Pediculus capitis: the prevention and treatment of head lice

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ABSTRACT

Constant outbreaks of head lice cause immense social disruption in school, and their management drains professional and parental resources. In this article, the two different types of treatment options that may be prescribed for head lice, insecticide medicine and the Bug Buster Kit, will be discussed. The importance of treating head lice within a strategy for prevention will also be explored.

Historically the involvement of health professionals in the control of head lice has been nurse-led in the UK. One of the concerns of the early health visitors and district nurses was to 'cleanse' the disadvantaged of *Pediculus capitis* in order to prevent the spread of what was regarded as a shameful parasite (Board of Education, 1910). The entitlement of children to free treatment was introduced under the Education Act 1918 and continued when the NHS was established (Board of Education, 1949). With this background, it is unsurprising that treatments for head lice are included in the Nurse Prescribers' Formulary. This article will focus on the management of treatment within the wider context of a strategy for prevention.

Epidemiology of pediculosis capitis

Anyone with head hair can catch pediculosis capitis (infestation with head lice). They are nearly always caught during close head-to-head contact. This parasitic insect spends its entire life-cycle on human heads and the sociability of people governs its distribution. The most commonly affected groups are nursery and primary school children, and their families and carers (Ibarra, 1998). Studies made from 1986 to 1991 show that around 80% of cases occur in those aged 4–16 years, with the incidence of head lice peaking between the ages of 7 and 11 years (Ibarra, 1998). Calls to the Community Hygiene Concern (CHC) helpline suggest that currently this same distribution is accompanied by a rising frequency among younger children as day-care provision for pre-school children extends.

In the absence of more accurate statistics, the best guide to incidence is the number of doses (single treatments) of insecticide medicine used in a year. Calculations based on sales figures indicate that this rose from about 3 million in 1989 (Anon,1990) to 10 million in 1998 (Purcell, 1998). On average, every eighteenth member of the population received treatment for head lice in 1989, which rose steadily to every sixth person in 1998, a level which continued in 2002 (Keller-Henman, 2002; Intercontinental Medical Statistics, personal communication). However, most treatment is going on to the heads of children and it is known that recurring infestation in the same individual child is common (Ibarra, 1989). In 2002, the NHS paid £11.5 million for half of the insecticide medicines used, while the general public paid a further £16 million buying the rest over the counter (OTC) at a higher price per unit (Keller-Henman, 2002; Intercontinental Medical Statistics, personal communication).

The stigma that catching head lice is associated with a lack of cleanliness still persists despite assurances to the public that this is not true. Constant outbreaks among nursery and school children cause immense social disruption and are a significant drain on both professional and parental resources.

Treatment

Lice, their eggs and empty eggshells may be present in the head hair. Pediculosis is sometimes referred to colloquially as 'nits', but strictly speaking only the empty eggshell is a nit, which is harmless. Nevertheless, in school the shunning of children with a noticeable burden of nits, is by no means trivial. Successful treatment must kill the lice and eggs. Nit removal is also required when they are obvious to avoid embarrassment, but this is not a louse control measure.

Pediculosis capitis has long been considered an adverse medical condition by the regulatory authorities, represented today by the Medicines and Healthcare products Regulatory Agency (MHRA) (2003). According to EU and UK law, any substance or combination of substances that is presented as a product to treat head lice must obtain a medicine licence before it may be marketed (EU Directive

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2001/83/EEC (article 1); EU Marketing Authorisations, Regulations 1994 (S.I. 1994/3144)). because any formulation intended to kill or disable insects is potentially toxic to humans. Licensed medicines for the treatment of head lice are 'pharmacy only' (P) or 'prescription only' (POM) medicines, which must be dispensed by a pharmacist. To obtain a UK licence, a product must satisfy the MHRA that it is safe and effective. Head lice rarely cause symptoms of medical importance, but repeated treatment of an individual in an attempt to achieve a cure can be harmful.

The treatment products in the current Nurse Prescribers' Formulary and their NHS prices are listed in *Table 1*. The 48th edition of the *British National Formulary* (*BNF*) (Joint Formulary Committee, 2004) makes it clear that a second application of treatment, one week after the first, is an unlicensed use of the product. Therefore health providers who recommend this assume an extra responsibility of care.

The supporting evidence for medicinal preparations (insecticide medicines)

Clinical evaluations have highlighted the failure rates of some medicinal preparations because of louse resistance. For example, malathion has a resistance rate of 22–64% (Roberts et al, 2000; Downs et al, 1999) and permethrin and phenothrin have a resistance rate of up to 87% (Downs et al, 1999; Plastow et al, 2001). Downs et al (2002) have also showed emerging carbaryl resistance.

