Occupational risk of scabies among healthcare workers: problem focus and personal experience

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Abstract

Introduction: scabies is a contagious parasitic disease which can cause hospital outbreaks, with possible involvement of sanitary staff, and considerable economic and managerial implications. The Policlinico San Matteo of Pavia adopts (since 2005) a protocol for the management of index cases, based on early patient isolation, identification of close contacts, and their prophylactic treatment. We report here descriptive data on reported cases of scabies and on the effectiveness of the protocol.

Materials and Methods: retrospective study (2005-2014) of the index cases. For each case, clinical data were collected, as well as information on the healthcare workers who had dealt with the patient within the 6 weeks (maximum scabies incubation period) preceding the diagnosis.

Results: 30 index cases were identified: 11 females and 19 males; mean age 60 years; range: 2 months - 92 years. 9 patients had been transferred from other health facilities. 11 were immunosuppressed: of these, 3 were suffering from Norwegian scabies (a highly contagious variant). Close contacts included 894 health professionals, mainly nurses, physicians and students; of these, 158 had provided care to patients with Norwegian scabies: 15 (1.7% of the entire sample) were infected. This percentage is below the rates of infection (sometimes > 30%) reported in other case series.

Discussion: scabies is a major occupational hazard in hospitals, especially for nursing staff, including students in training. Immunocompromised patients are particularly dangerous, since they are more prone to developing Norwegian scabies. The operative protocol adopted by the Policlinico San Matteo is effective for risk containment.

KEY WORDS: biological risk, hospital, nurses, parasitic disease, prevention, sarcoptes scabiei.

Introduction

Scabies: transmission and epidemiology

Scabies is a contagious skin infestation caused by the mite Sarcoptes scabiei var. hominis, an obligate human parasite. The fertilized female lays two to three eggs daily in tunnels burrowed in the epidermis, which mature to adult mites 17 days later. Once the parasites have reached the adult stage, they emerge onto the skin surface, where they mate, thus repeating the life cycle. The males stay on the skin surface, seeking new females to mate with, and die after a short time, while the females live for up to six weeks (1, 2). The disease is transmitted by prolonged, direct skin-to-skin contact (sexual transmission is a possibility), more rarely by indirect contact with bedding, clothing, or other contaminated fomites. The clinical manifestations in the host are the result of reactions to the mites, their saliva, eggs, and excrements, mainly sustained by type IV delayed hypersensitivity. Thus, symptoms generally appear 4-6 weeks after the initial infestation. In cases of subsequent contact with the parasite, they reappear more rapidly, within a few days, but only in a minority of subjects, indicating development of a certain degree of protective immunity (2, 3).

Scabies may affect all age groups, races, and social classes (4). Several risk factors are known, including poverty, overcrowding, promiscuity, poor hygiene, homelessness, malnutrition, dementia, substance abuse, and immunosuppression. Outbreaks frequently occur in communities, such as kindergartens, schools, hospitals, nursing homes, shelters, prisons, and convents (1, 5).
The prevalence of scabies is underestimated, since it is not a notifiable disease in most countries. In the developing world, it represents a serious public health problem, with prevalence ranging from 3.8 to 8.8%, without significant gender differences. Lower rates (<1%) are reported in industrialized countries, where the infestation is more frequent among women, and during autumn and winter (6, 7).

**Clinical aspects**

The hallmark of classic scabies is generalized, intensive pruritus with nocturnal predominance. Skin lesions appear as burrows and erythematous papules. Burrows are pathognomonic: they are serpiginous whitish lines in the outer epidermis of several millimeters in length. Typical locations are the interdigital spaces of the hand, the flexural surface of the wrists, elbows, and anterior axillary folds. Other common sites are the penis and scrotum, the areolae (in women), the buttocks, the sacral and periumbilical areas (1, 2, 8).

Frequent complications, especially in tropical areas, are secondary scratching lesions and superinfection, often caused by *Staphylococcus aureus* and group A *Streptococcus*: the classical features are then obscured by excoriations, impetiginization or eczematization. Secondary bacteriemia or septicemia are possible. Streptococcal infection can lead to glomerulonephritis and rheumatic fever, through autoimmune mechanisms (7, 9).

Nocturnal itching can cause neuropsychological disturbances related to sleep deprivation. Additionally, patients who have been successfully treated for scabies (or, sometimes, even contacts who never had the disease) may develop acarophobia or delusions of parasitosis (“pseudoscabies” or “psychoscabies”). This latter condition should be distinguished from the rather common persistence (up to a month) of pruritus and mild cutaneous phlogosis after therapy completion (7, 10).

A presumptive diagnosis of scabies can be made on the basis of history and physical examination. The disease can be confused with almost any pruritic dermatosis, particularly with atopic dermatitis, popular urticaria, pyoderma, insect bites, and dermatitis herpetiformis. Certain animal mites (e.g., *Sarcoptes scabei var. canis*) may transiently infest humans, and should be suspected in pruritic dermatoses of uncertain cause (2, 7).

