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Manuscripts

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3 1 **The management of scabies outbreaks in residential care facilities**
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6 2 **for the elderly in England: a review of current health protection**
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9 3 **guidelines**
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52 22 Reprints will not be available from the author
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57 24 Running head: SCABIES GUIDELINES RESIDENTIAL CARE FOR ELDERLY
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3 25 **Summary**
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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.

41 Supplementary material to this paper is available on the Cambridge Journals Online website
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3 48 **Introduction**
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9 50 Scabies is a dermatological condition caused by a reaction to the mite *Sarcoptes scabiei* [5].
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11 51 Scabies mites burrow into the human epidermis and provoke a delayed hypersensitivity
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13 52 reaction to mite antigens that appears 4-6 weeks following the initial infection, or within a
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15 53 week following repeat infection [5,6]. This reaction typically consists of an erythematous
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17 54 papular rash, accompanied by severe and persistent itching, that is characteristically worst at
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19 55 night. Scabies is transmitted by close personal and sexual contact and less commonly through
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21 56 fomites [5]. As well as being a debilitating cause of morbidity, the elderly, young and
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23 57 immunosuppressed are particularly vulnerable to complications of scabies, such as
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25 58 superimposed secondary bacterial infection [4,5].
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33 60 The global prevalence of scabies was estimated at 66 million in 2013 [7]. This is likely to be
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35 61 an underestimate, and also hides a notably higher prevalence in vulnerable communities [8].
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37 62 These include low-income and marginalised communities, where prevalence rates can be as
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39 63 high as 60%, and in institutions such as prisons or healthcare facilities [3,9]. A recent review
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41 64 of institutional scabies outbreaks globally found that 48% of outbreaks occurred in residential
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43 65 care facilities for the elderly (RCFE) [8], which we here define as residential facilities
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45 66 providing long-term care to elderly people who are not able to care for themselves.
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52 68 RCFE are at particular risk of scabies outbreaks due to their high population density, staff
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54 69 providing personal care to a large number of residents, and the less familiar way that scabies
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56 70 can present in older age groups [10]. For example, elderly patients with scabies may present
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3 71 with lesions primarily on the trunk and back, rather than the classical locations: interdigital
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5 72 webs, wrist flexors and elbows [6,10]. There is also an increased prevalence of the rarer and
6
7 73 highly contagious crusted (Norwegian) scabies variant in frail, immunocompromised or
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10 74 neurocognitively impaired patients. These patients can present with hyperkeratotic scaling
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12 75 anywhere on the body and are less likely to present with itching [1,10,11]. Lesions are highly
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14 76 infested with mites and the shedding of hyperinfested skin scales makes fomite transmission
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16 77 more pronounced in this variant [3]. Both of these presentations may be unexpected and
17
18 78 under-recognized, increasing the risk of further transmission and of outbreaks [10,12,13]. The
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20 79 management of scabies outbreaks in these settings generally involves the treatment of
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22 80 symptomatic cases as well as their often asymptomatic close contacts. This often requires the
23
24 81 simultaneous mass treatment of all residents and staff, as well as their family members,
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26 82 sexual contacts and regular visitors [14]. Treatments used globally include topical acaricides
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28 83 such as lindane, permethrin, benzyl benzoate, crotamiton, sulfur, malathion, and oral
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30 84 ivermectin, a broad spectrum antiparasitic [8].
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38 86 In the United Kingdom (UK), the mean prevalence of scabies is estimated at 2-3 per 1000
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40 87 population [15]. This prevalence peaks in the very young and the very elderly, the latter
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42 88 reflecting the number of people in that age group that live in RCFE, where outbreaks are
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44 89 common [1–3,15]. Recommended treatment involves the application of topical permethrin or
45
46 90 malathion to the entire body for a period of 8-24 hours before washing it off, and sometimes
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48 91 additional environmental decontamination is advised [1,14,16]. This is a substantial
49
50 92 undertaking in RCFE and can be stressful, time consuming and a significant drain on
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52 93 resources [1,2]. Oral ivermectin is recommended only for treatment-resistant crusted scabies
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54 94 [16].
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6 96 Public Health England (PHE) is an executive agency of the Department of Health, which has
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8 97 nine local centres. Each centre includes one or more Health Protection Team (HPT) which
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10 98 delivers frontline health protection services. The Department of Health recommends that
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12 99 facilities report all scabies outbreaks to the local HPT to assist them with the logistical
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14 100 difficulties involved in outbreak management [1,2,17]. Currently PHE (via HPTs) shares the
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16 101 responsibility to produce plans for the management of local outbreaks of infectious disease
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18 102 with local authority (local government in the form of a council or borough) and, where
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20 103 appropriate, local National Health Service (NHS) trusts through NHS Infection Control
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22 104 Teams (ICTs) [18,19]. This shared model means that how outbreaks are handled can vary
23
24 105 from region to region and from care facility to care facility. There are currently no national
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26 106 public health guidelines for the management of scabies along the lines of those produced for
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28 107 other diseases such as measles [20].
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36 109 We aimed to provide an overview of the current HPT guidelines for the management of
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38 110 scabies outbreaks in RCFE in England and to compare and contrast their scope and content,
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40 111 with a view to informing future policy and guidance.
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46 113 **Methods**