Products containing carbaryl were restricted to POMs from 1996 because of a link to cancer (Calman et al, 1995). A recommendation to limit the application of products containing malathion, phenothrin and carbaryl to a maximum of three doses, once a week, over three consecutive weeks has been introduced into their instruction sheets. Lyclear (permethrin) instructions now state that 'continual repetitive treatment should be avoided'. Aqueous formulations are preferable to alcoholic ones for patients with asthma because the latter give off fumes that can trigger an attack. Aqueous formulations are also less likely to cause a flare-up in patients prone to eczema on the head.

Recently the MHRA has allowed formulated products (e.g. conditioners and solutions) 'presented as facilitating the use of a fine-tooth comb for the removal of lice and/or nits', to be regarded as accessories to medical devices. Such products may be sold off the shelf. The dangers of this move have been demonstrated by the case reports of 15 patients using a plant enzyme product, apparently classed as a medical device, called Not Nice to Lice. These patients suffered adverse ocular effects, including corneal abrasion in seven cases (Fraunfelder et al, 2003).

Table 1

Treatments listed in the current nurse prescribers' formulary

Medicinal Preparations	Proprietary product names listed in BNF section 13.10.4	NHS price single unit
Malathion alcoholic lotions containing at least 0.5%	Prioderm Lotion Suleo-M Lotion	£2.22 £2.22
Malathion aqueous lotions containing at least 0.5%	Derbac-M Liquid Quellada M Liquid	£2.22 £1.85
Permethrin 1% creme rinse	Lyclear Creme Rinse	£2.38
Phenothrin 0.2% alcoholic lotion	Full Marks Lotion	£2.22
Phenothrin 0.5% aqueous lotion	Full Marks Liquid	£2.22
Phenothrin 0.5% foam application	Full Marks Mousse	£2.44
Appliances (Medical Devices): Head Lice Device as listed in Part IXA of the Drug Tariff (Part 3 of the Scottish Drug Tariff, Part III of the Northern Ireland Drug Tariff)	Bug Buster Kit	£4.31 Re-usable for detection and eradication
Treatments on the Nurse Prescribers' Extended Formulary: Carbaryl 1% aqueous lotion	Carylderm Liquid	£2.28
Carbaryl 0.5% alcoholic lotion	Carylderm Lotion	£2.28

Source: Joint Formulary Committee (2004)

A registered medical device must display a CE mark, but many products with ingredients of plant origin also place the mark on the formulation bottle. Some examples are Nitty Gritty Head Lice Solution, Nice 'n Clear and Lice Attack which are widely available in pharmacies, health stores and supermarkets. Their instructions for use suggest that the formulation kills lice and sometimes eggs. They are sold to parents seeking a safe and effective treatment, in the belief that 'natural' means 'safe' and that these products are appropriately regulated. It is concerning that a popular ingredient, tea tree essential oil, is known to be more neurotoxic volume for volume than the synthetic pesticides in current use (Hill, 2001; Tisser and and Balacs, 1995). Mills et al (2004) have confirmed the inhibition of acetylcholinesterase by tea tree oil. The potency of plant extracts is difficult to standardize and the residues of agricultural pesticides used during cultivation can remain in plant derivatives (Lino et al, 1999). There is inadequate evidence of the safety and efficacy of natural preparations, which should be used with caution.

Lapeere et al (2003) call for the establishment of uniform standards against which the efficacy and safety of all products used in head louse control can be measured. Downs (2004) urges that drug companies should be obliged to provide data on the current efficacy of their products.

The supporting evidence for the Bug Buster Kit (mechanical treatment)

Wet combing, to detect a low level of lice in the absence of itching, was first introduced by Ibarra (1988) who observed that thoroughly wet lice stay still. It was developed thereafter by the health charity CHC, under the name of Bug Busting. Lice are difficult to see on the head but, CHC proposed, it is necessary to detect a louse to prove that treatment is needed (Ibarra and Hill, 1994), a precaution which is now widely recognized. Finding egg-like structures on hairs is open to misinterpretation, e.g. they may be perceived as live eggs, dead eggs, empty eggshells, or a scalp secretion wrapped round the hair. However, if the detection method used is not accurate, some active cases will be missed and continue to spread lice.

