

The management of scabies outbreaks in residential care facilities for the elderly in England: a review of current health protection guidelines

L. C. J. WHITE^{1*}, S. LANZA¹, J. MIDDLETON¹, K. HEWITT²,
L. FREIRE-MORAN¹, C. EDGE², M. NICHOLLS², J. RAJAN-IYER² AND
J. A. CASSELL²

¹Department of Primary Care and Public Health, Brighton and Sussex Medical School, Falmer, Brighton, UK

²Surrey and Sussex Health Protection Team (Public Health England South East Centre), Horsham, UK

Received 3 February 2016; Final revision 2 July 2016; Accepted 13 July 2016;
first published online 8 August 2016

SUMMARY

Commonly thought of as a disease of poverty and overcrowding in resource-poor settings globally, scabies is also an important public health issue in residential care facilities for the elderly (RCFE) in high-income countries such as the UK. We compared and contrasted current local Health Protection Team (HPT) guidelines for the management of scabies outbreaks in RCFE throughout England. We performed content analysis on 20 guidelines, and used this to create a quantitative report of their variation in key dimensions. Although the guidelines were generally consistent on issues such as the treatment protocols for individual patients, there was substantial variation in their recommendations regarding the prophylactic treatment of contacts, infection control measures and the roles and responsibilities of individual stakeholders. Most guidelines did not adequately address the logistical challenges associated with mass treatment in this setting. We conclude that the heterogeneous nature of the guidelines reviewed is an argument in favour of national guidelines being produced.

Key words: Elderly medicine, infectious disease control, outbreaks, residential care, scabies.

INTRODUCTION

Scabies, a dermatological condition caused by a reaction to the mite *Sarcoptes scabiei*, is an important public health issue in residential care facilities for the elderly (RCFE) in high-income countries such as the UK [1–5]. Scabies mites burrow into the human epidermis and provoke a delayed hypersensitivity reaction to mite antigens that appears 4–6 weeks following the initial infection, or within a week

following repeat infection [5, 6]. This reaction typically consists of an erythematous papular rash, accompanied by severe and persistent itching, that is characteristically worst at night. Scabies is transmitted by close personal and sexual contact and less commonly through fomites [5]. As well as being a debilitating cause of morbidity, the elderly, young and immunosuppressed are particularly vulnerable to complications of scabies, such as superimposed secondary bacterial infection [4, 5].

The global prevalence of scabies was estimated at 66 million in 2013 [7]. This is likely to be an underestimate, and also hides a notably higher prevalence in vulnerable communities [8]. These include low-income and marginalized communities, where prevalence

* Author for correspondence: Ms. L. C. J. White, Scabies Research Project, Department of Primary Care and Public Health, Brighton and Sussex Medical School, Room 323, Mayfield House, Falmer BN1 9PH, UK
(Email: L.White1@uni.bsms.ac.uk)

rates can be as high as 60%, and in institutions such as prisons or healthcare facilities [3, 9]. A recent review of institutional scabies outbreaks globally found that 48% of outbreaks occurred in RCFE [8], which we here define as residential facilities providing long-term care to elderly people who are not able to care for themselves.

RCFE are at particular risk of scabies outbreaks due to their high population density, staff providing personal care to a large number of residents, and the less familiar way that scabies can present in older age groups [10]. For example, elderly patients with scabies may present with lesions primarily on the trunk and back, rather than the classical locations: interdigital webs, wrist flexors and elbows [6, 10]. There is also an increased prevalence of the rarer and highly contagious crusted (Norwegian) scabies variant in frail, immunocompromised or neurocognitively impaired patients. These patients can present with hyperkeratotic scaling anywhere on the body and are less likely to present with itching [1, 10, 11]. Lesions are highly infested with mites and the shedding of hyperinfested skin scales makes fomite transmission more pronounced in this variant [3]. Both of these presentations may be unexpected and under-recognized, increasing the risk of further transmission and of outbreaks [10, 12, 13]. The management of scabies outbreaks in these settings generally involves the treatment of symptomatic cases as well as their often asymptomatic close contacts. This often requires the simultaneous mass treatment of all residents and staff, as well as their family members, sexual contacts and regular visitors [14]. Treatments used globally include topical acaricides such as lindane, permethrin, benzyl benzoate, crotamiton, sulfur, malathion, and oral ivermectin, a broad spectrum antiparasitic [8].

