

Fungal infections: tinea pedis and onychomycosis

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Community pharmacists play a pivotal role in supporting patients with fungal infections through identifying the infection and providing antifungal treatments and support.

Fungal infections of the skin, hair and nails are common worldwide, affecting around 20–25% of people.¹ Fungal infections thrive in warm and humid conditions and therefore tend to be more prevalent in countries with warmer climates.¹ For this reason, infections of the skin and toenails are common in Australia and are exacerbated by the wearing of occlusive clothing and footwear.¹⁻³

The two most common fungal infections are tinea pedis and tinea unguium, also known as onychomycosis. It is estimated that around 5.2% of Australians have tinea pedis, with a higher incidence in men than women.¹ Onychomycosis is known to be the most prevalent of all nail conditions, accounting for around 50% of all diseased nails and up to 30% of cutaneous fungal infections.² In Westernised countries, the prevalence of onychomycosis varies but appears to be increasing, probably as a result of changes in lifestyle in these regions and ageing populations.²

Approximately 10% of the general population are thought to be affected with onychomycosis.³ The incidence increases with age, with around 20% of people aged older than 60 affected, and more than 50% of people older than 70.² Onychomycosis is also thought to be present in around one third of people with diabetes.² It affects toenails more commonly than fingernails.⁴

Manifestations of tinea

Tinea is a superficial fungal infection of the skin, hair or nails.⁵ It is classified according to the area affected (see Figure 1).

Tinea pedis

Tinea pedis, or athlete's foot, is the most common dermatophyte infection. It tends to occur most often in men aged 20–40 years and usually relates to sweating and warmth.^{6,7} When fielding questions from patients about suspected tinea pedis, it's important to be aware of the signs and symptoms so that you can properly assist them.⁸ To assist in recognising the condition, pharmacists should ask the patient's permission to examine the foot and ankle.⁸ There are three presentations of tinea pedis, of which the interdigital form is the most common.⁶ It is characterised by white, macerated areas, fissuring and scaling in the interdigital spaces of the feet.⁶ As it often occurs in the third, fourth and fifth spaces between the toes,⁶ these should be examined first.⁸ Patients may often describe itching and burning and there may be a strong odour.^{6,8}

The second type of tinea pedis is the moccasin type.⁸ With this kind you will notice a fine scale over the plantar surface, and thickening, with hyperkeratosis and erythema of the soles, heels and sides of feet.⁶

The third kind is known as vesicobullous infection. It is characterised by vesicles, pustules and sometimes bullae in an inflammatory pattern, usually on the soles.⁶ A strong odour and intense pruritis are usually present.^{6,8}

There are a number of disorders which can mimic the signs and symptoms of tinea pedis. These include psoriasis, pitted keratolysis, candida intertrigo, and dyshidrosis.⁷

AFTER READING THIS ARTICLE, THE LEARNER SHOULD BE ABLE TO:

- describe the different clinical presentations of tinea pedis and onychomycosis (tinea unguium);
- describe the five main types and causes of onychomycosis (tinea unguium) and factors that increase their risk;
- identify when to recommend topical antifungal treatments;
- identify situations when onward referral to other healthcare professionals is appropriate;
- describe the different types of topical antifungal treatments for fungal infections and the formats they are available in;
- discuss the role of community pharmacists in supporting and assisting patients with fungal infections.

The 2010 Competency Standards addressed by this activity include (but may not be limited to): 1.3, 6.1, 6.2, 7.1, 7.2



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Onychomycosis

Onychomycosis is a fungal infection of the toenail. Around 30–59% of cases of tinea pedis are associated with onychomycosis, suggesting that the skin is the main source of fungal organisms that infect the nail.² However, trauma to the cuticle may also permit entry of fungal organisms.¹⁰

Initially, fungal organisms usually invade the nail (between the nail plate and nail bed) through an opening in the subungual space of the hyponychium, near the distal groove.¹¹ The infection most often starts distally, then migrates proximally.¹¹ Mild inflammation then develops, resulting in focal parakeratosis and subungual hyperkeratosis.¹¹ This leads to thickening of the subungual region and detachment of the nail plate from the nail bed.¹¹

The resulting subungual space can then serve as a reservoir for superinfecting bacteria and moulds, which can cause the nail plate to appear yellowish brown in colour.¹¹