Traditional visual inspection results in too many false negatives (i.e. cases of head lice that are not identified) and false positives (i.e. cases where there are no active lice, but which are diagnosed as positive because of, for example, the presence of empty eggshells) (De Maeseneer et al, 2000). Fine-tooth combing dry hair is preferable but has its drawbacks because lice move rapidly away from disturbance in dry hair, evading the teeth of the comb. Burgess (1997) recommends 'placing a thumb over any suspect object before the comb is withdrawn from the hair. This prevents lice from being lost before they are identified'. But it also means that a louse must first be spotted in the hair and the procedure is tricky to perform. Bug Busting wet combing is a more accurate method for parents because the lice are temporarily immobilized by moisture and become readily visible as the strokes of the comb lift them motionless from the hair. It is also valid for curly and frizzy hair because the use of conditioner on hair that has been washed with shampoo facilitates straightening of the hair. These hair types cannot be thoroughly fine-tooth combed when dry.

The 1998 Bug Buster comb was designed expressly for louse detection. The leading edge of the teeth is deeply bevelled, ideal for slotting underneath lice in the hair roots, and it has the optimum tooth spacing to trap newly hatched lice (1 mm long) while still allowing comfortable passage through the hair. Lice caught by the comb are removed with ease by wiping it on kitchen paper or rinsing.

Many years of CHC work in the field with families infested with head lice, shows that the all-purpose 'nit' comb is a relatively poor tool for louse detection and removal. The tight tooth spacing of all metal nit combs makes them difficult to clean. Lice caught there remain unnoticed against the metal and may be combed back undamaged onto the hair at subsequent strokes. Additionally, rounded teeth on both plastic and metal combs miss lice and viable eggs close to the scalp. Most nit combs are only helpful for nit removal, i.e. the removal of empty eggshells after the head is louse free (Ibarra,1998; Ibarra et al, 2002). Before using the Bug Buster comb (*Figure 1*), the hair must be washed with ordinary shampoo, rinsed, hair conditioner applied and combed through with a wide-tooth comb. The time that the conditioner remains on the head is closely related to hair type. Short, straight hair is quicker to prepare and to fine-tooth comb than long, curly hair. After the conditioner is rinsed off, it is essential to comb the wet hair again with the Bug Buster comb as a fail-safe. The Nit Buster comb can then be used to gently sweep off any unsightly eggshells. Owing to the high failure rate of licensed

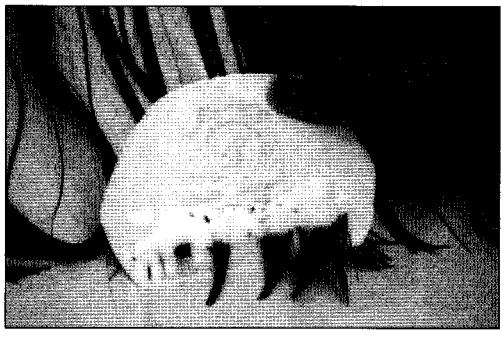

Figure 1. The Bug Buster comb

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medicines for head lice, a thorough check for lice (e.g. Bug Busting wet combing) is recommended after their use to find out if treatment has been successful (Department of Health (DH), 2000).

In 1995, CHC launched a pilot Bug Buster Kit. Patients are recommended to use the kit four times systematically over a period of 2 weeks (days 1, 5, 9 and 13), to remove an infestation before the lice can spread or lay new eggs (Ibarra and Hall, 1996). Removing large numbers does not involve much more effort than the detection of a light infestation because the comb takes off a larger number of lice at each stroke. The patient is not contagious between sessions. Actual size illustrations of the three nymph and full-grown stages of head lice are printed on the packaging and in the instructions of the Bug Buster Kit.

An accompanying booklet explains that the incubation period of head louse eggs lasts up to 10 days, and that the nymph stages generally remain on the head where the eggs are laid. However, full-grown lice, which develop in a minimum of 6 days, readily move between heads. Users are expected to remove all hatched lice on the head at the first combing session, and the nymphs that hatch from the eggs at the next three sessions, before they become full-grown. If any full-grown lice are found after the first session, they must be assumed to be evidence of re-infestation and the carer must continue combing for a further three sessions from the date of their detection, on the assumption that a new generation of eggs will have been laid. Anecdotal evidence has suggested that parents find the comb and the knowledge of how to use it empowering.

Plastow et al (2001) conducted a pilot randomized controlled trial of the remodelled Bug Buster Kit (containing the 1998 Bug Buster comb). Community nurses achieved a 53% success rate at day 14. At that point the participant families took over and achieved a 100% success rate by day 24, using it half-weekly. This demonstration that the Bug Buster Kit can be a low cost, sustainable solution to the head louse problem was instrumental in it becoming available on NHS prescription. The participating children cooperated willingly, which concurs with CHC experience, with a minority of exceptions. The results of this study relate to the 1998 comb and the full information on the precise method of use provided in the Bug Buster Kit; they do not confer a blanket endorsement on the many confused, abbreviated and vague wet combing methods that have been recommended from 1995 onwards, without sufficient testing.

