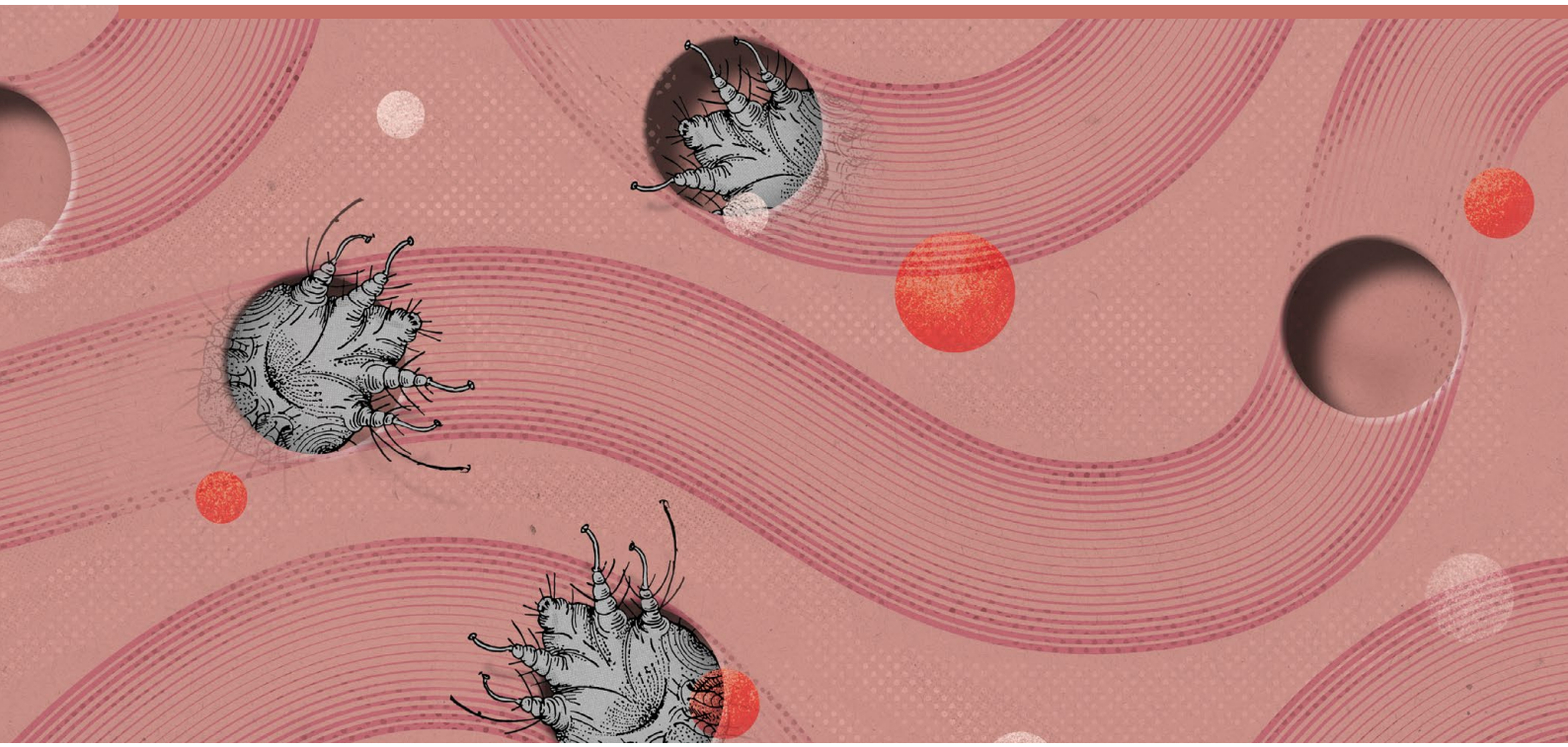

Scabies: diagnosis and management

Scabies is a highly contagious skin infestation that can often rapidly spread through households before it is detected. The characteristic pruritic rash, caused by a delayed hypersensitivity reaction, may not develop until weeks after the initial infestation. Consider the possibility of scabies in any situation where multiple household members report pruritus. Prompt treatment prevents ongoing transmission, and reduces morbidity and development of secondary complications, e.g. cellulitis, acute rheumatic fever.

