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

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Running head: SCABIES GUIDELINES RESIDENTIAL CARE FOR ELDERLY

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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 United Kingdom [1–4]. 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 twenty 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.

Supplementary material to this paper is available on the Cambridge Journals Online website

Author contributions: LCJW, SL, JM, and JAC designed the study. LCJW undertook the survey and performed the data analysis. KH, LRI, CE, MN and JRI gave expert advice on national and international infection control structures and advised on the interpretation of results. All authors reviewed and contributed to multiple drafts.

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Introduction

Scabies is a dermatological condition caused by a reaction to the mite *Sarcoptes scabiei* [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 marginalised communities, where prevalence 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 residential care facilities for the elderly (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

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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 United Kingdom (UK), the mean prevalence of scabies is estimated at 2-3 per 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 hours 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].

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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 frontline 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 from region to region and from care facility to 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

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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 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 (2014), and used to describe the variation between the guidelines.

Results

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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 twenty 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 'two 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 *et*

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al. that warned of a risk of death with the 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 hours). 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

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

184 measures. Notably, there were differences in the definition of an outbreak. Whilst 18 (90%)
185 guidelines defined it as 'two or more (linked) cases of scabies', two (10%) guidelines
186 additionally stated that even one case of crusted scabies would qualify an outbreak. Only two
187 (10%) guidelines specified a time period in their definitions, one (5%) stating that an
188 outbreak was when two or more cases of scabies occurred within an eight week period, the
189 other (5%) stating within a 3-6 month period.

190

191 Although 16 (80%) guidelines recommended simultaneous mass treatment, these differed in
192 their definition of treatment groups. Eight (40%) suggested mass treatment of all staff,
193 residents and contacts, whilst eight (40%) recommended treatment of all those defined as
194 'high risk', i.e. having direct personal contact with residents. Only two (10%) recommended
195 targeting treatment at cases and their close contacts only. There was notable variation in
196 which at-risk contact groups were mentioned, with suggestions ranging from sexual partners
197 to visiting hairdressers. There were also differences in whether one or two treatments were
198 recommended, and among those that recommended two treatments, when the initial treatment
199 for asymptomatic contacts should take place. In an attempt to provide clarity, 13 (65%)
200 guidelines used treatment algorithms, seven of which were identical (Supplementary Figure
201 S1).

202

203 *Infection control*

204

205 Standard infection control measures such as the use of disposable gloves and aprons were
206 recommended by all guidelines. Three (15%) guidelines suggested isolating all resident cases

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with classical scabies, whilst 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 hours (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 hours (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

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(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 whilst the manager was responsible for ground level organisation 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 0-12 weeks (median time: five 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%) of 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 scabicidal 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

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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

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'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 organisations 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

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301 countries that have implemented national policy for scabies in community settings. Despite
302 this, in a recent Dutch outbreak, the plurality of guidelines and protocols was identified as a
303 factor complicating the successful coordination of outbreak response [28]. We have not
304 analysed or attempted to present a representative sample of international guidance, however it
305 does appear this pattern of unclear evidence attribution also exists in other guidance on
306 institutional scabies outbreaks globally. For example, Bouvresse *et al.* have published an
307 eight step approach to managing scabies outbreaks in healthcare institutions, based on current
308 available evidence and recommendations made by the Centers for Disease Control and
309 Prevention (CDC), the national public health institution of the United States [10], yet how
310 evidence was selected for these recommendations is not clear. Similarly, the International
311 Committee of the Red Cross provides a guide to managing scabies outbreaks in prisons, and
312 despite the clarity and accessibility of this guidance, it is unclear on which evidence
313 individual recommendations are based [29]. In the United States, though the CDC provide
314 suggestions of what to include, it is local and/or state health departments that produce
315 guidelines for scabies outbreak management [30]. In Australia guidelines are developed at a
316 state government level [31]. To our knowledge no review similar to this one has been carried
317 out on the resultant policies in either country.

318

319 A treatment algorithm originating from the Medical Entomology Centre, Cambridge was
320 commonly replicated in the guidelines (Supplementary Figure S1). Although this source no
321 longer exists, it was originally developed in the late 1990s as a standalone professional
322 recommendation to aid management in a geriatric hospital and was then altered to the
323 requirements of RCFE (correspondence from Medical Entomology Centre, 13/11/15). This
324 algorithm states that oral ivermectin can be used for cases of topical scabicide resistant
325 classical scabies. Only one of the seven (35%) guidelines that included this algorithm made

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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 *et al.* [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

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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 gap [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 reorganisation within PHE and health and social care services. Our findings show that local guidelines seek to ameliorate the situation according to local organisational structure. There were some clear areas of misunderstanding, for example the Care Quality Commission

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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 condition [41].

Limitations

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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 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 focussed 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

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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.