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51 115 *Design*

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3 117 We undertook a mixed methods review of local guidelines for the management of scabies
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5 118 outbreaks in RCFE across England. Twenty-four HPTs operational at the time of review (July
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7 119 2015) were invited by telephone and email to supply a copy of their guidelines.
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13 121 *Selection*
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19 123 Guidelines were defined as any documents used by a HPT to guide their response to scabies
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21 124 outbreaks in RCFE, combined with any additional resources that they used to help formulate
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23 125 their support and advice. All guidelines currently in use were eligible for inclusion regardless
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25 126 of date, length or nature, to provide an accurate representation of the geographical variation
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27 127 in outbreak management. All supplementary materials, appendices and references provided
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29 128 were included for review.
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36 130 *Analysis*
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42 132 An independent reviewer undertook a mixed methods content analysis of the guidelines
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44 133 provided. A mixture of a priori codes such as ‘clinical features’ and descriptive codes
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46 134 emerging from the data such as ‘barriers to staff purchasing own treatment’ were extracted
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48 135 from the text (Supplementary Table S1). Code frequency was tallied using Microsoft Excel
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50 136 (2014), and used to describe the variation between the guidelines.
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58 138 **Results**
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6 140 Twenty four (100%) HPTs responded, of which four had not produced guidelines, and
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8 141 instead relied upon expert advice from within local ICTs to manage scabies outbreaks in
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10 142 RCFE in their area. The remaining twenty HPTs provided guidelines that ranged from 2-44
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12 143 pages long, with the most recent review date ranging from 2007 to 2015. Three were
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14 144 identical, and one was a previous version of the current guidelines used by another area. A
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16 145 summary of the variation between guidelines in key dimensions is presented in Table 1.
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23 147 *Diagnosis and treatment*
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29 149 Guidelines were most similar in their descriptions of the clinical features of classical scabies.
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31 150 The more unusual presentations of scabies in the elderly, including crusted scabies, were less
32
33 151 well described. Three (15%) guidelines included additional classifications of scabies,
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35 152 'atypical scabies' and 'pseudo-scabies', the latter being defined as a less drug responsive
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37 153 condition not caused by the human mite. The description of the incubation period of scabies
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39 154 varied substantially, with suggestions ranging from '2-4 weeks' to 'two months'.
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46 156 Guidelines were consistent on the use of topical permethrin 5% and/or malathion 0.5% in the
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48 157 treatment of classical scabies. The recommended role of oral ivermectin was more varied.
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50 158 Nine (45%) recommended its use in classical scabies, although this recommendation mostly
51
52 159 appeared in supplementary algorithms rather than within the main guideline text. Twelve
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54 160 (60%) recommended ivermectin use in treatment-resistant crusted scabies. One (5%)
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56 161 guideline advised caution in the use of ivermectin in the elderly, citing a study by Barkwell *et*
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3 162 *al.* that warned of a risk of death with the use of ivermectin in this population [21]. One (5%)
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5 163 guideline made a practical recommendation that permethrin 5% be treated as the first line
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7 164 choice in RCFE given its shorter treatment time (8-12 hours). Of the six (30%) guidelines
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9 165 that justified their treatment recommendations in the text, common sources were the National
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11 166 Institute of Health and Clinical Excellence: Clinical Knowledge Summaries (NICE: CKS)
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13 167 and the British National Formulary (BNF) [16,22].
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20 169 *Initial response*