Types of onychomycosis

Onychomycosis is usually defined clinically according to the method and initial site that the microorganisms invade the nail.¹¹ There are five main types, all of which are characterised by discolouration and thickening of the nail.¹¹

Distal lateral subungual onychomycosis is the most common form¹¹ and therefore the type you are most likely to see in pharmacies. It is caused by dermatophytes which invade through the distal end and sides of the nail, through the space between the nail plate and underlying skin.¹¹ The infection usually penetrates all layers of the nail causing it to turn yellowish white and to thicken.¹¹ If mould is the causal organism the nail can appear brownish/black in colour.¹¹

Proximal subungual onychomycosis is the least common type in healthy people and is usually seen in people who are immunocompromised. It is caused by dermatophytes, yeasts or moulds entering the nail fold, or base of the nail

through the cuticle.¹¹ It then spreads distally across the nail bed to the tip of the nail, causing destruction of the nail.¹¹

Superficial white onychomycosis usually occurs in toenails and is caused when dermatophytes colonise the most superficial layers of the nail plate without actually penetrating it.¹¹ This kind of onychomycosis is notable for its white colouration, which can form ‘islands’ or strips on the nail surface that can become rough, soft and crumbly.¹¹ Inflammation is usually minimal in these patients as viable tissue is not involved.¹¹

Endonyx onychomycosis is a relatively newly-described form of onychomycosis which involves fungal invasion of the nail surface as well as deeper penetration of the nail plate.² It is characterised by an opaque nail plate or milky white patches, lamellar splitting, and coarse pitting. It is different to other forms of onychomycosis in that nail thickening, lifting and inflammation are absent.²

If left untreated, all types of onychomycosis have the potential to progress to total dystrophic onychomycosis, in which there is total destruction of the nail plate.¹¹ At this stage the whole nail surface is damaged and the appearance is affected from the matrix to the distal edge.¹¹

Differential diagnosis of onychomycosis

It is estimated that around 50% of nail disorders that are believed to be onychomycosis are actually another condition.² These can include conditions such as psoriasis of the nail, lichen planus, paronychia, chronic onycholysis, and yellow nail syndrome.²

Psoriasis of the nail can be confused for onychomycosis due to discolouration of the nail, pitting, areas of white nail, separation of the nail from the nail bed, nail plate crumbling.⁹ However, over half of patients with psoriasis of the nails also have accompanying psoriatic arthritis.⁹

Lichen planus can mimic the signs of onychomycosis as the nail plate is thin, may be grooved or ridged, and the nail may darken, thicken, or lift off the nail bed.⁹ Sometimes the cuticle is destroyed and forms a scar and the nails may stop growing altogether.⁹

Paronychia is nail disorder caused by bacterial infection or dermatitis.⁹ The nail fold will appear swollen and lifted off the nail plate.⁹ Sometimes pus can be

