lice or viable eggs were detected. The third patient (XB) with active pediculosis was unavailable for retreatment on day 7 since she had been admitted to hospital for management of medical problems. On examination of this patient on day 14, no lice or viable eggs were detected. No special environmental measures such as increased cleaning or laundry activities were initiated at the home.

Patient (UD) who had refused topical treatment and detailed examination, but was willing to accept oral medication, was prescribed 12 mg of ivermectin [Stromectol, Merck Sharp and Dohme (Aust) Pty Ltd] at 0.2 mg/kg orally. Oral ivermectin has been recently used in the USA for the

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**Figure 1.** First instar nymph of head louse (*Pediculus humanus capitis*) as seen with a scanning electron microscope. Head lice have three juvenile stages, 1st, 2nd and 3rd instar nymphs. The 1st instar nymph shown here has recently hatched from the egg and is about 1 mm in length.

treatment of persistent pediculosis.<sup>1</sup> When examined at day 7 this patient had old hatched eggs in her hair about 5 cm from the scalp, but no evidence of live lice or newly laid eggs. Eighteen months after this control program the nursing home has had no further cases of pediculosis.

### Contact tracing outside nursing home

One of the nursing staff reported that her 13 year old daughter (SN) had pediculosis which was only noticed after the pediculosis outbreak had occurred in the nursing home; the child often visited the home. The pediculosis had been treated with all commercially available head lice products over this period without cure. Three treatments with Lice Blaster were required to cure the case.

### Discussion

Mrs NF had lice resistant to permethrin. Resistance of head lice to insecticides is not uncommon in Australia, and the efficacy of each application can be monitored using a practical technique.<sup>2</sup> Twenty minutes after application of the product, the liquid is combed from the hair with a fine tooth comb, wiped onto

paper tissue, and the activity of the lice observed. If sensitive to the product, lice should be dead after 20 minutes.<sup>3</sup> Resistant lice remain active. The first treatment kills mobile lice ('climbers') while the second, 7 days later kills instars (the nymph stage) that have hatched from eggs.

This case illustrates that pediculosis can become a problem in nursing homes, and that control of pediculosis in nursing homes must be done systematically. The key components are simultaneous screening of all residents, simultaneous use of effective treatment strategies, and detection of possible sources of reinfection. Environmental measures such as washing clothes and sheets and vigorous cleaning of rooms and seating are of little importance in control of pediculosis. The value of contact tracing for management of head lice is demonstrated in this report with the index case in hospital leading to the nursing home where a problem with pediculosis had been present for about a year. The trail then led to the child with long standing pediculosis.

The elements of an effective treatment strategy were:

- use of a minimum of two topical treatments 7 days apart;
- monitoring of each treatment for resistance; and
- use of an effective head lice product.

A minimum of two treatments are essential in each case of pediculosis because no product is 100% ovicidal.<sup>4</sup> Cases NF and BN illustrated the necessity to use two treatments; the first treatment killed adults and nymphs while the second treatment killed nymphs hatched from eggs in the period between treatments. Case SN illustrated that some cases need more than two treatments. SN had long, thick hair (about 40 cm), and, although her story is typical of insecticide resistant pediculosis, part of the reason for treatment failure in the past may have been inadequate application of products.

Resistance of head lice to insecticides is currently not uncommon, and by monitoring the efficacy of each application as described, one can determine whether lice are sensitive or resistant to the formulation used. Lice from the index case were resistant to permethrin *in vivo*, and the child from her history appeared to have insecticide resistant lice. Lice in all cases reported here were sensitive to Lice Blaster, a product listed with the Therapeutic Goods Administration in 1998 as a herbal treatment (L63221). Lice Blaster contains multiple herbal actives including tanacetum cinerifolium flower (natural pyrethrin), adhatoda vasica leaf, stemona sessifolia root, echinacea purpurea herb flower and melaleuca oil. Proper assessment of the efficacy of Lice Blaster will require double blind therapeutic trials, but early results are very encouraging.

The patient UD, who had many hatched eggs (nits) in her hair initially did not allow detailed examination to determine her infection status. Since she refused topical treatment, she could potentially have caused the eradication campaign to fail. However, by using oral ivermectin we were able to offer her an

**Table 1. Details of cases with pediculosis**

Case ID	Status of pediculosis	Treatment	Stages of <i>P. humanus capitis</i> collected at first treatment	Result
NF	active	Lice Blaster x 2	Adult lice and instars	Cured after 2 treatments
BN	active	Lice Blaster x 3	Adult lice and instars	Cured after 2 treatments
XB	active	Lice Blaster x 1	Instars	Cured after 1 treatment
FB	active	Lice Blaster x 1	Instars and nits	Cured after 1 treatment
TO	inactive	Lice Blaster x 1	Nits and dead eggs only	Already cured; treatment unnecessary
UD	Possibly active	Stromectol x 1	Nits	Cured when examined at day 12
SN	active	Lice Blaster x 4	Adult lice and instars	Cured after 3 treatments

effective and acceptable treatment, and to remove a potential cause of failure of the overall eradication campaign. Ivermectin is the most effective oral therapy for pediculosis. A single dose of ivermectin at 0.2 mg/kg may be effective if eggs are removed at the same time.<sup>1</sup> In some cases two doses of ivermectin may be required; the recommended optimum time to give the second dose varies from 2 days<sup>1</sup> to 10 days.<sup>5</sup> However, in the case reported here 0.2 mg/kg of ivermectin as a single oral dose may have been effective in a patient who refused to allow topical treatment.

Additional data on head lice and their management are available at <http://www.jcu.edu.au/school/phtm/PHTM/hlice/hlinfo1.htm>.

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