KEY PRACTICE POINTS:

- Scabies is highly contagious and spreads through prolonged skin-to-skin contact, especially between household members, sexual partners and people at institutional care facilities. Transfer via fomites such as clothing or furnishings is also possible, but usually only occurs in cases of severe crusted scabies.
- Scabies affects people of all ages, however, children, older people and people who are immunocompromised are most vulnerable to infestation, particularly those living in low socioeconomic areas
- Scabies is classified as classic, nodular and crusted. Classic scabies results from infestation with a low number of mites, e.g. 5 – 15, nodular scabies is characterised by inflammatory nodules in skin folds and genital areas, and crusted scabies (uncommon) is due to hyper-infestation with thousands to millions of mites.
- Classic scabies can usually be diagnosed clinically based on the characteristic features of burrows, a papular rash and pruritus, supported by history, e.g. known contact with an infested person or location; response to empiric treatment confirms the diagnosis
- Burrows can be identified on visual examination, appearing as thin, irregular, brown-grey lines, but may not always be apparent. To aid in detection, an ink test can be used to highlight burrows or dermatoscopy used to visualise the mite.
- Laboratory-based microscopy of burrow content and skin scrapings is not usually necessary, but in some cases, may be requested to confirm a diagnosis of scabies, e.g. if crusted scabies is suspected, if there is a suspected outbreak in a residential care facility or following inadequate response to treatment. Occasionally, a skin biopsy requested in the investigation of a rash reveals unexpected scabies.
- Topical permethrin is the first-line treatment for people with classic scabies. Oral ivermectin is added to the treatment regimen for people with crusted scabies. All recent close contacts should also be treated.
- Pruritus may persist for several weeks after successful treatment; manage with topical anti-pruritic preparations, e.g. mild topical corticosteroids, crotamiton, as required. Unless there is an urticarial response to scabies, oral antihistamines are generally unhelpful but can be worth a trial. Pruritus persisting beyond six weeks may indicate an alternative diagnosis or inadequate treatment response. Secondary bacterial infection following excessive excoriation may require treatment with oral antibiotics.

This is a revision of a previously published article. What's new for this update:

- A general article revision
- Treatment regimens updated
- Malathion lotion and lindane lotion are no longer available for the treatment of scabies in New Zealand
- A Table has been added on available treatment options for persistent symptoms and secondary complications following treatment for scabies

Scabies – a highly contagious and pruritic skin infestation

Scabies is caused by the microscopic female scabies mite (*Sarcoptes scabiei* var. *hominis*) burrowing beneath the skin.[1, 2] Scabies affects people of all ages, however, children, older people and people who are immunocompromised are most vulnerable to infestation, particularly those living in low socioeconomic areas (see: "Person-to-person contact is usually required for transmission").[1]

The characteristic pruritic skin rash associated with scabies often does not develop until weeks after the initial infestation, as it is caused by a delayed type IV hypersensitivity reaction to the mites eggs, faeces and saliva (see: "Classic scabies is usually diagnosed clinically based on the characteristic features of burrows, rash and pruritus").[1, 2] Usually by the time the patient develops symptoms, scabies transmission will have already occurred.[1] Prompt treatment is therefore important to prevent ongoing transmission. Following treatment for scabies, some people experience persistent pruritus, a secondary rash, e.g. dermatitis, or develop a secondary bacterial infection from excessive excoriation (see: "Manage any ongoing symptoms and secondary complications").[3, 4]

There are three main presentations of scabies:

- **Classic scabies** is the most common form, involving infestation with a low number of mites (approximately 5 – 15) and usually accompanied by a pruritic skin rash that typically starts in an acral distribution, e.g. palms, soles, fingers, toes, and spreads to the trunk and limbs[1]
- **Nodular scabies** is a feature of chronic infestation of classic scabies, characterised by clusters of pruritic inflammatory nodules and papules on axillary folds and genital areas, e.g. the shaft of the penis, the scrotum and buttocks.[5] Nodules can persist even after successful treatment for classic scabies.[5]
- **Crusted scabies** (uncommon) results from hyper-infestation with thousands to millions of mites causing thick crusted plaques on the skin and hyperkeratosis.[1] Crusted scabies is more contagious than classic scabies and most commonly affects people with underlying immunodeficiency, neurological diseases that cause reduced sensation or immobility, older people and those living in institutional facilities (see: "Crusted scabies is uncommon, but more contagious than classic scabies").[4, 6]

Life cycle of a scabies mite

After mating, the female mite burrows into the upper epidermal layers of the skin where it lays two to three eggs per day for up to six weeks.[2, 3] The scabies mites hatch from the eggs, and progress through larval and nymphal stages, reaching maturity in approximately 10 – 13 days.[2] Female mites make new burrows while male mites move between burrows to mate; shortly after mating, the male mites die.[2, 3] Scabies mites are reliant on a human host to continue their life cycle and can only survive for approximately three days outside of a host.[1]

The scabies life cycle is species-specific. Animals can also be infested with scabies, but are affected by different variants.[1] These variants can be transferred from animal-to-human, however, they are unable to complete their lifecycle to reproduce on a human host.[1] Due to the mites' acute presence, the human host may experience self-limiting symptoms, e.g. transient pruritus and rash.[1] The animal variants are not thought to be transmissible from human-to-human.[4]

Person-to-person contact is usually required for transmission

Scabies transmission most often occurs through prolonged (e.g. 20 minutes) skin-to-skin contact with someone who has scabies.[1] More fleeting contact with someone who has crusted scabies may also result in transmission due to the extensive number of mites.[7] Scabies mites spread easily between household members, sexual partners and through other close contact behaviours, e.g. hand holding.[1, 2] Less commonly, mites transfer from the sharing of materials or fomites, such as clothing, towels, bedding and other furnishings; this form of indirect transmission is most often seen in cases of crusted scabies.[4]

Scabies is not the result of poor hygiene. The risk of developing a scabies infestation and its transmission is influenced by factors such as:[1, 3]

- Living in hotter, more humid environments
- Living in areas of high population density, e.g. poverty and overcrowding

- Living or working in high-contact environments or institutional care facilities, e.g. hospitals, educational or residential care facilities, prisons
- Underlying immunodeficiency or immunosuppression*, e.g. due to HIV, long-term oral corticosteroid use (or rarely, prolonged topical corticosteroid use)
- Contact with contaminated fomites, e.g. through shared clothing and materials (typically only in crusted scabies)
- Travelling to endemic areas overseas, e.g. developing countries with hot, humid environments

* Particularly increases the risk of crusted scabies[1]

Classic scabies is usually diagnosed clinically based on the characteristic features of burrows, rash and pruritus

Classic scabies is usually identified with the presence of characteristic features, e.g. mite burrows, a papular rash and pruritus (Figure 1), supported by risk factors, e.g. known contact with a person or location with active infestation (see: "Crusted scabies is uncommon, but more contagious than classic scabies" for details on the characteristic features of crusted scabies).[1, 4] Some people, however, may present with atypical or subtle features which can make the diagnosis more challenging. A type IV hypersensitivity reaction to the mites' antigens often results in a delay of up to six weeks after the initial infestation, before the pruritic rash develops.[3] Conversely, people who have been exposed to scabies previously can experience symptoms within a few hours or days following exposure.[1, 3]

Consider the possibility of scabies in any situation where multiple patients or members of the same household report pruritus, particularly on the trunk and limbs, even if burrows or rash are minimal or absent.[3]

Ask about pruritus

For most patients with scabies, pruritus begins in an acral distribution, e.g. palms, soles, fingers, toes, and spreads to the trunk and limbs, and in infants it may spread to the head and neck.[1, 3] Patients often report that itching is worse after a hot bath or shower, and at night and disturbs their sleep.[1, 3] Severe pruritus and sleep disturbance can impact on school or work attendance and excessive excoriation can lead to a secondary bacterial infection (see: "Manage any ongoing symptoms and secondary complications").[1]