In the UK, the mean prevalence of scabies is estimated at 2–3/1000 population [15]. This prevalence peaks in the very young and the very elderly, the latter reflecting the number of people in that age group that live in RCFE, where outbreaks are common [1–3, 15]. Recommended treatment involves the application of topical permethrin or malathion to the entire body for a period of 8–24 h before washing it off, and sometimes additional environmental decontamination is advised [1, 14, 16]. This is a substantial undertaking in RCFE and can be stressful, time consuming and a significant drain on resources [1, 2]. Oral ivermectin is recommended only for treatment-resistant crusted scabies [16].

Public Health England (PHE) is an executive agency of the Department of Health, which has nine local centres. Each centre includes one or more Health Protection Team (HPT) which delivers front-line health protection services. The Department of Health recommends that facilities report all scabies outbreaks to the local HPT to assist them with the logistical difficulties involved in outbreak management [1, 2, 17]. Currently PHE (via HPTs) shares the responsibility to produce plans for the management of local outbreaks of infectious disease with local authority (local government in the form of a council or borough) and, where appropriate, local National Health Service (NHS) trusts through NHS Infection Control Teams (ICTs) [18, 19]. This shared model means that how outbreaks are handled can vary by region and care facility. There are currently no national public health guidelines for the management of scabies along the lines of those produced for other diseases such as measles [20].

We aimed to provide an overview of the current HPT guidelines for the management of scabies outbreaks in RCFE in England and to compare and contrast their scope and content, with a view to informing future policy and guidance.

METHODS

Design

We undertook a mixed methods review of local guidelines for the management of scabies outbreaks in RCFE across England. Twenty-four HPTs operational at the time of review (July 2015) were invited by telephone and email to supply a copy of their guidelines.

Selection

Guidelines were defined as any documents used by a HPT to guide their response to scabies outbreaks in a RCFE, combined with any additional resources that they used to help formulate their support and advice. All guidelines currently in use were eligible for inclusion regardless of date, length or nature, to provide an accurate representation of the geographical variation in outbreak management. All supplementary materials, appendices and references provided were included for review.

Analysis

An independent reviewer undertook a mixed methods content analysis of the guidelines provided. A mixture of *a priori* codes such as ‘clinical features’ and descriptive codes emerging from the data such as ‘barriers to staff purchasing own treatment’ were extracted from the text (Supplementary Table S1). Code frequency was tallied using Microsoft Excel (Microsoft Corp., USA), and used to describe the variation between the guidelines.

RESULTS

Twenty-four (100%) HPTs responded, of which four had not produced guidelines, and instead relied upon expert advice from within local ICTs to manage scabies outbreaks in RCFE in their area. The remaining 20 HPTs provided guidelines that ranged from 2–44 pages long, with the most recent review date ranging from 2007 to 2015. Three were identical, and one was a previous version of the current guidelines used by another area. A summary of the variation between guidelines in key dimensions is presented in Table 1.

Diagnosis and treatment

Guidelines were most similar in their descriptions of the clinical features of classical scabies. The more unusual presentations of scabies in the elderly, including crusted scabies, were less well described. Three (15%) guidelines included additional classifications of scabies, ‘atypical scabies’ and ‘pseudo-scabies’, the latter being defined as a less drug responsive condition not caused by the human mite. The description of the incubation period of scabies varied substantially, with suggestions ranging from ‘2–4 weeks’ to ‘2 months’.

Guidelines were consistent on the use of topical permethrin 5% and/or malathion 0.5% in the treatment of classical scabies. The recommended role of oral ivermectin was more varied. Nine (45%) recommended its use in classical scabies, although this recommendation mostly appeared in supplementary algorithms rather than within the main guideline text. Twelve (60%) recommended ivermectin use in treatment-resistant crusted scabies. One (5%) guideline advised caution in the use of ivermectin in the elderly, citing a study by Barkwell & Shields that warned of the risk of death with use of ivermectin in this population [21]. One (5%) guideline made a practical recommendation that permethrin 5% be treated as the first-line choice in

RCFE given its shorter treatment time (8–12 h). Of the six (30%) guidelines that justified their treatment recommendations in the text, common sources were the National Institute of Health and Clinical Excellence: Clinical Knowledge Summaries (NICE: CKS) and the British National Formulary (BNF) [16, 22].