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Declaration of Interest

None

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Table 1: Frequency with which key codes appeared in HPT guidelines, n=x/20 (%)	
Background information	
Classical scabies	
- 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%)
Crusted scabies	
- 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	
Classical scabies	
- First line: permethrin 5% dermal cream. Second line: malathion 0.5% dermal cream.	10 (50%)
- First line: permethrin 5% or malathion 0.5%	

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	7 (35%)
- Permethrin 5% only	2 (10%)
- Oral ivermectin can be used for the treatment resistant/non-cooperative/immunosuppressed patients	9 (45%)
Crusted scabies	
- 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	
Prophylactic treatment of staff and residents	
- 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%)
Further contact tracing for prophylactic treatment	
- 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 and agency staff)	2 (10%)
Timing of treatments	
- 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%)

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- Cases need to be treated twice; asymptomatic contacts require treatment (treatment day not specified).	8	(40%)

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

Diagnosis and Treatment

- 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

- 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

- The roles and responsibilities of stakeholders involved in outbreak management, including treatment coordination and follow up
- How/where scabicidal treatment is obtained and who carries financial responsibility for its purchase

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Epidemiology and Infection, The management of scabies outbreaks in care homes in England: a review of current health protection guidelines, L.C.J. White, S. Lanza, J. Middleton, K. Hewitt, L. Freire-Moran, C. Edge, M. Nicholls, J. Rajan-Iyer, J.A. Cassell. Supplementary Material

Supplementary Table S1: Examples of coding

Code ("" represents *a priori* code)	**Text**
"CLINICAL FEATURES"	Disease Information a) Clinical features The microscopic mites penetrate the epidermis causing tiny "burrows", which are visible particularly on the wrists, back of the hands and between the fingers.
…	
BARRIERS TO STAFF PURCHASING OWN TREATMENT	Purchasing treatments over the counter or paying for prescriptions is expensive for staff particularly if their household/close contacts also require treatment. Staff may also feel that treatment is not necessary if they don't have any symptoms but failure to comply could affect the successful management of the situation

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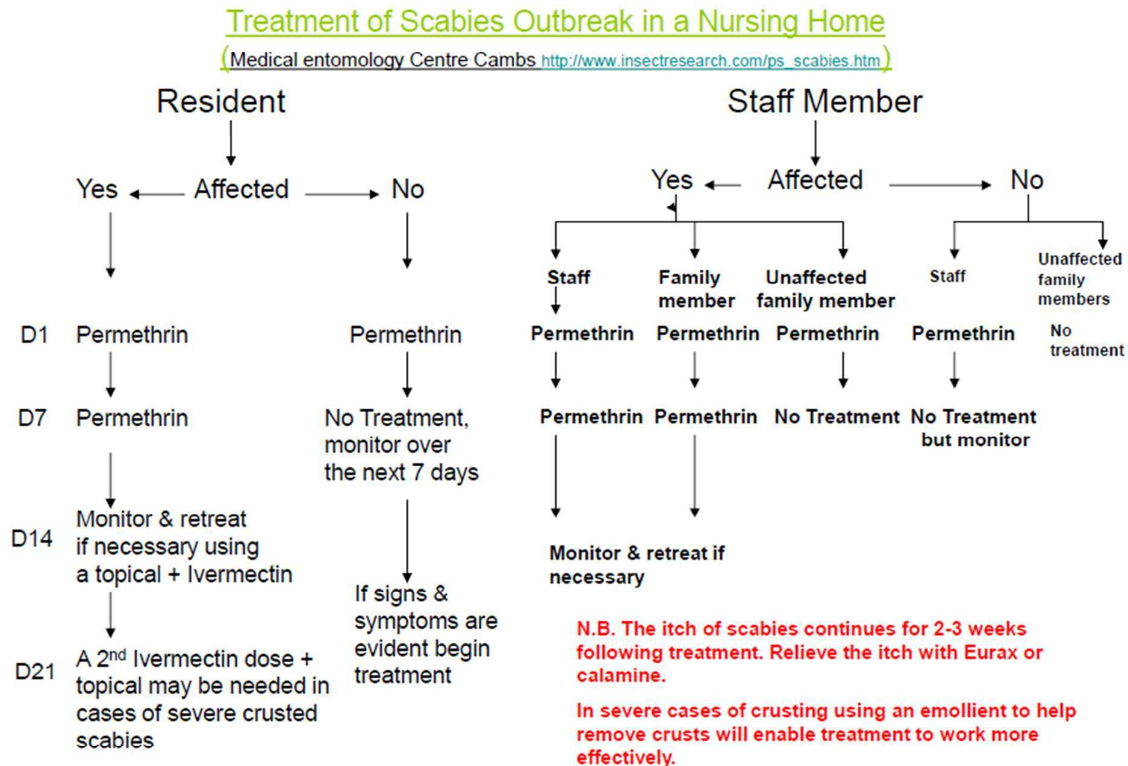
Supplementary Figure S1:



Treatment of scabies in care homes algorithm, replicated in the guidelines of 7 health protection teams. Algorithm produced by Medical Entomology Centre (Cambridge). Image taken from:

Health Protection Agency North West, The management of scabies infection in the community, 2010. (http://www.wirral.nhs.uk/document_uploads/Policies_Infection_Prevention_Control/HPAManagementofScabiesApril12.pdf) Accessed 26 January 2016.

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