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26 171 In the initial response to a suspected case of scabies in a RCFE, key issues and actions
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28 172 included the early identification of cases, ascertaining diagnostic accuracy, and reporting the
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30 173 outbreak to the correct bodies to trigger comprehensive outbreak control. Eleven (55%)
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32 174 guidelines recommended a risk assessment process or the formation of an outbreak
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34 175 management team. In order to accurately record the outbreak, 11 (55%) guidelines produced
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36 176 resources such as log sheets for every affected individual, including body maps to chart the
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38 177 progress of the rash, lists of their possible contacts, and details of their management and
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40 178 follow up.
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48 180 *Outbreak management strategies*
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54 182 The guidelines were highly variable in their outbreak management strategies, both in terms of
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56 183 their prophylactic treatment of contacts, and infection control/environmental decontamination
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3 184 measures. Notably, there were differences in the definition of an outbreak. Whilst 18 (90%)
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5 185 guidelines defined it as ‘two or more (linked) cases of scabies’, two (10%) guidelines
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7 186 additionally stated that even one case of crusted scabies would qualify an outbreak. Only two
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10 187 (10%) guidelines specified a time period in their definitions, one (5%) stating that an
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12 188 outbreak was when two or more cases of scabies occurred within an eight week period, the
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14 189 other (5%) stating within a 3-6 month period.
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20 191 Although 16 (80%) guidelines recommended simultaneous mass treatment, these differed in
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22 192 their definition of treatment groups. Eight (40%) suggested mass treatment of all staff,
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24 193 residents and contacts, whilst eight (40%) recommended treatment of all those defined as
25
26 194 ‘high risk’, i.e. having direct personal contact with residents. Only two (10%) recommended
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28 195 targeting treatment at cases and their close contacts only. There was notable variation in
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30 196 which at-risk contact groups were mentioned, with suggestions ranging from sexual partners
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32 197 to visiting hairdressers. There were also differences in whether one or two treatments were
33
34 198 recommended, and among those that recommended two treatments, when the initial treatment
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36 199 for asymptomatic contacts should take place. In an attempt to provide clarity, 13 (65%)
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38 200 guidelines used treatment algorithms, seven of which were identical (Supplementary Figure
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40 201 S1).
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48 203 *Infection control*
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54 205 Standard infection control measures such as the use of disposable gloves and aprons were
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56 206 recommended by all guidelines. Three (15%) guidelines suggested isolating all resident cases
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3 207 with classical scabies, whilst seven (35%) suggested closing the home to new admissions.
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5 208 Despite only four guidelines (25%) stating that classical scabies can be transmitted through
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7 209 fomites, 18 (90%) recommended washing and/or drying thoroughly all bed linen, clothes or
8
9 210 towels on the first day of treatment. Other measures suggested included that staff and/or
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11 211 clients wear long sleeves (three guidelines, 15%), that the home should be thoroughly cleaned
12
13 212 and vacuumed (three, 15%), or all duvets be left to hang in a cold environment for 12 hours
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15 213 (one, 5%).
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22 215 Nine (45%) guidelines stressed the need for additional infection control measures with cases
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24 216 of crusted scabies. These measures include thoroughly washing/drying clothing on a hot
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26 217 cycle (nine, 45%), placing items not suitable for washing in a plastic bag for 72 hours (seven,
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28 218 35%), or cleaning upholstery, curtains and cushion covers to remove scales (nine, 45%). For
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30 219 these patients, isolation was recommended by six (30%) guidelines.
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37 221 *Roles and responsibilities*