Initial response

In the initial response to a suspected case of scabies in a RCFE, key issues and actions included the early identification of cases, ascertaining diagnostic accuracy, and reporting the outbreak to the correct bodies to trigger comprehensive outbreak control. Eleven (55%) guidelines recommended a risk assessment process or the formation of an outbreak management team. In order to accurately record the outbreak, 11 (55%) guidelines produced resources such as log sheets for every affected individual, including body maps to chart the progress of the rash, lists of their possible contacts, and details of their management and follow-up.

Outbreak management strategies

The guidelines were highly variable in their outbreak management strategies, both in terms of their prophylactic treatment of contacts, and infection control/environmental decontamination measures. Notably, there were differences in the definition of an outbreak. While 18 (90%) guidelines defined it as ‘two or more (linked) cases of scabies’, two (10%) guidelines additionally stated that even one case of crusted scabies would qualify an outbreak. Only two (10%) guidelines specified a time period in their definitions, one (5%) stating that an outbreak was when ≥ 2 cases of scabies occurred within an 8-week period, the other (5%) stating within a 3- to 6-month period.

Although 16 (80%) guidelines recommended simultaneous mass treatment, these differed in their definition of treatment groups. Eight (40%) suggested mass treatment of all staff, residents and contacts, while eight (40%) recommended treatment of all those defined as ‘high risk’, i.e. having direct personal contact with residents. Only two (10%) recommended targeting treatment at cases and their close contacts only. There was notable variation in which at-risk contact groups were mentioned, with suggestions ranging from sexual partners to visiting hairdressers. There were also differences in whether one or two

Table 1. Frequency with which key codes appeared in Health Protection Team guidelines, $n = x/20$ (%)

Background information	
<i>Classical scabies</i>	
Clinical features	18 (90%)
Incubation period	18 (90%)
<8 weeks	6 (30%)
<6 weeks	8 (40%)
<4 weeks	4 (20%)
Transmission by direct prolonged skin–skin contact	17 (85%)
Complications such as secondary bacterial infection	9 (45%)
Possible unusual clinical presentations in the elderly	14 (70%)
<i>Crusted scabies</i>	
Clinical features	12 (60%)
Highly contagious	15 (75%)
List of at risk populations (e.g. the elderly, immunosuppressed)	17 (85%)
Diagnosis	
GP to make clinical diagnosis	20 (100%)
Dermatologist also able to make clinical diagnosis	17 (85%)
Dermatologist diagnosis preferred	4 (20%)
Other (e.g. dermatologist specialist nurse, GP with special interest in dermatology)	9 (45%)
Microscopic analysis of skin scrapings can confirm uncertain diagnosis	12 (60%)
Management of an individual case	
<i>Classical scabies</i>	
First line: permethrin 5% dermal cream. Second line: malathion 0.5% dermal cream	10 (50%)
First line: permethrin 5% or malathion 0.5%	7 (35%)
Permethrin 5% only	2 (10%)
Oral ivermectin can be used for the treatment resistant/non-cooperative/immunosuppressed patients	9 (45%)
<i>Crusted scabies</i>	
Requires specialist/dermatologist management	9 (45%)
Several applications of topical scabicides required on 2–4 consecutive days	11 (55%)
Oral ivermectin may be used for treatment resistant cases	12 (60%)
Outbreak prevention (e.g. being vigilant to presence of rash in new residents)	9 (45%)
Outbreak management	
<i>Prophylactic treatment of staff and residents</i>	
Simultaneous mass treatment of all staff and residents	8 (40%)
Simultaneous mass treatment of all high risk staff and residents (e.g. those that directly handle patients)	8 (40%)
Only staff and residents that have been in direct contact with symptomatic cases	2 (10%)
Other	2 (10%)
<i>Further contact tracing for prophylactic treatment</i>	
All those who have had skin–skin contact with a case	10 (50%)
Household members/family of staff cases	13 (65%)
Visitors of resident cases	5 (25%)
Sexual and intimate contacts of cases	10 (50%)
Visiting staff (e.g. hairdressers, physiotherapists, agency staff)	2 (10%)
<i>Timing of treatments</i>	
Everyone should be treated twice, seven days apart	3 (15%)
Cases need to be treated twice; asymptomatic contacts require one treatment (day 1)	6 (30%)
Cases need to be treated twice; asymptomatic contacts require one treatment (day 7)	3 (15%)
Cases need to be treated twice; asymptomatic contacts require treatment (treatment day not specified)	8 (40%)

treatments were recommended, and among those that recommended two treatments, when the initial treatment for asymptomatic contacts should take place. In an attempt to provide clarity, 13 (65%) guidelines used treatment algorithms, seven of which were identical (Supplementary Fig. S1).

