

Scabies: A clinical update



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Background

Scabies is a common, yet neglected, skin disease. Scabies occurs across Australia, but most frequently in socioeconomically disadvantaged populations in tropical regions, including in remote Aboriginal and Torres Strait Islander communities. In temperate settings, the disease clusters in institutional care facilities.

Objectives

The objective of this article is to provide updates on the clinical diagnosis and treatment approaches for scabies in Australia.

Discussion

Clinical examination remains the mainstay of diagnosis, although dermatoscopy is a useful adjunct. Scabies presents with severe itch and a papular rash, with a predilection for the hands, feet and genitalia. The distribution may be more widespread in infants and older people. Secondary bacterial infection is also common in patients with scabies. Crusted scabies is a rare but highly infectious variant. Topical permethrin is highly effective for individual treatment, but less practical for treatment of asymptomatic contacts and control of outbreaks. Oral ivermectin is a safe and effective alternative, and is now listed on the Pharmaceutical Benefits Scheme as a third-line treatment.

Scabies is caused by the microscopic mite *Sarcoptes scabiei* var. *hominis*. The mite is transmitted via person-to-person contact and, therefore, household contacts are at highest risk of infestation. Only 20 minutes of close contact (eg holding hands or sexual contact) is required for successful transmission.¹ Scabies occurs worldwide, affecting an estimated 100 million people each year.² The highest prevalence of scabies is in tropical areas, especially in populations with co-existing poverty and overcrowding.

Scabies affects species other than humans, including dogs, pigs and Australian wildlife, but the disease in these animals is caused by *S. scabiei* variants, which are genetically distinct from scabies in humans. These animal variants cannot reproduce on the human host and, therefore, are only able to cause minor, self-limited infestation.^{3,4}

Most patients present with 'classical' (also known as 'typical') scabies caused by a low burden of mites (5–15), with the rash typically located in an acral distribution. Rarely, patients may present with 'crusted scabies', caused by hyperinfestation of millions of mites, which leads to hyperkeratosis.⁵

Children and older people are at highest risk of scabies. Infection risk increases in settings with higher levels of population density, including residential aged care facilities (RACFs), prisons and refugee camps, among returned travellers to endemic areas, and within remote Aboriginal and Torres Strait Islander communities with overcrowded housing. Patients with underlying immunodeficiency from any cause, such as human immunodeficiency virus (HIV), human T-lymphotropic virus 1 (HTLV-1) or corticosteroid treatment, are at an increased risk of crusted scabies.^{5,6}

Scabies lesions are often secondarily infected with *Streptococcus pyogenes* (Group A Streptococcus [GAS]) and/or *Staphylococcus aureus* because of breaches in the skin barrier.⁷ These organisms have the potential to cause local soft tissue infections such as impetigo, cellulitis and abscesses, and can also lead to potentially fatal bloodstream and other sterile site infections. Skin infections with GAS can also lead to post-infectious sequelae, including post-streptococcal glomerulonephritis,² which in turn is a risk factor for subsequent development of end-stage

renal failure.⁸ A link has also been proposed between GAS impetigo and acute rheumatic fever, especially among remote Aboriginal and Torres Strait Islander peoples, although this has yet to be proven.⁹

Clinical features

The symptoms of scabies infection are caused by the host allergic response to the mite. After the first infestation, there is a delay of up to six weeks before symptoms begin to develop. Subsequent infections become apparent earlier after exposure.⁵

The clinical features of classical scabies are papules or burrows in typical locations, including the web spaces of the fingers and toes, wrists, buttocks, breasts in females, and genitals (Figure 1). Young children and older people may have more widespread involvement, including palms, soles and scalp. Scabies is intensely itchy, affecting the body and limbs, but usually sparing the head and neck (except in infants). The itch is worst at night. Skin breaches from mite burrows and the excoriation from scratching the itch often result in co-existing bacterial skin infection, up to 79% in some studies.¹⁰ Bacterial skin infection should be considered when scabetic lesions have surrounding erythema, yellow crusting or pus (Figure 2). Crusted scabies is characterised by plaques and extensive scale and, in severe cases, deep fissures may develop. In contrast to classical scabies, crusted scabies may not be itchy.