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43 223 Since only one (5%) guideline included a concise summary of the roles and responsibilities of
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45 224 each of the stakeholders, it was difficult to draw concrete conclusions about who was
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47 225 responsible for each aspect of managing an outbreak. All guidelines recommended that the
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49 226 outbreak be reported to the local HPT, PHE centre or Consultant in Communicable Disease
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51 227 Control. Eleven (55%) recommended that it also be reported to the local NHS ICT, and/or
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53 228 that the ICT take responsibility for outbreak management in RCFE with state funded beds. As
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55 229 for the division of responsibilities between the HPT and the manager of the care facility, ten
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3 230 (50%) guidelines included a list of actions for, or roles of, the manager and/or a list of
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5 231 actions/standard operating procedure for the HPT. One (5%) guideline contained a complete
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7 232 list of the roles and responsibilities for each member of the HPT. In general, the HPT held
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9 233 responsibility for advising and supporting the manager whilst the manager was responsible
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11 234 for ground level organisation and coordination of the outbreak response. There was
12
13 235 disagreement over whether follow up was the responsibility of the HPT, manager or general
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15 236 practitioner (GP), while the suggested time period for follow up ranged from 0-12 weeks
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17 237 (median time: five weeks) with only three (15%) guidelines detailing the appropriate
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19 238 response to outbreak reoccurrence within that time. Other stakeholders that were mentioned
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21 239 included the Care Quality Commission (the independent regulator of health and social care in
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23 240 England), to whom eight (40%) of guidelines recommended that the outbreak be reported. A
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25 241 further three (15%) recommended informing the local authority.
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243 *Financial and logistical barriers*

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245 Guidelines varied on which stakeholder carried the financial responsibility for the purchase of
246 scabical treatment. Nineteen (95%) guidelines recommended treatment for residents should
247 be obtained from GPs. One (5%) detailed how this could be financed, recommending that
248 resident's treatment be prescribed and paid for by their own GP practice, but that the GPs be
249 reimbursed by the local Clinical Commissioning Group (CCG), the bodies that commission
250 local healthcare services in England. Thirteen (65%) guidelines suggested that the facility
251 carry the financial responsibility for purchasing all staff treatments. These guidelines
252 highlighted the potential barriers imposed by asking staff members to purchase their own
253 treatments, stating that this may hinder the coordination of an early, simultaneous and

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3 254 effective treatment as staff may feel that treatment is too expensive, or unnecessary if they are
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5 255 asymptomatic. One (5%) guideline provided template reimbursement forms where a local
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7 256 agreement with the CCG was in place that this body also be responsible for reimbursing costs
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10 257 of staff treatment. There was also disagreement on whether the facility should pay for the
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12 258 treatment of all staff, or only of asymptomatic staff, or also of the household contacts of
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14 259 symptomatic staff.
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20 261 Fifteen (75%) guidelines considered the logistical barriers to coordinating mass treatment
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22 262 programmes. Common themes identified included the difficulties with obtaining sufficient
23
24 263 treatment for residents. Recommendations for overcoming this barrier included using a single
25
26 264 pharmacy or the CCG Chief Pharmacist to coordinate the supply of treatment, and ensuring
27
28 265 extra tubes are prescribed to allow for large or tall people, or for the reapplication of
29
30 266 treatment that had been prematurely washed off during the treatment process. It was further
31
32 267 recommended that enough scabicide for both treatment days was obtained on a single
33
34 268 prescription. In order to inform residents, staff and visitors, seven (35%) guidelines included
35
36 269 practical tools such as posters for visitors and patient information leaflets.
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44 271 Difficulties in coordinating the timing of the simultaneous treatments were also highlighted
45
46 272 throughout the texts. Recommendations ranged from simply stating that it was easier to leave
47
48 273 the lotion on overnight, and that high levels of staffing would be required, to more detailed
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50 274 plans. One detailed example of a treatment plan included:

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53 275 “The late/night shift (dirty team) must apply treatment to all residents -all other staff not on duty as the
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55 276 ‘dirty team’ must apply treatment to themselves and their identified close contacts at this time. (The
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57 277 next day) the early shift who themselves are treated must remove the treatment from all residents -the
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3 278 'dirty team' must go off duty and apply treatment to themselves and their identified close contacts...
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5 279 Arrange for staff who will be away (e.g. sick/on holiday) to be treated at the same time as the home...
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7 280 Arrange for residents currently away from the home (e.g. in hospital) to be treated prior to return....".
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12 282 **Discussion**
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18 284 While guidelines for individual case management were relatively consistent, there was great
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20 285 variation in the recommendations regarding outbreak management strategies, and the roles
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22 286 and responsibilities of individuals and organisations in coordinating the outbreak response.
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24 287 Advice around the investigation and management of crusted scabies, especially the use of
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26 288 ivermectin, was also variable. Although several of the logistical and financial barriers to
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28 289 successful outbreak management in RCFE were raised, there was a lack of consensus on the
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30 290 proposed solutions.
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38 292 *Existing UK and international guidance*
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44 294 The wide diversity in guideline recommendations reflects a gap in UK national guidance,
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46 295 which focuses almost exclusively on the management of the individual patient [16,22]. There
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48 296 is little international guidance on institutional outbreak management strategies [23]. The
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50 297 European Guideline for the Management of Scabies (2010) [24], closely reflects the British
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52 298 Association for Sexual Health and HIV guideline (2007) [25], and fails to address scabies in
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54 299 institutional settings. There is inconsistency surrounding the production, commissioning or
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56 300 validation of guidelines across Europe. France [26] and the Netherlands [27] are examples of
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3 301 countries that have implemented national policy for scabies in community settings. Despite
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5 302 this, in a recent Dutch outbreak, the plurality of guidelines and protocols was identified as a
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7 303 factor complicating the successful coordination of outbreak response [28]. We have not
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9 304 analysed or attempted to present a representative sample of international guidance, however it
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11 305 does appear this pattern of unclear evidence attribution also exists in other guidance on
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13 306 institutional scabies outbreaks globally. For example, Bouvresse *et al.* have published an
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15 307 eight step approach to managing scabies outbreaks in healthcare institutions, based on current
16
17 308 available evidence and recommendations made by the Centers for Disease Control and
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19 309 Prevention (CDC), the national public health institution of the United States [10], yet how
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21 310 evidence was selected for these recommendations is not clear. Similarly, the International
22
23 311 Committee of the Red Cross provides a guide to managing scabies outbreaks in prisons, and
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25 312 despite the clarity and accessibility of this guidance, it is unclear on which evidence
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27 313 individual recommendations are based [29]. In the United States, though the CDC provide
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29 314 suggestions of what to include, it is local and/or state health departments that produce
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31 315 guidelines for scabies outbreak management [30]. In Australia guidelines are developed at a
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33 316 state government level [31]. To our knowledge no review similar to this one has been carried
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35 317 out on the resultant policies in either country.
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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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3 326 this recommendation anywhere in the text of their guidance. This illustrates the key issue that
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5 327 it is not known how existing guidelines have been developed, and to what extent their
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7 328 recommendations have been based on evidence, context, or expert advice.
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13 330 *Diagnosis and treatment*
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19 332 In some areas, the lack of agreement between guidelines appeared to reflect variation in the
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21 333 scientific literature, such as for the incubation period of scabies, which is essential knowledge
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23 334 in the development of a time frame for contact tracing and follow up [12,32]. However, one
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25 335 area on which the literature was relatively clear, but yet the guidelines varied, was crusted
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27 336 scabies. Highly contagious yet frequently under-recognized, crusted scabies commonly
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29 337 affects the index case in outbreak situations [8]. This represents a need for the early diagnosis