Infection control

Standard infection control measures such as the use of disposable gloves and aprons were recommended by all guidelines. Three (15%) guidelines suggested isolating all resident cases with classical scabies, while seven

(35%) suggested closing the home to new admissions. Despite only four guidelines (25%) stating that classical scabies can be transmitted through fomites, 18 (90%) recommended washing and/or drying thoroughly all bed linen, clothes or towels on the first day of treatment. Other measures suggested included that staff and/or clients wear long sleeves (three guidelines, 15%), that the home should be thoroughly cleaned and vacuumed (three, 15%), or all duvets be left to hang in a cold environment for 12 h (one, 5%).

Nine (45%) guidelines stressed the need for additional infection control measures with cases of crusted scabies. These measures include thoroughly washing/drying clothing on a hot cycle (nine, 45%), placing items not suitable for washing in a plastic bag for 72 h (seven, 35%), or cleaning upholstery, curtains and cushion covers to remove scales (nine, 45%). For these patients, isolation was recommended by six (30%) guidelines.

Roles and responsibilities

Since only one (5%) guideline included a concise summary of the roles and responsibilities of each of the stakeholders, it was difficult to draw concrete conclusions about who was responsible for each aspect of managing an outbreak. All guidelines recommended that the outbreak be reported to the local HPT, PHE centre or Consultant in Communicable Disease Control. Eleven (55%) recommended that it also be reported to the local NHS ICT, and/or that the ICT take responsibility for outbreak management in RCFE with state-funded beds. As for the division of responsibilities between the HPT and the manager of the care facility, ten (50%) guidelines included a list of actions for, or roles of, the manager and/or a list of actions/standard operating procedure for the HPT. One (5%) guideline contained a complete list of the roles and responsibilities for each member of the HPT. In general, the HPT held responsibility for advising and supporting the manager while the manager was responsible for ground-level organization and coordination of the outbreak response. There was disagreement over whether follow-up was the responsibility of the HPT, manager or general practitioner (GP), while the suggested time period for follow-up ranged from 0 to 12 weeks (median time 5 weeks) with only three (15%) guidelines detailing the appropriate response to outbreak reoccurrence within that time. Other stakeholders that were mentioned included the Care Quality Commission (the

independent regulator of health and social care in England), to whom eight (40%) guidelines recommended that the outbreak be reported. A further three (15%) recommended informing the local authority.

Financial and logistical barriers

Guidelines varied on which stakeholder carried the financial responsibility for the purchase of scabicial treatment. Nineteen (95%) guidelines recommended treatment for residents should be obtained from GPs. One (5%) detailed how this could be financed, recommending that resident's treatment be prescribed and paid for by their own GP practice, but that the GPs be reimbursed by the local Clinical Commissioning Group (CCG), the bodies that commission local healthcare services in England. Thirteen (65%) guidelines suggested that the facility carry the financial responsibility for purchasing all staff treatments. These guidelines highlighted the potential barriers imposed by asking staff members to purchase their own treatments, stating that this may hinder the coordination of an early, simultaneous and effective treatment as staff may feel that treatment is too expensive, or unnecessary if they are asymptomatic. One (5%) guideline provided template reimbursement forms where a local agreement with the CCG was in place that this body also be responsible for reimbursing costs of staff treatment. There was also disagreement on whether the facility should pay for the treatment of all staff, or only of asymptomatic staff, or also of the household contacts of symptomatic staff.

Fifteen (75%) guidelines considered the logistical barriers to coordinating mass treatment programmes. Common themes identified included the difficulties with obtaining sufficient treatment for residents. Recommendations for overcoming this barrier included using a single pharmacy or the CCG Chief Pharmacist to coordinate the supply of treatment, and ensuring extra tubes are prescribed to allow for large or tall people, or for the reapplication of treatment that had been prematurely washed off during the treatment process. It was further recommended that enough scabicide for both treatment days was obtained on a single prescription. In order to inform residents, staff and visitors, seven (35%) guidelines included practical tools such as posters for visitors and patient information leaflets.