The most obvious effects of scabies on an individual are the severe itch and subsequent sleep disturbance, both of which have an impact on school and work attendance and performance and, ultimately, affect the economic productivity of communities.¹¹ In addition, patients with scabies are at risk of secondary bacterial infection with all of its potential complications as described above.

Diagnosis

Diagnosis is usually made on the basis of clinical features alone. Multiple household members with itch should raise suspicion of scabies. For cases that do not have the typical distribution or

appearance, the diagnosis can be more challenging. Applying ink from a pen over a burrow entrance can confirm its presence as ink tracks along the burrow.¹² Dermatoscopy can be used to identify the characteristic 'delta sign', representing the mite's mouth parts, and the 'jet with contrail pattern' representing a mite and its burrow.¹³ Definitive diagnosis can be made by taking a skin scraping for analysis under light microscopy. The finding of the mite, its eggs or faecal pellets are diagnostic for scabies.⁵ However, dermatoscopy and skin scrapings may not be feasible in many settings. A response to empirical treatment also supports the diagnosis.

Diagnosis of crusted scabies requires confirmation by skin scrapings because of the intensity of treatment and public health implications. The extensive scale and high burden of mites makes specimen collection easier, and identification with magnification more sensitive.

Differential diagnoses

Practitioners should consider other differential diagnoses that may mimic classical scabies, including insect bites, other infections and inflammatory or immune-mediated dermatological conditions (Table 1). Possible differential diagnoses for crusted scabies include other conditions that present with extensive scale, such as psoriasis and seborrheic dermatitis.

Management

General considerations

The delay between infection and symptoms results in many asymptomatic, yet infected, household contacts of the index case at time of first diagnosis. Therefore, it is important in all instances to treat household contacts of cases. The risk of re-infestation is high if contacts are not treated, especially if contacts are infants or young children.¹⁴

Once scabies treatment has commenced, it is common, and almost expected, for itch to increase over a period of a few days. It is important to advise patients about this phenomenon to avoid



Figure 1. Classical interdigital papular rash consistent with scabies



Figure 2. Infected scabies in an infant

the perception of treatment failure. The itching associated with a scabies infestation can be managed with moisturisers, mild topical corticosteroids or oral antihistamines. If scabies treatment has been successful, all symptoms, including itch, will generally resolve by four weeks.⁵ Intensely pruritic, persistent nodules occasionally occur for months after successful treatment, most likely representing a hypersensitivity reaction to retained mite antigens.

Treatment options for classical scabies

The mainstay of treatment for classical scabies is a topical agent (Table 2). First-line treatment for scabies is topical permethrin 5% cream, which should be applied to the whole body (excluding the head and neck in patients other than infants) and washed off after eight hours. All household contacts should be treated at the same time. If the first application is thorough, then no repeat dose is required, as permethrin is active against all stages of the parasite's life cycle. If symptoms persist, we recommend a repeat application 7–14 days after the first treatment. Permethrin is highly effective and generally well tolerated, but success may be hindered by non-adherence of asymptomatic contacts,

inadequate application or by incidental washing off of the therapy. Benzyl benzoate 25% is the second-line topical agent. It commonly causes skin irritation, and should be diluted with water for children and infants (Table 2). It is applied and then left for 24 hours before being washed off.