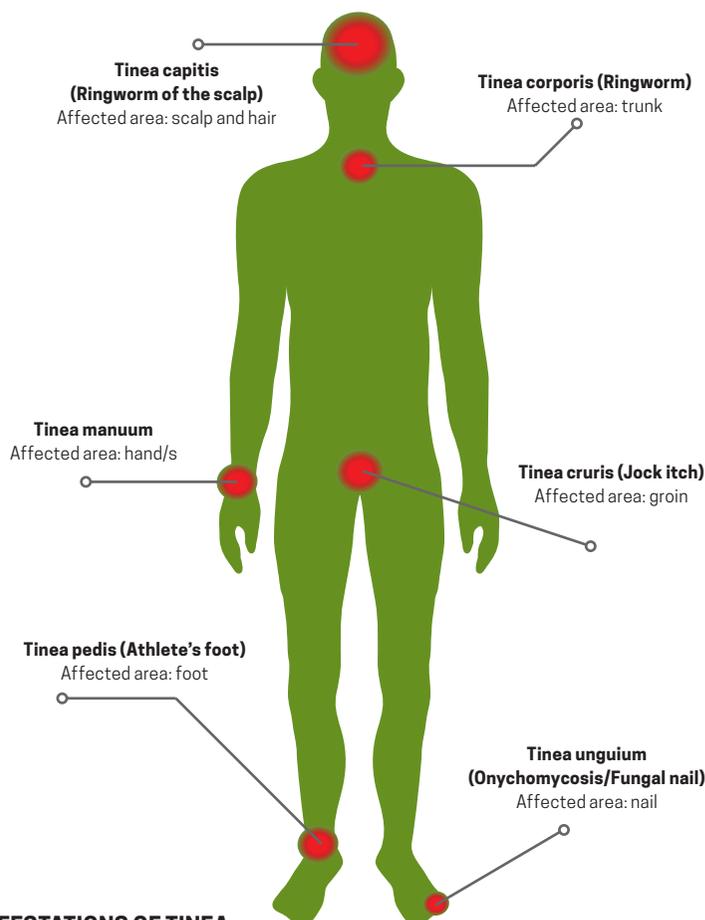


FIGURE 1: MANIFESTATIONS OF TINEA

expressed from under the cuticle.⁹ The nail plate may be distorted, ridged, and yellow in appearance.⁹

Onycholysis is a common nail disorder that causes loosening or separation of a nail from the nail bed and usually starts at the tip and progresses back.⁹ Often repeated trauma to the nail is the cause rather than infection.⁹

Yellow nail syndrome is a rare nail disorder, often in older people, that is usually accompanied by lymphodema.⁹ Signs and symptoms include thickening, yellow-green colour, ridging, and onycholysis.⁹ Nails may be slow growing and all nails may be affected.⁹

The nail disorders described are not a complete list of disorders that can mimic onychomycosis. Therefore, it is important that pharmacists take extra care to correctly identify the signs and symptoms of onychomycosis and refer patients when diagnosis is unsure.

Common risk factors for onychomycosis and tinea pedis

The dermal layers of the foot along with the nail possess properties that make it vulnerable to infection.¹⁴ The regular use of footwear which maintains a moist environment can provide opportunistic infections to occur.¹⁴ Also, the regular contact stress endured by the foot, particularly during sports, can cause abrasions that can harbour organisms.¹⁴ This is why tinea pedis is commonly known as athlete's foot.

There are a number of known risk factors for the development of onychomycosis and tinea pedis.

These include: wearing occlusive footwear, not changing socks regularly, sporting activities like running or swimming, and having an existing fungal infection on other parts of the body.^{2,3} The risk of onychomycosis is thought to increase 25-fold when tinea pedis is present.⁴

Onychomycosis is also known to increase with age.³ This may be due to poor peripheral circulation, repeated nail damage, longer exposure to pathogenic fungi, inability to cut toenails, altered immune status, inactivity, larger distorted nail surface and slower growing nails.³

Other causes that can be associated with fungal infections of the feet include smoking, medical conditions such as

psoriasis, diabetes, immunodeficiency and peripheral arterial disease.^{2,3}

Risks of cross infection

Fungal infections are contagious and therefore can be transmitted to other people, usually via direct skin-to-skin contact, although shedding of infected dead skin cells on clothing, bedding and towelling are other ways they can be transmitted.¹³ Less commonly, infection from animals or soil can occur.¹³

Many patients are unaware of the risk of spreading the infection to other parts of their own body.^{15,16} In one study, around 71% of patients were unaware they had tinea pedis and 46% were unaware they had onychomycosis.¹⁶ Infected fingernails and toenails can often be a primary site of infection which can spread to other areas of the body later on.¹⁵ Tinea of the foot is also commonly associated with cross-infection of the toe nails.¹⁷ The toenails can be a reservoir of infection, which can precipitate recurrent tinea of the feet.¹⁸

Infection is often spread by scratching the infected area, such as the feet, and then touching another body area, such as the groin.¹ In a study of 2761 patients with onychomycosis, around 43% of patients had a concomitant fungal infection, including tinea capitis, tinea corporis, tinea manuum, or tinea pedis.¹⁵

Because fungal disease can spread from one infected body area to another on and many patients may be unaware this has occurred to them,¹⁵ pharmacists should inquire whether itching, scaling or other symptoms of fungal infection are present elsewhere on the body so that they may be provided with effective treatments.

Treating fungal infections of the skin and hair

When assisting a patient with tinea, it's important to understand what kinds of treatment are most appropriate.