Examine for rash

The generalised skin rash associated with a scabies infestation can be variable or polymorphic in appearance and is often characterised by:[1, 3, 4]

- **Small erythematous papules**, generally capped with haemorrhagic crusts on the trunk and limbs, wrists, webbing between fingers and toes, buttocks and genitalia, axillary folds, waist, breasts and periumbilical area. In young children and older people, papules may spread to the scalp, palms and soles (Figure 2).
- **Urticaria**
- **Dermatitis**, typically diffuse or discoid
- **Vesicles** on the palms and soles. Young children may also get pustules that can mimic impetigo. In infants, vesicles or pustules can arise on any body site.
- **Nodules** usually 0.5 – 1 cm in diameter often clustered in the groin, genitalia, buttocks or axillary folds in persistent cases (Figure 3)

Rarely, other inflammatory conditions such as a morbilliform rash, folliculitis, vasculitis or bullous pemphigoid may follow untreated scabies.

Figure 1. Classic scabies infestation with arrows pointing to burrows (image supplied by DermNet).

Figure 2. Scabies infestation on the sole of a young child (image supplied by DermNet).

Search skin for burrows

Scabies mite burrows generally appear as thin, irregular, brown-grey lines within superficial epidermal layers, approximately 0.5 – 1.5 cm in length.[1, 3, 4] Burrows are most commonly found on the webbing between fingers and on the wrists or palms.[1, 3, 4] Other less commonly affected sites include the periumbilical area, genitalia, buttocks, breasts, axillary folds, soles of feet and between the toes and rarely, on the scalp.[1, 3, 4]

Excoriation, secondary bacterial infection or concurrent skin conditions, e.g. eczema, can make burrows difficult to identify.[1, 4] For easier identification, an ink test may be used to check for burrows and dermatoscopy used to visualise the mite.[1]

Ink Test A burrow can be confirmed by applying ink from a non-toxic water-soluble felt tip pen over the suspected entrance of the burrow.[1] Wait a few moments and then wash off the ink. The ink will track down a scabietic burrow forming a characteristic dark zig-zag line.

Dermatoscopic examination The female mite at the end of a burrow is often observed as a 'delta' or 'jet-plane' shape (Figure 4). Dermatoscopy can also be used to locate the infestation sites for skin scraping, if indicated (see: "Microscopy to confirm a diagnosis of scabies is rarely required").

Microscopy to confirm a diagnosis of scabies is rarely required

Laboratory-based microscopy of burrow content and skin scrapings can be used to identify mites, their eggs or faeces to confirm scabies in patients where the diagnosis is uncertain or in atypical cases, e.g. a major outbreak in a residential care facility. A negative result does not always exclude scabies due to the possibility of sampling error.

In practice, however, if scabies is suspected, treatment is usually commenced on the basis of a clinical diagnosis without the need for confirmation via microscopy. Response to empiric treatment supports a diagnosis of classic scabies.[1]

If crusted scabies is suspected, a diagnosis should always be confirmed by dermatoscopy (preferably digital) or from skin scrapings (see: "Crusted scabies is uncommon, but more contagious than classic scabies").[1]

Consider differential diagnoses

Potential differential diagnoses for scabies include insect bites, bacterial infections, e.g. impetigo* or folliculitis, atopic eczema or other forms of dermatitis and immune-mediated conditions, e.g. pityriasis rosea, papular urticaria.[1] Also consider seborrhoeic dermatitis and psoriasis in the differential diagnosis of crusted scabies.[1]

* Scabies can also mimic impetigo in young children

Managing scabies: treatment and reducing transmission

Permethrin is the recommended first-line topical treatment

Permethrin 5% cream or lotion (funded, also available over-the-counter [OTC]) is the recommended first-line treatment for classic scabies (Table 1).[2] Treatment may not be sufficiently effective against eggs so it should be repeated seven to ten days after the initial application to cover any newly hatched larvae. Household members should also be treated. Advise patients that a transient increase in pruritus is common in the first few days following permethrin application and can be managed with other treatments, e.g. topical crotamiton (Table 2).[1]

Figure 3. Scabies infestation with nodular skin lesions (image supplied by DermNet).