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31 338 of this variant in order to prevent the subsequent spread of infection [2], and yet its clinical
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33 339 features were only described by 12 (60%) guidelines. Similarly, classical scabies can be
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35 340 difficult to diagnose in the elderly, yet only 14 (70%) guidelines described the possible
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37 341 differences in presentation. This information is essential, given that misdiagnosis occurs in
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39 342 approximately 43% of institutional scabies outbreaks and leads to outbreak prolongation [8].
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47 344 Oral ivermectin was recommended for classical scabies by nine (45%) guidelines, despite
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49 345 only being available in the UK on a named patient basis for treatment-resistant crusted
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51 346 scabies in combination with topical treatment [22]. A study by Barkwell *et al.* [21] referenced
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53 347 in one (5%) guideline caused controversy after indicating an increased risk of death with
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55 348 ivermectin use in long-term care settings. The validity of this study has been disputed and its
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3 349 results have not been reproduced [33–36]. Later studies have shown ivermectin to be equally
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5 350 as effective as one dose of permethrin [37], and recommended that oral therapy should be
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7 351 preferred when topical therapy is difficult to apply, such as in mass treatment settings [2,10].
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9 352 This is currently reflected in the French national guidelines [26].
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16 354 *Outbreak management strategies*
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22 356 Scabies outbreaks are associated with a high workload and the need for considerable
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24 357 resources [2,10]. The effectiveness of infection control methods and the prophylactic
25
26 358 treatment of contacts in scabies outbreaks have been identified as important research gap
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28 359 [23]. This paucity of evidence is reflected in a highly varied response from the guidelines,
29
30 360 particularly in terms of who should receive treatment and to what extent infection control
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32 361 measures are needed. A thorough assessment of the evidence base is needed, in order to
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34 362 ensure that recommendations are not needlessly increasing staff workload.
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41 364 *Roles and responsibilities*
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47 366 The striking variation in the description of the roles and responsibilities of the stakeholders
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49 367 involved in scabies outbreak management is unsurprising given the ongoing structural
50
51 368 reorganisation within PHE and health and social care services. Our findings show that local
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53 369 guidelines seek to ameliorate the situation according to local organisational structure. There
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55 370 were some clear areas of misunderstanding, for example the Care Quality Commission
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3 371 explicitly states that scabies outbreaks do not need to be reported to them despite almost half
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5 372 of the guidelines recommending that they be notified [38].
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11 374 *Financial and logistical barriers*
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17 376 A noteworthy omission in many guidelines was the practical, ethical and financial impact of
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19 377 outbreak management strategies on staff and residents. Staff in RCFE frequently report
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21 378 concerns about the high workload burden and ethical implications of treating residents with
22
23 379 dementia, who are themselves more prone to scabies infections [8]. Concerns surrounding
24
25 380 treating residents with dementia, such as dealing with wandering behaviour, the treatment of
26
27 381 residents without capacity to consent, or the distress caused by isolation, were not mentioned
28
29 382 by any of the guidelines [2,39]. This is particularly important given the obligations RCFE
30
31 383 have to residents under the Mental Capacity Act 2005 [40]. The direct and indirect costs of
32
33 384 managing scabies outbreaks in RCFE can be substantial [8]. Although the financial
34
35 385 implications for staff purchasing their own treatment was mentioned, this was not extended to
36
37 386 visitors, while the potential impact on the home such as through the loss of income due to
38
39 387 temporary closure to new admissions was not addressed [2] The financial impact for residents
40
41 388 of purchasing their own treatment was only mentioned by one of the guidelines, however this
42
43 389 may be because the majority of residents of such care facilities will be entitled to state-funded
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45 390 prescriptions due to their age or specific long-term health condition [41].
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54 392 **Limitations**
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3 394 This study had several limitations. The analysis was performed by a single reviewer, making
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5 395 it more error prone. This study only reviewed guidance on how scabies outbreaks should be
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7 396 managed, rather than how they were managed in practice by the local HPT or RCFE in
8
9 397 question. The study did not explore the methods used by ICTs, who predominantly manage
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11 398 community outbreaks of infection in four of the 24 areas that we contacted, and as such may
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13 399 not reflect the full spectrum of the recommended management of scabies outbreaks in RCFE
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16 400 in England.
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402 **Recommendations**