Dermatophytes found in hair follicles and thickened skin are not easily accessible by topical treatment.¹⁹ Therefore, oral systemic therapy is recommended for tinea in hair bearing areas and on the palms and soles of the feet.¹⁸ It is also recommended for tinea that is widespread or recurrent, tinea that is unresponsive to topical therapy, or tinea that has been previously treated with corticosteroids.¹⁸

Topical therapy may be used in localised tinea infections of the body, face, limbs or interdigital areas.¹⁸ For some patients, adjunctive topical therapy may help to decrease the risks of transmissibility and improve the mycological cure rate.^{19,20}

Preparations containing a topical corticosteroid are commonly used in combination with antifungal treatment during the early stages of tinea infection to suppress any inflammation and provide symptomatic relief.⁷ Because of the possibility of fungal proliferation, they should not be used in alone in the treatment of tinea infections.⁷

Topical treatments

Topical antifungals are used for most localised tinea infections of the skin that are hair-free and not heavily keratinised.⁵ A number of over-the-counter (OTC) treatments are available which contain either an azole compound or the active ingredient terbinafine.

Topical azoles such as bifonazole, clotrimazole, econazole, ketoconazole and miconazole are commonly used to treat patients with tinea.⁵ They are broad spectrum agents, with activity against dermatophytes, yeasts, including *Candida albicans*.²¹⁻²³ The benefit of a broad spectrum agent is that the causative microorganism is not always known in the pharmacy setting. Topical azoles come in a range of OTC formats, such as cream, solution, spray or powder. They are usually applied one or more times daily until symptoms resolve and for up to 2 weeks after to avoid recurrence.⁵

Topical azoles are generally well tolerated, although burning, itch, erythema and stinging have been reported.⁵ Clotrimazole, econazole and miconazole are suitable for use during pregnancy and breastfeeding.⁵ Bifonazole and ketoconazole should be avoided.⁵

Patients should be advised to clean and dry the affected area thoroughly before applying a thin layer—paying attention to skin folds.⁵ See Table 1.

Hydrocortisone and azoles

The combination of clotrimazole with hydrocortisone 1% offers the benefits of a broad spectrum anti-fungal to clear

TABLE 1: TOPICAL AZOLES: BIFONAZOLE, CLOTRIMAZOLE, ECONAZOLE, KETOCONAZOLE, MICONAZOLE^{5,18}

	Bifonazole 1%	Clotrimazole 1%	Econazole 1%	Ketoconazole 2%	Miconazole 2%
Format	Cream	Cream or solution	Cream	Cream	Cream, lotion, spray, or powder
Dose	Once-daily until symptoms resolve and continue for 2 weeks after	2–3 times daily until symptoms resolve, and continue for 2 weeks after symptoms disappear	Twice-daily, continue for 2 weeks until symptoms resolve	Once-daily, continue for several days after symptoms resolve	Twice-daily for 4 weeks
Microbial activity	Broad spectrum agents: active against dermatophytes and yeasts ^{21–23}				
Suitable in pregnancy and breastfeeding	Avoid (category B3)	Yes (category A)	Yes (category A)	Avoid (category B3)	Yes (category A)
Adverse events	Topical azoles are usually well tolerated. Infrequent reactions can occur (0.1–1%): burning, stinging, itch, erythema				
Counselling	Patients should clean and dry both feet thoroughly before applying a thin layer to each foot, including the toes, soles and sides				

the infection and the hydrocortisone to reduce the inflammation and the itch. Clotrimazole and hydrocortisone 1% combinations are available for sale over the counter (S2) in a pack size of 15g and is to be used in ages 12 and above.

Terbinafine

Topical terbinafine 1% is available in a number of OTC formats, including cream, gel, spray and liquid.⁵ Unlike the azoles, it does not have broad spectrum activity.²⁴ Studies have shown that it has fungicidal activity against dermatophytes and some yeasts, but only fungistatic

against *Candida albicans*.⁵ It has no activity against bacteria.²⁴

Adverse effects are infrequent, but redness, itch and stinging have been reported.⁵ It should be applied once-daily for 1 week.⁵ Before application the patient should be counselled to clean and dry both feet thoroughly before applying a thin layer to each foot, including the toes, soles and sides.⁵ Both feet should be treated even if the skin looks healthy. The area should not be washed for 24 hours after application.⁵

Terbinafine has a rapid action which

allows a shorter duration of treatment than with typical azoles, but is usually more expensive.⁵ The shorter duration of action may be useful when patient compliance is poor.⁵ As it is not broad spectrum, it may not be suited to patients with mixed infections where bacteria may be involved.²⁴ This may need to be considered when recommending to patients. See Table 2.