Figure 4. Scabies burrows shown under dermatoscopic examination (image supplied by DermNet).

Crusted scabies is uncommon, but more contagious than classic scabies

Crusted scabies is generally more contagious and transmissible than classic scabies as it involves hyper-infestation with thousands to millions of mites.[6] Crusted scabies most commonly affects people with underlying immunodeficiency, neurological diseases that cause reduced sensation or immobility, older people and those living in institutional facilities, e.g. residential care.[4, 6] People with crusted scabies are often at risk of reinfestation (due to underlying immunodeficiency or living conditions) and will likely benefit from increased follow-up and education about prevention.[6]

The clinical characteristics of crusted scabies are different to classic scabies, and patients are at greater risk of secondary bacterial infection and sepsis (although rare) due to the extensive skin involvement.[1] One of the main features that distinguishes crusted scabies from classic scabies is mild or absent pruritus;[1, 6] approximately 50% of people with crusted scabies do not experience pruritus.[8] Other features of crusted scabies include (Figure 5 and Figure 6):[1, 4, 6]

- **Crusted scaly plaques** under the nails, on finger creases and between the fingers, central palms, wrists, elbows, ears, breasts and scrotum
- **Lymphadenopathy** on examination
- **Eosinophilia** if a full blood count is requested

Figure 5. Crusted scabies in an older person (image supplied by DermNet).

Figure 6. Crusted scabies in a residential care resident with multiple burrows on their palms (image supplied by DermNet).

Crotamiton is also a weak scabicide but is primarily used for reducing pruritus in people with classic scabies.[3] Both lindane and malathion lotions are no longer available for the treatment of scabies in New Zealand.[9]

Reducing the chain of transmission

Reducing scabies transmission is crucial for successful management and the prevention of re-infestation.[1, 3] The following strategies can reduce the chain of transmission:[1, 3]

- Advise the patient to **avoid direct contact** with other people for at least eight hours following treatment. In crowded settings, e.g. hospitals, residential care facilities, prisons, ideally the person with scabies should be kept apart from other people. This is particularly important for those with crusted scabies.
- Recommend that **all household members are treated**. Patients should also advise known close contacts (within the last 30 days) to seek assessment and treatment from their general practitioner even if pruritus is mild or absent
- Recommend **basic cleaning practices** to eliminate mites from fomites or other materials, e.g. hot laundering (or hot ironing) of bedding, clothing and towels and vacuuming of carpets and upholstery. **This is most important in institutional settings or in cases of crusted scabies** as crusted plaques are often shed. Excessive cleaning is unnecessary as scabies mites can only survive for three days outside of a human host; there is also little evidence that cleaning practices are effective outside of institutional settings.
- Provide patient information on the management of scabies, e.g. **www.healthinfo.org.nz/patientinfo/519865.pdf**

N.B. Oral ivermectin is occasionally used for prophylaxis when there is a scabies outbreak in an institutional facility.[3, 4]

Table 1. Treatment options for classic and crusted scabies.[3,6,9]