Ivermectin is a macrocyclic lactone antiparasitic derived from fermentation products of the bacterium *Streptomyces avermitilis*.¹⁵ It has very broad antiparasitic activity, including against onchocerciasis (river blindness), lymphatic filariasis and soil-transmitted helminths.¹⁵ The use of ivermectin in mass drug administration campaigns against these diseases has been hailed as one of the world's great public interventions, recognised by the awarding of the 2015 Nobel Prize in Physiology or Medicine to the discoverers of ivermectin. The drug is active against the scabies mite, but not its eggs, and has a short half-life of 12–56 hours.¹⁶ Therefore, repeat dosing 7–14 days after the first dose is required to kill newly hatched mites. Ivermectin is the only currently available oral agent that is effective against scabies. However, alternative oral agents with longer duration of action are currently under active investigation, with the related drug moxidectin appearing to be highly promising.¹⁷

Table 1. Differential diagnoses of classical scabies¹³

Insect bites	Infections	Dermatitis	Immune-mediated
Mosquitos	Folliculitis	Eczema	Papular urticarial
Midges	Impetigo	Contact dermatitis	Bullous pemphigoid
Fleas	Tinea		Pityriasis rosea
Bedbugs	Viral exanthems		

Table 2. Treatment of typical scabies

Age	Medication	Brand names	Route	Dose and administration	Frequency
First-line treatment					
Younger than 2 months of age	Crotamiton	Eurax	Topical	Apply to whole body, wash off after 24 hours	Repeat daily for three days
Older than 2 months of age	Permethrin 5%	Lyclear	Topical	Apply to whole body, wash off after eight hours	Can repeat after 7–14 days if ongoing symptoms
Second-line treatment					
Older than 6 months of age	Benzyl benzoate 25%	Ascabiol Benzemul	Topical	Dilute to 6.25% for infants 6 months to 2 years of age Dilute to 12.5% for children 2–12 years of age Apply to whole body, wash off after 24 hours	Repeat once after 7–14 days
Third-line treatment					
5 years of age or older	Ivermectin	Stromectol	Oral	200 µg/kg Contraindicated if <15 kg, pregnant, or breastfeeding	Repeat once after 7–14 days

The key advantage of ivermectin is its oral formulation, increasing the likelihood that household contacts will adhere to treatment. Adverse effects include itch, headache, dizziness, and abdominal and joint pain, but these are usually mild and transient.¹⁸ There have been concerns about neurotoxicity when ivermectin is used in some animals;¹⁹ however, it does not cross the blood–brain barrier in humans.²⁰ Nonetheless, due to current limited safety data, ivermectin is not recommended for use in children younger than 5 years of age or weighing less than 15 kg. Ivermectin is also not recommended for use in pregnant and breastfeeding women. Ivermectin is considered to be safe in older people, but should generally be avoided in the very elderly and frail. Ivermectin is now listed on the Pharmaceutical Benefits Scheme (PBS), with streamlined authority for treatment of classical scabies for patients who have failed sequential treatment with topical permethrin and benzyl benzoate used four weeks prior, or have a contraindication to topical treatment.

A Cochrane review, which evaluated randomised trials of scabies treatment, concluded that topical permethrin was the most effective agent, when treatment failure was used as the outcome measure.²¹ Single-dose ivermectin was more effective than most topical agents in direct comparisons. However, in the only study that made a direct comparison with permethrin, a single dose of ivermectin was less effective.²² More recent data from a study of mass drug administration for scabies in Fiji found that ivermectin (two doses) was superior to mass drug administration using permethrin (two doses).¹⁸ In this study, in the ivermectin arm, the prevalence of scabies fell by 94% (prevalence 32.1% at baseline to 1.9% at 12 months), compared with a fall of 62% in the permethrin arm ($P < 0.001$).

Environmental measures for scabies infection

The role of transmission of scabies other than person-to-person transmission is controversial. Some authorities recommend hot laundering of clothes and bedsheets, and the use of aerosolised insecticides for furniture and carpets. While live mites have been recovered from the furniture of patients with scabies,²³ there is little evidence for the efficacy of environmental measures. Scabies mites are highly susceptible to dehydration away from the human host, surviving for only three days.¹ Human challenge studies in the first half of last century suggest that transmission from fomites is uncommon.²⁴ Further, the Fiji mass drug administration trial showed very high efficacy that was sustained out to two years without any environmental intervention.¹⁸ Therefore, we suggest environmental cleaning for classical scabies is unnecessary, aside from institutional settings (see below).