In some cases topical antifungals will be used as add-on treatment in patients taking systemic therapy to help improve the chance of mycological cure.^{11,25}

When recommending topical

TABLE 2: TOPICAL TERBINAFINE^{5,18,24}

Indications	Tinea
Format	Cream, gel, spray, liquid
Dosage	Terbinafine 1% applied topically, once-daily for 1 week
Microbial activity	Fungicidal activity against dermatophytes and some yeasts—only fungistatic against <i>C. albicans</i> . No activity against bacteria.
Adverse effects	Infrequent: redness, itch and stinging
Precautions	Suitable for use during breastfeeding and pregnancy (category B1)
Counselling	Patient should: <ul style="list-style-type: none"> • clean and dry both feet thoroughly before applying a thin layer to each foot, including the toes, soles and sides • treat both feet even if skin looks healthy • do not wash for 24 hours after application

TABLE 3: TOPICAL TREATMENTS FOR ONYCHOMYCOSIS

	Amorilfine	Ciclopirox	Miconazole	Urea + bifonazole
Format	5% Lacquer	8% Lacquer	Tincture	Ointment/Cream
Indication	Onychomycosis caused by dermatophytes, yeasts, and moulds. ³⁰	Onychomycosis caused by dermatophytes, yeasts and moulds. ³¹	Topical treatment of onychomycosis ³²	Distal onychomycosis affecting <50% of the nail and up to 3 nails ⁵
Microbial activity	Broad spectrum antimycotic action against dermatophytes and yeasts	Broad spectrum antimycotic action against dermatophytes and yeasts	Antifungal activity against dermatophytes and yeasts ³²	Broad spectrum activity dermatophytes and yeasts
Dose	1-2x weekly until affected nails have regrown and infection has cleared ^{2,17}	Once daily until affected nails have regrown and clear of infection ^{2,17,31}	Twice-daily until affected nails have regrown and infection has cleared ³²	Urea ointment once daily for 2-3 weeks to allow avulsion of infected nail parts. ³³ Bifonazole cream once daily for 4 weeks to treat the nail bed. ³³
Treatment duration	6 months fingernails and 9-12 months for toenails ^{2,17,30}	6 months fingernails and 9-12 months for toenails ³¹	6 months for fingernails and over 12 months for toenails ¹⁷	2 months or less ³³
Adverse events	Generally well tolerated, may cause skin irritation ¹⁷	Generally well tolerated. ³⁰ May cause irritation, burning sensation and pruritis ²	Usually well tolerated. ³² Reported side effects include burning, irritation, rash or softening of the skin. ³²	Generally well tolerated. Mild and transient side effects may include irritation, reddening, skin softening, peeling, localised rash, itching, burning around the nail ³³
Suitability	Avoid in pregnancy (category B3) and breastfeeding ¹⁷	Avoid in pregnancy (category B3) and breastfeeding ³¹	Avoid in patients taking anticoagulants ³⁵ Suitable in pregnancy	Avoid in pregnancy (category B3)

antifungal treatments to patients, pharmacists should stress the importance of complying with the specified regimen for the recommended product, applying the agent as often as directed and completing the full course of therapy as suggested by the package instructions.

Treating onychomycosis

Treating onychomycosis remains challenging despite recent advances in treatment options.²⁶ Choice of therapy depends on the type of onychomycosis, the number of affected nails, and the severity of the nail involvement.²⁷

The aims of treatment should be to reduce spread of infection, reduce pain, prevent nail loss or destruction and improve appearance and function.⁵

Treatment options should be carefully considered for the individual patient, due to costs involved and potential for adverse effects.¹⁸

Systemic oral treatments are considered suitable for proximal nail disease or where there is severe nail-bed involvement, defined as more than 50%, or when more than three nails are involved. Topical treatments should be used in superficial infection or onychomycosis involving the distal ends of nails, or distal lateral subungual onychomycosis, involving no more than three nails.