Difficulties in coordinating the timing of the simultaneous treatments were also highlighted throughout

the texts. Recommendations ranged from simply stating that it was easier to leave the lotion on overnight, and that high levels of staffing would be required, to more detailed plans. One detailed example of a treatment plan included:

The late/night shift [dirty team] must apply treatment to all residents – all other staff not on duty as the ‘dirty team’ must apply treatment to themselves and their identified close contacts at this time. [The next day] the early shift who themselves are treated must remove the treatment from all residents – the ‘dirty team’ must go off duty and apply treatment to themselves and their identified close contacts Arrange for staff who will be away (e.g. sick/on holiday) to be treated at the same time as the home Arrange for residents currently away from the home (e.g. in hospital) to be treated prior to return.

DISCUSSION

While guidelines for individual case management were relatively consistent, there was great variation in the recommendations regarding outbreak management strategies, and the roles and responsibilities of individuals and organizations in coordinating the outbreak response. Advice around the investigation and management of crusted scabies, especially the use of ivermectin, was also variable. Although several of the logistical and financial barriers to successful outbreak management in RCFE were raised, there was a lack of consensus on the proposed solutions.

Existing UK and international guidance

The wide diversity in guideline recommendations reflects a gap in UK national guidance, which focuses almost exclusively on the management of the individual patient [16, 22]. There is little international guidance on institutional outbreak management strategies [23]. The European Guideline for the Management of Scabies (2010) [24], closely reflects the British Association for Sexual Health and HIV guideline (2007) [25], and fails to address scabies in institutional settings. There is inconsistency surrounding the production, commissioning or validation of guidelines across Europe. France [26] and The Netherlands [27] are examples of countries that have implemented national policy for scabies in community settings. Despite this, in a recent Dutch outbreak, the plurality of guidelines and protocols was identified as a factor complicating the successful coordination of outbreak response [28]. We have not analysed or attempted to

present a representative sample of international guidance; however, it does appear this pattern of unclear evidence attribution also exists in other guidance on institutional scabies outbreaks globally. For example, Bouvresse & Chosidow have published an eight-step approach to managing scabies outbreaks in healthcare institutions, based on current available evidence and recommendations made by the Centers for Disease Control and Prevention (CDC), the national public health institution of the United States [10], yet how evidence was selected for these recommendations is not clear. Similarly, the International Committee of the Red Cross provides a guide to managing scabies outbreaks in prisons, and despite the clarity and accessibility of this guidance, it is unclear on which evidence individual recommendations are based [29]. In the United States, although CDC provide suggestions of what to include, it is local and/or state health departments that produce guidelines for scabies outbreak management [30]. In Australia guidelines are developed at the state government level [31]. To our knowledge no review similar to this one has been carried out on the resultant policies in either country.

A treatment algorithm originating from the Medical Entomology Centre, Cambridge was commonly replicated in the guidelines (Supplementary Fig. S1). Although this source no longer exists, it was originally developed in the late 1990s as a stand-alone professional recommendation to aid management in a geriatric hospital and was then altered to the requirements of RCFE (correspondence from Medical Entomology Centre, November 2015). This algorithm states that oral ivermectin can be used for cases of topical scabicide-resistant classical scabies. Only one (35%) of the seven guidelines that included this algorithm made this recommendation anywhere in the text of their guidance. This illustrates the key issue that it is not known how existing guidelines have been developed, and to what extent their recommendations have been based on evidence, context, or expert advice.

Diagnosis and treatment

In some areas, the lack of agreement between guidelines appeared to reflect variation in the scientific literature, such as for the incubation period of scabies, which is essential knowledge in the development of a time-frame for contact tracing and follow-up [12, 32]. However, one area on which the literature was relatively clear, but yet the guidelines varied,

was crusted scabies. Highly contagious yet frequently under-recognized, crusted scabies commonly affects the index case in outbreak situations [8]. This represents a need for the early diagnosis of this variant in order to prevent the subsequent spread of infection [2], and yet its clinical features were only described by 12 (60%) guidelines. Similarly, classical scabies can be difficult to diagnose in the elderly, yet only 14 (70%) guidelines described the possible differences in presentation. This information is essential, given that misdiagnosis occurs in approximately 43% of institutional scabies outbreaks and leads to outbreak prolongation [8].

Oral ivermectin was recommended for classical scabies by nine (45%) guidelines, despite only being available in the UK on a named patient basis for treatment-resistant crusted scabies in combination with topical treatment [22]. A study by Barkwell & Shields [21] referenced in one (5%) guideline caused controversy after indicating an increased risk of death with ivermectin use in long-term care settings. The validity of this study has been disputed and its results have not been reproduced [33–36]. Later studies have shown ivermectin to be equally as effective as one dose of permethrin [37], and recommended that oral therapy should be preferred when topical therapy is difficult to apply, such as in mass treatment settings [2,10]. This is currently reflected in the French national guidelines [26].