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404 There is a need for nationally produced guidance for the management of scabies outbreaks in
405 RCFE in England. Although local HPTs have attempted to fill this gap, the guidelines they
406 have produced are highly variable in their scope and content. Based on this review we have
407 constructed a set of key recommendations for areas that need to be clarified in future scabies
408 guidelines (Table 2), and we further recommend that national guidance would be the best
409 way to ensure clear lines of accountability and enable consistent care. Identifying measures to
410 overcome key barriers to successful outbreak management will require multidisciplinary
411 involvement, and input from care facility staff and managers should be obtained in the
412 formation of future guidelines. Evidence is lacking with regards to the optimal management
413 strategy for scabies outbreaks in these settings. There is a need to evaluate current practice
414 and to rationalize guidance to ensure all approaches implement the best available evidence,
415 even when incomplete, in order to ensure a minimum and feasible standard of care. Although
416 this study is focussed on the English setting, it is likely that evidence based recommendations
417 on the optimal management of scabies outbreaks would also be applicable on an international
418 level, and of interest to other countries currently lacking consistent management guidance. In

1
2
3 419 England, national guidance would be the most comprehensive way of ensuring a thorough
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5 420 and cohesive response to all outbreaks of this unpleasant and debilitating condition in the
6
7 421 elderly population living in residential care facilities.
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16 425 nationwide and the Medical Entomology Centre (Cambridge) for their help and support with
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18 426 this paper.
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27 430

28 29 431 **Declaration of Interest**

30
31 432 None
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34 35 434 **References**

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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%

- 1
2
3 7 (35%)
4
5 - Permethrin 5% only 2 (10%)
6
7 - Oral ivermectin can be used for the treatment resistant/non- 9 (45%)
8
9 cooperative/immunosuppressed patients

10
11 *Crusted scabies*

- 12
13 - Requires specialist/Dermatologist management 9 (45%)
14
15 - Several applications of topical scabicides required on 2-4 consecutive days 11 (55%)
16
17 - Oral ivermectin may be used for treatment resistant cases 12 (60%)
18
19

20
21 **Outbreak prevention** (e.g. being vigilant to presence of rash in new residents) 9 (45%)
22

23 **Outbreak management**

24
25 *Prophylactic treatment of staff and residents*

- 26
27 - Simultaneous mass treatment of all staff and residents 8 (40%)
28
29 - Simultaneous mass treatment of all high risk staff and residents (e.g. those that 8 (40%)
30 directly handle patients)
31
32 - Only staff and residents that have been in direct contact with symptomatic cases 2 (10%)
33
34 - Other 2 (10%)
35
36

37
38 *Further contact tracing for prophylactic treatment*

- 39
40 - All those who have had skin-skin contact with a case 10 (50%)
41
42 - Household members /family of staff cases 13 (65%)
43
44 - Visitors of resident cases 5 (25%)
45
46 - Sexual and intimate contacts of cases 10 (50%)
47
48 - Visiting staff (e.g. hairdressers, physiotherapists and agency staff) 2 (10%)
49

50 *Timing of treatments*

- 51
52 - Everyone should be treated twice, seven days apart. 3 (15%)
53
54 - Cases need to be treated twice; asymptomatic contacts require one treatment (Day 1). 6 (30%)
55
56 - 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 8 (40% day not specified).
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For Review Only