Classic scabies	
First line: Permethrin cream or lotion 5% (funded, also available OTC)	Apply to the entire body* with particular attention to the webbing between fingers and toes, genitalia and under nails (a soft nail brush may be used) and wash off after 8 – 12 hours. **Repeat seven to ten days after initial treatment.** The treatment should be re-applied to areas that are washed within the application time, e.g. hands. Adult: prescribe two 30 g tubes/bottles (or four for a larger patient) for the two applications Child: prescribe one 30 g tube/bottle (or two for a larger patient) for the two applications
Second line: Oral ivermectin† (only if permethrin has been trialled first and is not effective)	200 micrograms/kg rounded up to the nearest 3 mg (tablets are 3 mg); N.B. There is no specified maximum dose. Do not use in children weighing ≤ 15 kg. Tablets may be crushed. **Repeat seven to ten days after initial treatment.** Patients often experience a transient increase in pruritus. N.B. There is no difference in the efficacy between oral ivermectin and topical permethrin.[7]
Crusted scabies	
Oral ivermectin† ***OR***	Dosing instructions as per box above. **Repeat 8 – 10 days after initial dose. Continue weekly treatment until no burrows are detected.** ***OR*** 200 micrograms/kg rounded up to the nearest 3 mg on **days one, two and eight**. A dose on **days nine and 15** may be required based on severity and treatment response (and on **days 22 and 29** if very severe infestation).
A combination of oral ivermectin and topical permethrin	Topical permethrin dose as per treatment for classic scabies – above. Consider additional daily localised application of permethrin cream to thick scale until crusting has resolved. Patients undergoing combination treatment may require application of salicylic acid (5 – 10%) in cetomacrogol aqueous cream + glycerol to crusted areas to reduce crusting and increase absorption of permethrin.

* Manufacturer recommends exclusion of head and neck, however, NZF recommends application should extend to the scalp, neck, face and ears.[9] This is particularly important in infants.

† Funded with Special Authority approval following discussion with a dermatologist, infectious disease specialist or clinical microbiologist for crusted scabies, large scale outbreaks, e.g. in institutions, or for patients who cannot use or are unresponsive to topical treatment.[9] Up to 100 tablets are available on Practitioners Supply Order for outbreaks within institutions.[9] N.B. The safety of oral ivermectin in children weighing < 15 kg is not established.[10]

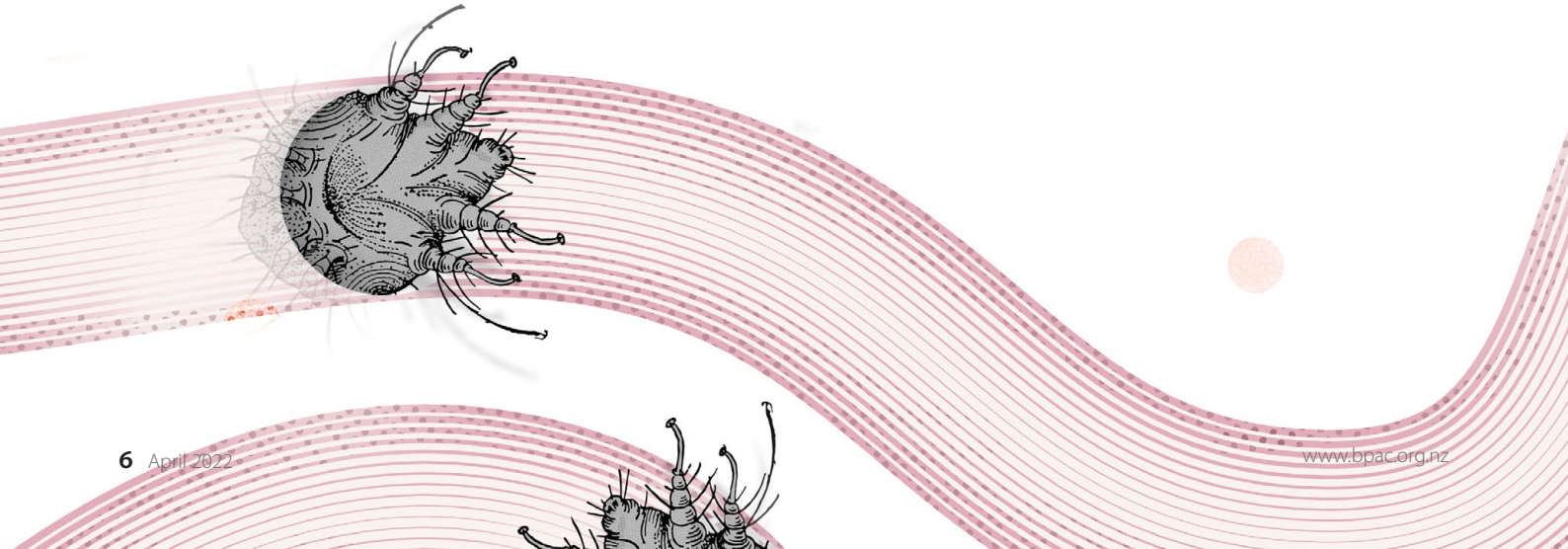

Table 2. Treatment options for persistent symptoms and secondary complications following treatment for scabies.[1, 3, 9]