Treatment of associated impetigo

If impetigo is severe, topical scabies treatment may be intolerable, particularly with benzyl benzoate. Therefore, if the patient has significant secondary bacterial infection,

initial treatment with antibiotics and removal of crusts can be followed by topical scabies treatment. Flucloxacillin in adults and cephalexin in children (more palatable than flucloxacillin) are the preferred choice of antibiotics in non-remote settings where *S. aureus* is the most likely pathogen.²⁵ In remote settings, *S. pyogenes* is the primary driver of infection, and additional treatment options include short-course trimethoprim-sulfamethoxazole or intramuscular benzathine penicillin G.^{26,27} Trimethoprim-sulfamethoxazole is also recommended if methicillin resistant *S. aureus* is suspected or proven.

Treatment of crusted scabies

While crusted scabies is rare, extensive skin involvement places patients at high risk for invasive bacterial infection, sepsis and mortality.²⁶ Identification and treatment of this condition are also important as patients with crusted scabies are highly infectious and can perpetuate infestation within a community. If a case of crusted scabies is suspected, advice should be sought from a local expert. Treatment usually requires hospital admission for isolation and intensive treatment with a combination of topical scabicides, oral ivermectin and topical keratolytics. The frequency and duration of treatment are based on the severity at diagnosis.⁶ Environmental measures are also required to prevent fomite transmission because of the excessive scale and mites that are shed.

Public health considerations

Because of the prolonged asymptomatic phase, scabies is often spread from person-to-person before a diagnosis is made. Indeed, a scabies outbreak is indicative of transmission within the institution for at least several weeks. Widespread outbreaks may occur in closed communities, such as hospitals, RACFs and prisons, or areas where overcrowding is common. In these situations, involvement of the local public health unit, physicians, nursing staff, facility infection control and management is crucial in enabling a comprehensive and effective response.²⁸ There are a number of key elements to the public health management of scabies outbreaks. Early detection and implementation of infection control measures are key in preventing further transmission. Early identification of any case of crusted scabies is important. Once a case is diagnosed, or is suspected, the patient should be isolated in a single room until 24 hours after the first treatment has been completed, if possible, and staff and visitors should use contact precautions during this period. The index case should be treated, along with staff or visitors who had direct contact with them. Most guidelines recommend some form of environmental disinfection, including hot laundering of bedding, clothing and towels used by people with infestations any time during the three days before treatment, and routine cleaning and vacuuming of furniture and carpets in patients' rooms.

The most successful treatment approach in endemic infestations is mass drug administration – treatment of all

community members regardless of infection status.^{18,29} Sustained prevention may require public health strategies to improve housing and reduce overcrowding.

At a global level, scabies is classified as a 'neglected tropical disease' because of its substantial effects on the health and wellbeing of the world's poorest populations. The International Alliance for the Control of Scabies is a group of experts formed to increase awareness, collaboration and progress towards effective control measures for scabies (www.controlscaabies.org).³⁰ There is momentum for ongoing research into more suitable oral treatments for all ages, as well as integration of scabies surveillance and control with existing local and global health programs.³¹

Key points

- Scabies should be considered in any patient with an itchy papular rash, especially if multiple family members are affected.
- Diagnosis is often based on clinical recognition of a rash in a typical distribution – that is, in the interdigital spaces and limb extremities in older children and adults, as well as palms, soles and scalp in infants and older people.
- Ivermectin is now registered on the PBS for use in classical scabies where topical therapy has failed or is contraindicated.
- In endemic or outbreak settings, mass drug administration of permethrin or ivermectin to all members of the group, regardless of infection status, is an effective and safe strategy to substantially reduce the prevalence of scabies.

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