Outbreak management strategies

Scabies outbreaks are associated with a high workload and the need for considerable resources [2, 10]. The effectiveness of infection control methods and the prophylactic treatment of contacts in scabies outbreaks have been identified as important research gaps [23]. This paucity of evidence is reflected in a highly varied response from the guidelines, particularly in terms of who should receive treatment and to what extent infection control measures are needed. A thorough assessment of the evidence base is needed, in order to ensure that recommendations are not needlessly increasing staff workload.

Roles and responsibilities

The striking variation in the description of the roles and responsibilities of the stakeholders involved in scabies outbreak management is unsurprising given the ongoing structural reorganization within PHE

and health and social care services. Our findings show that local guidelines seek to ameliorate the situation according to local organizational structure. There were some clear areas of misunderstanding, for example the Care Quality Commission explicitly states that scabies outbreaks do not need to be reported to them despite almost half of the guidelines recommending that they be notified [38].

Financial and logistical barriers

A noteworthy omission in many guidelines was the practical, ethical and financial impact of outbreak management strategies on staff and residents. Staff in RCFE frequently report concerns about the high workload burden and ethical implications of treating residents with dementia, who are themselves more prone to scabies infections [8]. Concerns surrounding treating residents with dementia, such as dealing with wandering behaviour, the treatment of residents without capacity to consent, or the distress caused by isolation, were not mentioned by any of the guidelines [2, 39]. This is particularly important given the obligations RCFE have to residents under the Mental Capacity Act 2005 [40]. The direct and indirect costs of managing scabies outbreaks in RCFE can be substantial [8]. Although the financial implications for staff purchasing their own treatment was mentioned, this was not extended to visitors, while the potential impact on the home such as through the loss of income due to temporary closure to new admissions was not addressed [2]. The financial impact for residents of purchasing their own treatment was only mentioned by one of the guidelines; however, this may be because the majority of residents of such care facilities will be entitled to state-funded prescriptions due to their age or specific long-term health conditions [41].

Limitations

This study had several limitations. The analysis was performed by a single reviewer, making it more error prone. This study only reviewed guidance on how scabies outbreaks should be managed, rather than how they were managed in practice by the local HPT or RCFE in question. The study did not explore the methods used by ICTs, who predominantly manage community outbreaks of infection in four of the 24 areas that we contacted, and as such may not

Table 2. *Areas that need to be clarified in future scabies guidelines*

Diagnosis and treatment
<ul style="list-style-type: none"> • Descriptions of the clinical features of non-classical scabies presentations in the elderly • The incubation period of scabies • Description of the potential complications that can arise from scabies infection • The role of specialist dermatology input in diagnosis and treatment • Optimal treatment regimens for both classical and crusted scabies • Ethical considerations for the treatment of vulnerable groups such as dementia patients
Outbreak management
<ul style="list-style-type: none"> • The definition of a scabies outbreak, to include the number of cases within a specified time period • Initial actions in the event of an outbreak including: outbreak diagnostic confirmation, reporting to national bodies and associated paperwork to record patient information • Treatment of contacts including: clarification of who is classified as a contact, who should receive treatment and the number, timing and coordination of treatments • Practical consideration of the logistical barriers to mass treatment regimens • Infection control advice for both classical and crusted scabies including: exclusion/isolation of cases, care home closure, treatment of fomites and cleaning of the home • Time period for follow-up, and criteria for declaring an outbreak over
Roles and responsibilities
<ul style="list-style-type: none"> • The roles and responsibilities of stakeholders involved in outbreak management, including treatment coordination and follow-up • How/where scabidical treatment is obtained and who carries financial responsibility for its purchase

reflect the full spectrum of the recommended management of scabies outbreaks in RCFE in England.