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For Review Only

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 scabicial treatment is obtained and who carries financial responsibility for its purchase
-

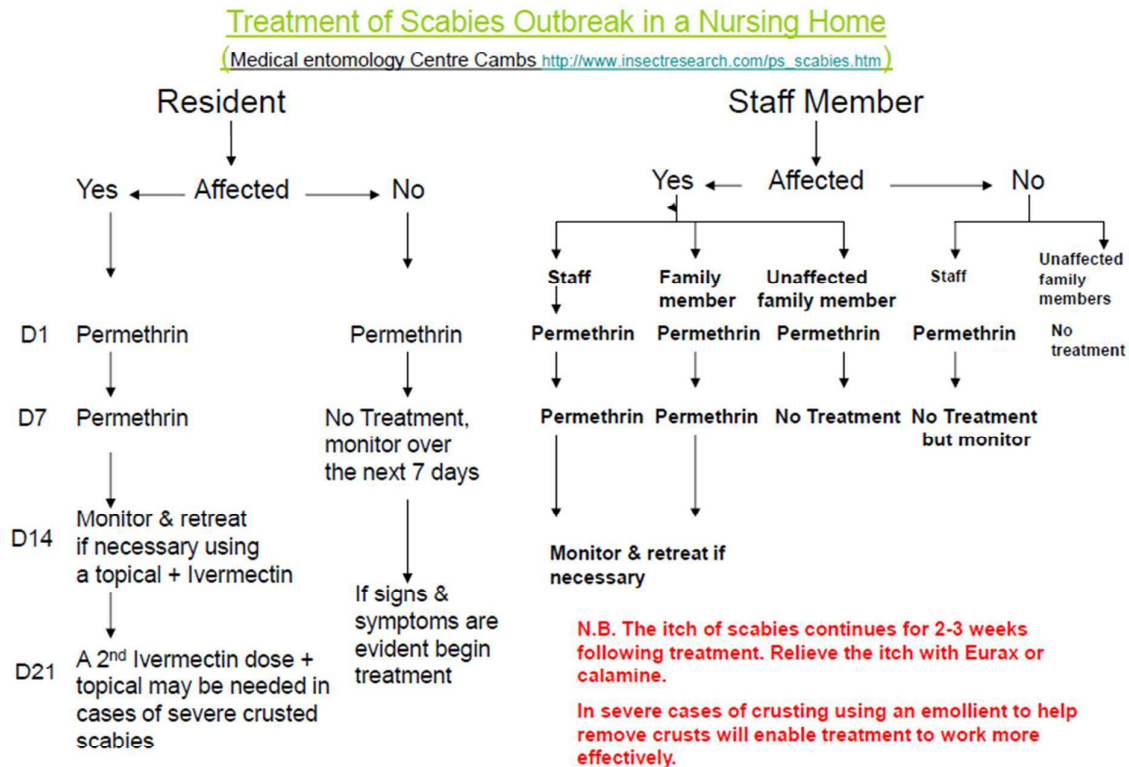
Epidemiology and Infection, The management of scabies outbreaks in care homes in England: a review of current health protection guidelines, L.C.J. White, S. Lanza, J. Middleton, K. Hewitt, L. Freire-Moran, C. Edge, M. Nicholls, J. Rajan-Iyer, J.A. Cassell. Supplementary Material

Supplementary Table S1: Examples of coding

Code (“” represents <i>a priori</i> code)	Text
“CLINICAL FEATURES”	Disease Information a) <u>Clinical features</u> 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 treatments over the counter
PURCHASING OWN TREATMENT	or paying for prescriptions <u>is expensive for staff</u> particularly if their household/close contacts also require treatment. Staff <u>may also feel that treatment is not necessary if they don't have any symptoms</u> but failure to comply could affect the successful management of the situation

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 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/HPAM_anagementofScabiesApril12.pdf) Accessed 26 January 2016.