Definitive diagnosis relies on the identification of mites, eggs, eggshell fragments, or mite pellets. This is usually obtained by microscopy of multiple, superficial skin samples from characteristic lesions (1, 2). Dermatoscopy and video-dermatoscopy increase diagnostic accuracy (11). Serologic testing is another possible diagnostic approach (12, 13).

Scabies is treated with local or oral agents (14). Currently, the drug of choice is permethrin (a synthetic pyrethroid compound) as a topical 5% cream: it should be applied overnight twice, one week apart, over the entire skin surface (with the exception of the face and scalp), the region behind the ear down, with particular care to the sites where the disease more frequently localizes (see above). Patients should be advised that itching and skin irritation usually persist for a few weeks after healing and, therefore, not to unnecessarily repeat applications. The alternative to topical treatment is oral ivermectin (200 µg/kg body weight). Since this drug is not effective against the eggs of the parasite, a second dose should be administered after 1-2 weeks. In addition to the acaricide therapy, local emollients and systemic antihistamines may be used to relieve the itching. Infective complications are treated accordingly (7, 15, 16).

**Crusted (Norwegian) scabies**

Orkin (17) described nine atypical presentations of scabies that may present diagnostic difficulties (Table 1).

<table>
<thead>
<tr>
<th>Special forms of scabies (17).</th>
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<tr>
<td>Scabies in patients with good hygiene</td>
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<tr>
<td>Scabies incognito</td>
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<td>Nodular scabies</td>
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<td>Scabies in infants and young children</td>
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<td>Scabies in the elderly</td>
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<td>Crusted (Norwegian) scabies</td>
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<td>Scabies and HIV/AIDS</td>
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<td>Scabies of the scalp</td>
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<td>Bullous scabies</td>
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Among these, crusted scabies (approximately 7% of cases) is particularly relevant to the topic of the present article. This form is also known as Norwegian scabies since it was first described in Norway among patients with leprosy (18). Historically, this condition has been associated with advanced age, debility, and developmental disabilities such as Down’s syndrome. Nowadays, it is mainly observed in patients with AIDS or other forms of immunosuppression (e.g., after antineoplastic chemotherapy or organ transplantation). An identifiable risk factor is lacking in approximately 40% of cases of crusted scabies, suggesting an inherited predisposition to this variant (19). Norwegian scabies presents as psoriasiform dermatitis with an acral distribution and variable whitish scaling, occasionally accompanied by generalized lymphadenopathy. Nails are commonly involved, with hyperkeratosis of the subungual area leading to thickening and dystrophy. Pruritus is mild or absent. Mortality rate due to secondary sepsis is high, up to 50% at 5 years (8, 19).
The average number of mites on the skin of a patient with classic scabies is usually low (around 10 to 12), due to mechanical removal by scratching and the host immune response (7, 8). In crusted scabies, these defensive mechanisms are lacking. As a consequence, hundreds to millions of parasites may be present in the patients’ scales and nails and contaminate the hospital environment, where they survive for up to three days, with high risk of transmission to other patients, healthcare staff, and visitors (5, 8).

**Scabies and healthcare workers**
As mentioned above, outbreaks of scabies can occur in various community settings, including hospitals and healthcare facilities. Such events usually follow the admission of a patient with unrecognized scabies (sometimes, the crusted variant), and a large numbers of other patients and staff are exposed before the disease is recognized. Consequently, the outbreaks can be widespread, prolonged, and difficult to control. They induce significant anxiety among patients, visitors and personnel, and may result in ward closure, disruption of medical services, significant excess costs, and image damage. In spite of this, scabies in healthcare facilities is often an underestimated problem (5, 20).

Epidemiological data on occupational scabies are limited. A questionnaire study in 130 chronic healthcare institutions in Canada revealed that 25% of them reported cases of the disease over a one-year period. Healthcare workers were infested in 11% of these institutions. Their size, in terms of number of residents and staff, was a risk factor for the development of scabies. Only a few of the facilities had a written policy for dealing with infestations, especially in the case of a mass outbreak (21).

In the United Kingdom, scabies accounted for 11.1% of the infectious diseases reported by occupational physicians from 2000 to 2003. Most cases occurred among social care and health workers (22).

A review identified 19 hospital epidemics worldwide during the 1999-2003 period: average duration of the outbreak was 14.5 weeks (range, 4-52), involving an average of 18 patients (range, 3-32) and 39 healthcare workers (range, 6-278). Factors facilitating the development of the disease were poor knowledge of scabies epidemiology, unfamiliarity of physician and nurses with atypical presentations, long incubation period, diagnostic delay, and incomplete monitoring (5). Similar data originated from more recent epidemics in Switzerland (23), Germany (24), Canada (25), and Italy (26).

Management of scabies’ outbreaks is problematic. During the long incubation of the disease (up to six weeks), contacts may act as reservoirs for onward infection, or even cause re-infection in the index patient. No international consensus exists on interventions for preventing the spread of the infestation among close contacts with index cases. However, it is generally recommended that close contacts receive prophylactic treatment. Additionally, healthcare personnel may require restriction from work until treatment has been initiated (20, 27). Recently, a management model based on an information-centered strategy was used as an alternative to mass prophylaxis, with some success (26).