Recommendations

There is a need for nationally produced guidance for the management of scabies outbreaks in RCFE in England. Although local HPTs have attempted to fill this gap, the guidelines they have produced are highly variable in their scope and content. Based on this review we have constructed a set of key recommendations for areas that need to be clarified in future scabies guidelines (Table 2), and we further recommend that national guidance would be the best way to ensure clear lines of accountability and enable consistent care. Identifying measures to overcome key

barriers to successful outbreak management will require multidisciplinary involvement, and input from care facility staff and managers should be obtained in the formation of future guidelines. Evidence is lacking with regards to the optimal management strategy for scabies outbreaks in these settings. There is a need to evaluate current practice and to rationalize guidance to ensure all approaches implement the best available evidence, even when incomplete, in order to ensure a minimum and feasible standard of care. Although this study is focused on the English setting, it is likely that evidence-based recommendations on the optimal management of scabies outbreaks would also be applicable on an international level, and of interest to other countries currently lacking consistent management guidance. In England, national guidance would be the most comprehensive way of ensuring a thorough and cohesive response to all outbreaks of this unpleasant and debilitating condition in the elderly population living in residential care facilities.

SUPPLEMENTARY MATERIAL

For supplementary material accompanying this paper visit <http://dx.doi.org/10.1017/S0950268816001746>.

ACKNOWLEDGEMENTS

The authors acknowledge Public Health England and Health Protection Teams nationwide and the Medical Entomology Centre (Cambridge) for their help and support with this paper. There was no specific funding for this work.

DECLARATION OF INTEREST

None

REFERENCES

1. **Suwandhi P, Dharmarajan TS.** Scabies in the nursing home. *Current Infectious Disease Reports* 2015; **17**: 453.
2. **Hewitt KA, Nalabanda A, Cassell JA.** Scabies outbreaks in residential care homes: factors associated with late recognition, burden and impact. A mixed methods study in England. *Epidemiology and Infection* 2015; **143**: 1542–1551.
3. **Hengge UR, et al.** Scabies: a ubiquitous neglected skin disease. *Lancet Infectious Diseases* 2006; **6**: 769–779.
4. **Fuller LC.** Epidemiology of scabies. *Current opinion in Infectious Diseases* 2013; **26**: 123–126.

