

Scabies outbreak among healthcare workers in a German acute care hospital

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Abstract

Background: This article reports on a scabies outbreak among healthcare workers (HCW) in an acute care hospital. The outbreak was associated with a patient suffering from a chronic skin disease that was later diagnosed as crusted scabies.

Objective: The objective was to determine the outbreak drivers and define a prevention strategy against future outbreaks.

Methods: All staff that had contact with the patient were treated with 5% permethrin ointment. An interdisciplinary outbreak investigation team was established. The team conducted a questionnaire-based case-control study.

Findings: After the permethrin treatment, no further case was found. Twenty-seven HCWs who had contact with the index patient answered the questionnaire (response rate 73%). The outbreak questionnaire revealed 13 cases of secondary scabies among HCWs. In the multivariable analysis, a lack of glove use (odds ratio [OR], 9.8; *P* value = 0.036) and frequent close physical contact (OR, 8.151; *P* value = 0.038) were associated with increased risk of scabies acquisition.

Discussion: The scabies outbreak was most likely driven by three factors: an index patient with crusted scabies; a delayed diagnosis of this patient; and close physical contact without gloves during his hospital stay. The use of disposable gloves for patients with unclear dermatological diagnosis have the potential to limit future scabies outbreaks.

Keywords

Scabies, outbreak, Norwegian scabies, crusted scabies

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Introduction

Scabies is a highly prevalent infection worldwide, caused by *Sarcoptes scabiei hominis* (Walton and Currie, 2007). These mites are transmitted predominantly by skin-to-skin contact. Complications of scabies can be bacterial superinfection, nephritis, rheumatic fever and bacteraemia. While the contagiousity of normal scabies is considered rather low, an increased risk for transmission is associated with cases of so-called crusted or Norwegian scabies (Bouvresse and Chosidow, 2010).

This article describes an outbreak of scabies in an acute care hospital (hospital A, 320 beds) associated with crusted scabies in an 85-year-old patient. The index patient was initially admitted to a geriatric ward. He stayed in hospital A for 65 days in total. In a previous stay in another hospital he was diagnosed with ‘toxic contact dermatitis’. The referral

letter stated the exclusion of scabies and the initiation of topical corticosteroids. Therefore, during his stay in hospital A, he was treated with standard hygiene measures. Unfortunately, during this stay, he fell and fractured the patella of his left knee which had five years earlier

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undergone surgery, including a total knee replacement. The initial surgical treatment included a tension band plating. Unfortunately, the patient developed a postoperative wound infection and, despite intensive surgical and infectiological treatment, it exacerbated. As a result, the patient was referred to a tertiary care hospital with a specialised intensive care unit for surgical infectiology.

On admission to hospital B, the patient displayed a clinical picture compatible with eczema or psoriasis. However, dermoscopy revealed numerous scabies mites on multiple body sites including head, torso and hands. Contact precautions, including gowns and gloves, were started. Treatment was initiated with topical 5% permethrin ointment. One week later, skin lesions had improved but mites were still visible. Ivermectin treatment was recommended as efficacy of topical treatment seemed hampered by hyperkeratotic scales. Eight weeks after ivermectin, no further lesions were seen and the patient was declared free of scabies. Hospital A was informed immediately. A few days before the referral of the index patient and a few days after, five nurses at hospital A who had direct contact with the patient presented symptoms of scabies. An outbreak of scabies was suggested. As an urgent intervention, all staff of hospital A who had potentially had contact with the index patient were treated prophylactically with topical 5% permethrin ointment. Furthermore, an investigation was initiated, conducted by a multi-professional team from hospitals A and B in order to analyse the drivers of the outbreak and to develop a future prevention strategy.

Material and methods

The outbreak team initiated a questionnaire-based study based on risk factors found in the literature. The questionnaire contained questions on personal risk factors for scabies infestation (e.g. use of topical steroids, eczema), infection prevention behaviour (e.g. use of gloves, gown) and intensity of contact with the patient (e.g. regular physical examination). Secondary cases of scabies were seen only in healthcare workers (HCWs) of hospital A who had contact with the patient. Therefore, the questionnaire was distributed among all those HCWs. The complete questionnaire is available as supplementary material. All HCWs who developed pruritus and skin lesions after contact with the index patient were defined as secondary scabies cases. In the univariate analysis, categorical variables were assessed using the Chi-square test and continuous variables using the Wilcoxon rank sum test. A multivariable analysis was performed using a stepwise forward conditional logistic regression. For the data analysis, answers about the frequency of measures were transformed into binary variables as follows: often/daily = often; never/rare = rare. All parameters from the univariate analysis with a P value <0.200 were included in the analysis. The P values for including or excluding a variable in the multivariable model were 0.05

and 0.06, respectively. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated. SPSS (IBM SPSS statistics, Somers, NY, USA) was used for these analyses. Due to the observational character of this case description an ethical approval was not indicated.