**The operative protocol of the Policlinico San Matteo**
The Policlinico San Matteo of Pavia (Italy) is a third level regional hospital, hosting the local University School of Medicine and Surgery. It has more than 1,000 beds and employs more than 4000 healthcare workers, providing at the same time practical training to hundreds of medical and paramedical students. To prevent the transmission of scabies to employees and students, the hospital adopts (since November 2005) an operative protocol, divided into 16 sections (Table 2), devised and periodically updated (every 3 years) by the Occupational Health Service, in cooperation with the Sanitary Direction (Epidemiology Committee) and the Department of Infectious Disease (which includes the Unit of Dermatology).

**Table 2 - Sections of the Policlinico San Matteo protocol for the management of index cases of scabies.**

| 1. | collocation of the patient |
| 2. | notification |
| 3. | identification of the type of isolation to be implemented |
| 4. | gloves and hand washing |
| 5. | full protective overalls |
| 6. | therapeutic treatment of the index case |
| 7. | transport of the patient |
| 8. | medical equipment |
| 9. | bedding and clothes |
| 10. | medications |
| 11. | biological samples |
| 12. | waste disposal |
| 13. | room cleaning |
| 14. | health education |
| 15. | contact list, and their prophylactic treatment |
| 16. | organization of staff shifts |

The protocol contemplates, first of all, isolation of the index patient and notification of the case to the public sanitary authority and the Occupational Health Service of the hospital. Physicians and nurses must wear...
disposable protective devices, to be discarded after use in specially provided containers, located in the patient’s room. The diagnosis, treatment and follow-up of the index case are managed by the dermatologist. The patient is transported only when absolutely needed, with appropriate precautions. The patient’s bedding and pajamas should be preferably disposable. Alternatively, bedding and clothes must be sealed in double bags, treated with a pyrethroid, and sent to the laundry after 24 hours, where they are washed at >50 °C, or dry cleaned. The room is cleaned and sanitized on a daily basis, and at patient discharge. Information and health education are provided to the patient, relatives, visitors, and healthcare personnel. A most important, critical step of the protocol is the identification of all the index case’s contacts during the six weeks (maximal scabies incubation period, see above) preceding the recognition of the disease. Close contacts are advised to receive (free) prophylactic treatment, and exposed health workers are declared “temporarily not fit for the job”.

Materials and Methods

To evaluate the effectiveness of the protocol described above, we performed a retrospective analysis of the cases of scabies diagnosed among in-patients of the Policlinico San Matteo between November 2005 and March 2014. For each case, we collected personal and clinical data, as well as information on the healthcare workers who had come into close contact with the patient within the 6 weeks preceding the diagnosis of scabies.

Results

Thirty index cases were identified. The sample consisted of 11 females (36.7%) and 19 males (63.3%), aged between 2 months and 92 years (average: 60.2 years). Five patients (16.7%) were less than 18-year-old (pediatric cases). Four patients (13.3%) had been transferred to the Policlinico from other hospitals, 5 (16.7%) from retirement homes. Only 5 patients (16.7%) were in surgical units when scabies was diagnosed.

The case record included 11 subjects (36.7%) who were immunosuppressed. Three of them (10.0% of the whole sample) had Norwegian scabies. A search for close contacts identified 894 healthcare workers, mostly nurses and physicians (Figure 1). A considerable percentage of them (n = 158; 17.7%) had been in contact with the cases of Norwegian scabies.

In accordance with operative protocol, all the involved personnel received prophylactic treatment (total compliance), with the exception of 6 subjects (who were re-categorized, in a later more detailed investigation, as being occasional contacts to classic scabies cases, with negligible risk of infection). In total, 15 health workers (1.7%) developed occupational scabies (the disease was already present at the moment of their identification as contacts), with a preponderance of cases among nurses and student nurses (Figure 2). This percentage is far below the rates of infection (sometimes > 30%) reported in other experiences (5). All cases of occupational scabies (successfully treated) originated from patients with Norwegian scabies.

Discussion

Our experience confirms that scabies is a common problem in the hospital setting, where its timely diagnosis and appropriate management may be difficult. Nurses are at the forefront in providing patient care. For this reason, they are the healthcare workers more
exposed to biological risk, including occupational scabies. In training hospitals, the same appears to be true for student nurses.

With regard to occupational transmission, Norwegian scabies is by far the most dangerous variant. Medical staff should be trained to look for and recognize the disease at an early stage, particularly when dealing with immunosuppressed subjects. Special caution is also required for patients who are socially disadvantaged, homeless, drug addict, immigrant, and/or elderly, especially when they arrive from communities or residential care homes.

Every health facility should develop a specific protocol for the management of occasional scabies cases, to prevent outbreaks of the infestation. A recent review pointed out the lack of well-designed, randomized controlled trials on the use of prophylactic measures to prevent the spread of the disease among contacts (27). However, common sense says that treating close contacts restricts onward transmission and prevents re-infection of the index case. This appears particularly true in hospitals, where a large number of vulnerable patients and healthcare staff are in close proximity to each other. The operative protocol adopted by the Policlinico San Matteo appears effective for the containment of risk.

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