How to prescribe a Bug Buster Kit

Only one kit per family is necessary because it is reusable. 'Bug Buster Kit' must be written on the prescription to enable the pharmacy to identify the item with a note to telephone 020 7686 4321 for supplies. The Bug Buster Kit is a non-profit supply direct from the charity CHC, and is not available through pharmacy wholesalers. Health centres can also buy a copy of a demonstration video from the same source (*Box 1*).

Management of treatment in the context of prevention

Most parents hasten to treat their children as soon as lice become noticeable. It is an unpleasant surprise for those new to the problem and their expectation is that modern technology will provide a 'quick fix'. Although Lyclear Creme Rinse and Full Marks Mousse are no longer recommended in the *BNF* (Joint Formulary Committee, 2004), the manufacturer of Lyclear Creme Rinse is still permitted to claim that a 10-minute application is a 'fast, effective treatment of head lice and their eggs' on the packet, while the manufacturer of Full Marks Mousse is allowed to claim that it produces 'dead lice and eggs' after a 30 minute application. These products are widely advertised to the general public in popular magazines and on TV and may be purchased OTC in pharmacies. Parents become very upset when they do not work, especially after paying 'good money' for them. Moreover, in many cases, infestation consists of 10 or less asymptomatic but contagious lice (Mellanby, 1942). This results in treated children coming into immediate contact with undiagnosed cases and re-infestation often occurs.

It was demonstrated in the 1970s that coordinated detection by thorough inspection of everyone at risk reduces prevalence dramatically (Donaldson, 1979). Failure to apply the principles then established has led to the expensive, piecemeal use of three groups of insecticide, allowing lice to become resistant to them.

Health providers have a duty of care, which is complicated to fulfil in relation to families continually plagued with lice. The nurse prescriber is likely to be involved with families who depend on free prescriptions and most will visit a pharmacy to obtain treatments, whether on prescription or OTC. In some

Box 1

Resources

Bug Buster Kits and the demonstration video can be purchased from Community Hygiene Concern, by calling **020 7686 4321** or online at **www.chc.org/bugbusting.**

For information on the Bug Buster Teaching Pack send 3 x 2nd class stamps loose, plus a self-addressed label to:
Community Hygiene Concern, Manor Gardens Centre,
6-9 Manor Gardens, London N7 6LA

areas, parents are supplied with free treatment by pharmacies running minor ailment schemes.

Government policy on head lice

It is the policy of the NHS to work towards informed self-management of head lice. In the view of both the DH and the Department for Education and Skills, the 'whole school approach' offers the best strategy to prevent head lice from circulating. This approach, developed and resourced by the CHC, is a form of delivery of the National Healthy School Standard which is part of the government's strategy to raise educational achievement and address inequalities. Participating schools use a curriculum-linked Bug Busting teaching pack and pupils are able to take the message home. Parents are encouraged to purchase a Bug Buster Kit and to use it to detect head lice in their families in united action on national Bug Busting Days on 31 January, 15 June and 31 October each year.

Conclusions

Community nurses, who tend to bear the brunt of parental distress about head lice, are nurse prescribers and, with increasing numbers of extended and supplementary prescribers, the range of nurses able to prescribe for head lice will also grow. Therefore, it is an appropriate time for primary care trusts to review policy in order to ensure coherence and continuity of care and to make economic use of resources, in liaison with schools.

Nurses and health visitors should encourage parents to acquire a Bug Buster Kit and use it to check their children regularly from the time they mix with others. Pharmacies should also be encouraged to stock the Bug Buster Kit, not solely to fill prescriptions promptly, but to sell off the shelf. The advent of the Bug Busting programme frees the school nurse of the 'nit nurse' image. The futility of conducting head inspections in school is explained in the programme educational resources, such as the demonstration video, which the nurse can show routinely at new parent induction days. Teaching Bug Busting techniques to disadvantaged families can open up communications and establish trust, a pathway for other important health promotion.

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Conflict of interest:
Joanna Ibarra is Coordinator for the charity Community Hygiene Concern which runs the not-for-profit Bug Busting programme

KEY POINTS

- **Medicines for head lice should not be prescribed without confirming the diagnosis accurately**
- **Bug Busting wet combing is a reliable detection method**
- **Insecticide medicines have a high failure rate**
- **The Bug Buster Kit may be used systematically for mechanical removal**