Results

The questionnaire was handed out to the entire staff who had contact with the patient ($n = 37$). The response rate was 73% ($n = 27$). Thirteen HCWs reported secondary scabies, predominantly nurses ($n = 11$, 85%) (Table 1). Only eight cases answered the question on the onset of symptoms after first contact with the patient (62%). The results show a median onset on day 8 after first contact (range, 3–42 days). The cases were predominantly nurses ($P = 0.025$) and rarely used gloves when examining the patient ($P = 0.046$). In the multivariable regression analysis, low frequency in glove use when examining the patient and frequent close physical contact to the patient were independently associated with increased risk of scabies acquisition (OR 9.8 and OR 8.2; see Table 2).

Discussion

The onset of scabies symptoms varies between 24 h and six weeks (Walton and Currie, 2007). It depends on the immunological reaction of the skin and the time between infection and clinical presentation is usually between four and six weeks. In cases of reinfestation, the skin can react with itching or pruritic papules after as quickly as 24 h. The cases of this outbreak reported onset of symptoms was in the range of 3–42 days and corresponds with these findings.

A common feature of scabies outbreaks is index patients with crusted scabies and a delayed diagnosis of this disease (Lay et al., 2011; Walton and Currie, 2007). Our report supports this finding as the diagnosis of scabies in the index patient was confirmed only after the start of the outbreak. All secondary cases were HCWs at the hospital, specifically, HCWs with close physical contact and a low frequency of glove use. All cases were diagnosed with 'ordinary scabies'.

Our observation furthermore confirms crusted scabies as an important risk factor for nosocomial outbreaks (Walton and Currie, 2007). The index patient had been previously diagnosed with eczema and treated with topical steroids. Prior studies found that in corticosteroid-treated patients, scabies infestation has an increased chance of going undetected or show misleading clinical pictures resulting in wrong diagnoses (Lay et al., 2011; Walton and Currie, 2007). However, it is unclear whether immunosuppression is relevant for the development of crusted scabies or if, for example, topical corticosteroid applied on already highly infested skin masks the clinical picture of the disease (Mounsey et al., 2016).

Table 1. Univariate analysis of potential risk factors for scabies acquisition after contact with the index patient.

Parameter	Manifestation	Controls (n = 14) n, (%)	Cases (n = 13) n, (%)	P value
Gender	Female	7 (50%)	12 (92%)	0.033
Age	Years (median, IQR)	45 (31–54)	48 (38–53)	0.641
Profession	Physician	7 (50%)	1 (8%)	0.025
	Nurse	6 (43%)	11 (85%)	
	Physical/ massage therapist	1 (7%)	1 (8%)	
Individual risk factor for scabies infestation	Eczema ever	5 (36%)	2 (15%)	0.385
	Eczema last 12 months	1 (7%)	1 (8%)	1.000
	Self-use of topical corticosteroid	1 (7%)	1 (8%)	1.000
Gloves when physical examination	Rarely	2 (14%)	7 (54%)	0.046*
Physical examination	Often	2 (14%)	1 (8%)	1.000
Ointment application	Often	3 (21%)	8 (62%)	0.054*
Gloves when applying ointment	Rarely	–	2 (15%)	n.a.
Holding the patient	Often	3 (21%)	8 (62%)	0.054*
Change of bed linen	Often	3 (21%)	7 (54%)	0.252
Washing the patient	Often	3 (21%)	7 (54%)	0.120*
Blood pressure measurement	Often	3 (21%)	7 (54%)	0.120*
Gloves when treating the patient	Often	2 (14%)	3 (23%)	0.648
Potential contact days with patient	Days	27 (13–27)	27 (9–27)	0.791
Affected family members		–	1 (8%)	n.a.

n.a., not applicable.

Table 2. Results of the multivariable logistic regression analysis.

Parameter	P value	OR	95% CI
Disposable gloves rarely used when examining patient	0.036	9.789	1.163–82.418
Holding the patient often	0.038	8.151	1.121–59.270

Analysed parameters included: gloves during physical examinations, frequency of ointment application, frequency of holding the patient, frequency of blood pressure measurement or i.v. drug administration, frequency of washing the patient.

Scabies mites are resistant to water, soap and alcoholic hand rub, but are controllable by the use of disposable gloves (Bellissimo-Rodrigues et al., 2008; Khan et al., 2012). In hospital A, the patient was managed using standard hygiene measures. Upon admission in hospital B, the patient was put under contact precautions including gowning and gloving. In hospital B, no cases of secondary scabies arose. The results of our inquiry also support that the use of gloves reduce the transmission risk.

Our outbreak was successfully controlled by administration of topical permethrin to all individuals at increased risk. This is consistent with other reports (Belvisi et al.,

2015; Bouvresse and Chosidow, 2010). However, the effectiveness of a topical treatment is significantly reduced in crusted scabies (Stoevesandt et al., 2012). In these cases, a systemic therapy with weight-adapted dosage of ivermectin has been recommended (Dourmishev et al., 2005). In crusted scabies especially, the use of repeated applications has been recommended since ivermectin is not ovicidal.

This outbreak demonstrates a collection of factors that together lead to a scabies outbreak in an acute healthcare setting: an index patient with crusted scabies who is under immunosuppressive medication; a delay in diagnosing scabies; and close physical contact to the patient without

wearing gloves. Therefore, precautions should be considered in cases of unclear dermatological diseases in immunosuppressed patients. Preventative measures should include the use of disposable gloves during close physical contact and repeated dermatological consultations until the discharge of the patient.

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