5. **Green M.** Epidemiology of scabies. *Epidemiological Reviews* 1989; **11**: 126–150.
6. **Walton SF.** The immunology of susceptibility and resistance to scabies *Parasite Immunology* 2010; **32**: 532–540.
7. **Vos T, et al.** Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; **386**: 743–800.
8. **Mounsey K, et al.** Retrospective analysis of institutional scabies outbreaks from 1984 to 2013: lessons learned and moving forward. *Epidemiology and Infection*. Published online: 28 March 2016. doi:10.1017/S0950268816000443.
9. **Hay RJ, et al.** The global burden of skin disease in 2010: an analysis of the prevalence and impact of skin conditions. *Journal of Investigative Dermatology* 2013; **134**: 1–8.
10. **Bouvresse S, Chosidow O.** Scabies in healthcare settings. *Current Opinion in Infectious Diseases* 2010; **23**: 111–118.
11. **Wilson MG, Philpott CD, Breer WA.** Atypical presentation of scabies among nursing home residents. *Journal of Gerontology: Medical Sciences* 2001; **56**: M424–M427.
12. **Chosidow O.** Scabies and pediculosis. *Lancet* 2000; **355**: 819–826.
13. **Lay CJ, et al.** Risk factors for delayed diagnosis of scabies in hospitalized patients from long-term care facilities. *Journal of Clinical Medicine Research* 2011; **3**: 72–77.
14. **Hawker J, et al.** *Communicable Disease Control Handbook*, 2nd edn. New Jersey: Wiley-Blackwell, 2005, pp. 200–203.
15. **Lassa S, Campbell MJ, Bennett CE.** Epidemiology of scabies prevalence in the U.K. from general practice records. *British Journal of Dermatology* 2011; **164**: 1329–1334.
16. **British National Formulary (BNF).** 13:10:4 Parasitological preparations: scabies. (<https://www.medicinescomplete.com/mc/bnf/current/index.htm>). Accessed 30 August 2015.
17. **Department of Health.** Health Protection Legislation (England) Guidance 2010, 2010 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_114510). Accessed 26 August 2015.
18. **Department of Health, Public Health England, Local Government Association.** Protecting the health of the local population: the new health protection duty of local authorities under the Local Authorities (Public Health Functions and Entry to Premises by Local Healthwatch Representatives). Regulations 2013, 2013 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/19977/Health_Protection_in_Local_Authorities_Final.pdf). Accessed 10 August 2015.
19. **Public Health England.** Communicable disease outbreak management: operational guidance, 2014. (<https://www.gov.uk/government/publications/communicable-disease-outbreak-management-operational-guidance>). Accessed 17 September 2015.
20. **Health Protection Agency England.** HPA National Measles Guidelines for Local & Regional Services, 2010 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32293/National_Measles_Guidelines.pdf). Accessed 12 January 2016.
21. **Barkwell R, Shields S.** Deaths associated with ivermectin treatment of scabies. *Lancet* 1997; **349**: 1144–1145.
22. **National Institute for Health Care Excellence (NICE).** Clinical knowledge summaries. Scabies, 2011 (<http://cks.nice.org.uk/scabies>). Accessed 26 August 2015.
23. **Fitzgerald D, Grainger RJ, Reid A.** Interventions for preventing the spread of infestation in close contacts of people with scabies. *Cochrane Database of Systematic Reviews* 2014; **2**: CD009943.
24. **Scott GR, Chosidow O.** European guideline for the management of scabies, 2010. *International Journal of STD & AIDS* 2011; **22**: 301–303.
25. **British Association for Sexual Health and HIV (BASHH).** United Kingdom national guideline on the management of scabies infestation 2007, 2007. (www.bashh.org/documents/27/27.pdf). Accessed 26 January 2016.
26. **Castor C, Bernadou I.** Community-based scabies epidemics – a guide to investigation and management, 2008 [in French], (http://www.invs.sante.fr/publications/2008/epidemie_gale_communautaire/). Accessed 26 January 2016.
27. **National Coordination Centre for Prevention of Infectious Disease.** Manual for ‘scabies’, scabies in care homes, 2006 [in Dutch]. (http://www.rivm.nl/Documenten_en_publicaties/Professioneel_Praktisch/Draaiboeken/Infectieziekten/LCI_draaiboeken/Scabies_schurft_in_zorg_instellingen). Accessed 31 August 2015.
28. **Ladbury G, et al.** An outbreak of scabies in multiple linked healthcare settings in The Netherlands. *Infection Control & Hospital Epidemiology* 2012; **33**: 1047–1050.
29. **International Committee of the Red Cross (ICRC).** Healthcare in detention: managing scabies outbreaks in prison settings. 2015 (<https://www.icrc.org/eng/resources/documents/publication/p4241.htm>). Accessed 6 June 2016.
30. **Department for Health and Ageing, Government of South Australia.** Scabies management in care facilities, 2012, 2012 (<http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/resources/policies/scabies+management+in+care+facilities>). Accessed 12 June 2016.
31. **Centers for Disease Control and Prevention (CDC).** Scabies, resources for health professionals: institutional settings (http://www.cdc.gov/parasites/scabies/health_professionals/institutions.html). Accessed 12 June 2016.
32. **Wolf R, Davidovici B.** Treatment of scabies and pediculosis: facts and controversies. *Clinical Dermatology* 2010; **28**: 511–518.
33. **Strong M, Johnstone P.** Interventions for treating scabies. *Cochrane Database of Systematic Reviews* 2007; **3**: CD000320.
34. **Coyne PE, Addiss DG.** Deaths associated with ivermectin for scabies. *Lancet* 1997; **350**: 215–216.

35. **Bockarie MJ, et al.** Treatment with ivermectin reduces the high prevalence of scabies in a village in Papua New Guinea. *Acta Tropica* 2000; **75**: 127–30.
36. **Heukelbach J, Feldmeier H.** Scabies. *Lancet* 2006; **367**:1767–74.
37. **Usha V, Gopalakrishnan Nair T V.** A comparative study of oral ivermectin and topical permethrin cream in the treatment of scabies. *Journal of the American Academy of Dermatology* 2000; **42**: 236–240.
38. **NHS England.** Notifications required by the Health and Social Care Act 2008: Guidance for English NHS providers, 2013 (http://www.cqc.org.uk/sites/default/files/documents/statutory_notifications_for_nhs_bodies_-_provider_guidance_v6.pdf). Accessed 27 August 2015.
39. **Tsutsumi M, Nishiura H, Kobayashi T.** Dementia-specific risks of scabies: retrospective epidemiologic analysis of an unveiled nosocomial outbreak in Japan from 1989–90 *BMC Infectious Diseases* 2005; **5**: 85.
40. **Mental Capacity Act 2005.** Chapter 9 (<http://www.legislation.gov.uk/ukpga/2005/9>) Accessed 6 June 2016.
41. **NHS Business Services Authority.** Help with health-care costs, 2012 (<http://www.nhsbsa.nhs.uk/792.aspx>). Accessed 6 June 2016.