Symptom	Treatment options – refer to NZF and NZFC for dosing and application instructions
Persistent pruritus, nodules, papules and eczematous plaques	**Topical crotamiton cream (10%) – funded, also available OTC** ■ Helps to control pruritus after treatment for scabies
	Topical calamine + zinc lotion – funded, also available OTC ■ Used as an antipruritic (may cause dry skin)
	Emollients and mild topical corticosteroids (1% hydrocortisone cream) – funded, also available Pharmacist Only ■ Used for treating nodules, pruritic papules and eczematous plaques ■ Emollients can be applied frequently, e.g. three to four times daily ■ Mild topical corticosteroids can be applied once or twice daily for up to two weeks (after one application of permethrin has been applied)
	Tar oil, e.g. Pinetarsol (2.3%) – funded, also available OTC ■ Can be used during a bath or shower for pruritus and eczema
	Oral antihistamines – funded, also available OTC ■ **Loratadine and cetirizine** (non-sedating antihistamines) can be used in adults and children aged one year and older to reduce pruritus with variable efficacy ■ **Promethazine** (liquid and tablet formulations) a sedating antihistamine, can be taken at night in adults and children aged six* years and older to reduce pruritus. Do not exceed 7 – 10 days of consecutive use.
Secondary bacterial and soft tissue infection	**Oral antibiotics – funded** ■ **Flucloxacillin** is the first-line antibiotic for infections due to *Streptococcus* and *Staphylococcus* ■ **Cefalexin** may be a suitable alternative in children if flucloxacillin is not tolerated ■ **Erythromycin** or **trimethoprim + sulfamethoxazole** may be suitable for people with penicillin allergy, hypersensitivity or intolerance

* Promethazine products are now contraindicated in children aged under six years due to an increased risk of adverse effects, for more information see: https://bpac.org.nz/bulletin/bestpractice/ninety-nine.aspx#3

Follow-up after initial treatment

Even after treatment has successfully eliminated all of the scabies mites, a nodular rash and pruritus may persist for several weeks.[1, 3, 4] Reassure patients that ongoing symptoms do not necessarily indicate a lack of treatment response as these symptoms are likely due to the hypersensitivity reaction to mite antigens retained within the skin or a secondary rash.[1, 3, 4] Symptoms that worsen or do not improve within four-to-six weeks may indicate inadequate treatment response which could be due to:[3]

- Inadequate treatment (e.g. application), treatment resistance or over-treatment resulting in contact dermatitis
- Scabies re-infestation
- Secondary bacterial infection
- Incorrect diagnosis

Consider discussion with or referral to a dermatologist or infectious disease specialist if symptoms persist after six weeks despite treatment adherence and appropriate cleaning practices.

Manage any ongoing symptoms and secondary complications

For patients with **persistent pruritus,** emollients, calamine or crotamiton, tar oil, short-term oral antihistamines or mild potency topical corticosteroids can be used to manage their symptoms (Table 2).[1, 3]

Treat **secondary bacterial infection**, e.g. *Streptococcus pyogenes*, *Staphylococcus aureus*, from a broken skin barrier due to excoriation, with oral antibiotics (Table 2).[1] A secondary bacterial infection can cause local soft tissue complications, e.g. impetigo, cellulitis, abscess, and rarely post-streptococcal glomerulonephritis.[1] Observational studies in New Zealand have also shown a strong association between scabies infestation, Group A streptococcal infection, impetigo and acute rheumatic fever.[11]

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This article is available online at:
www.bpac.org.nz/2022/scabies.aspx