A nail avulsion product, such as 40% urea, can be useful in combination with an antifungal to increase the chance of mycological cure.²⁸

Topical treatments

Currently, topical treatment options are only advocated for the management of superficial onychomycosis and in very early cases of distal onychomycosis, where the infection is limited to the distal edge of the nail plate in no more than three nails, or in cases where patients are restricted from using oral antifungal medications.^{2,18,28} They are also often used in combination with systemic treatment to help increase the chances of mycological cure.²⁸

Topical antifungals have several advantages over systemic antifungals, including lower chance of drug interactions and adverse events, but their efficacy is limited by how well the active ingredient can penetrate into the nail.²⁹ Because infections usually occur



CASE STUDY 1: **TINEA PEDIS**

A 35-year-old man approaches the pharmacist to request assistance with athlete's foot. Within the last month he has started to experience intense itching and burning between the fourth and fifth toes and across the soles of his feet which he would like treatment for. The pharmacist requests to inspect the feet to rule out other conditions that may require referral.

Symptoms include intense itching and redness on soles of feet, itching and burning between the fourth and fifth toes.

On visual inspection, lesions appear inflamed and macerated in the toe web space with malodour.

Diagnosis: the patient's symptoms seem to imply inflammatory form of interdigital tinea pedis.

Pharmacist recommendation: clotrimazole 10mg/hydrocortisone 11.2mg cream twice daily to the affected area until inflammation, itching and redness has subsided (max. 7 days) followed by clotrimazole 1% cream applied twice-daily for 2 weeks until after symptoms resolve to avoid recurrence of infection.

Directions for the patient: clean and dry the feet thoroughly before each application. Apply the cream sparingly and rub in gently twice a day—being sure to rub in between the toes. Follow treatment as directed even if symptoms have resolved to avoid recurrence of infection.

Patient counselling: keep the feet clean, cool and dry. Always use a clean towel. Wear clean, cotton socks and change daily or more often if the feet have been sweating. Wear ventilated shoes or sandals and use thongs in communal shower areas. Wash contaminated clothing, towels and linen in hot water (not cold).

With full attention to these tips and others provided above, he might never suffer another episode of tinea pedis.

CASE STUDY 2: **ONYCHOMYCOSIS**

A 40-year-old woman approaches the pharmacist to request assistance with a suspected fungal infection of the toenail. The patient has noticed over the last couple of months that the appearance of the large toenail on her left foot has changed and the discolouration has alerted her to the possibility of infection.

Symptoms are discolouration around distal edge of the nail.

On visual inspection, there is yellowing on the side of the nail and distal edge which has started to migrate proximally; there is no evidence of thickening (<50% infection). Also look for symptoms of Tinea pedis (athlete's foot).

Diagnosis: the patient's symptoms seem to imply early stages of distal onychomycosis.

Pharmacist recommendation: Treatment with 40% urea with bifonazole 1% cream for 2 months (or less) as required.

Directions for the patient: for the first 2–3 weeks, apply the 40% urea ointment to soften the infected parts of the nail and then remove with the help of a scraper. For the next 4 weeks apply the bifonazole 1% cream to the nail bed once-daily preferably before bedtime to avoid recurrence even if the infection seems to have cleared.

Patient counselling: keep the feet clean and dry. Always use a clean towel. Avoid wearing occlusive shoes, wear cotton socks and rotate shoes regularly. Wash contaminated clothing, towels and linen in hot water (not cold).

With full attention to these tips and others provided above, this patient may be free of fungal nail within two months.

under the nail, this can be particularly problematic in thickened nails. Recently, newer formulations have been developed to deliver better penetration into the nail and increase their effectiveness.²

Commonly available topical treatments in Australia include amorolfine nail lacquer, ciclopirox nail lacquer and miconazole tincture. See Table 3.

Role of the pharmacist

The community pharmacist can play a pivotal role in helping patients with fungal infections of the skin, hair and nails by helping to recognise the infection, undertaking assessment of the patient's medical history, knowing the trigger points for referral, understanding treatments to recommend

and encouraging compliance, as well as patient counselling. Accurate diagnosis is usually confirmed with microscopy and fungal culture rather than clinical symptoms alone,² however in the pharmacy setting this can only be done with visual inspection and assessment of the patient's medical history.

Before selecting a treatment for your patient, it is important first to determine what type of infection your patient has.¹⁷ As there are a number of different types, it is strongly advised that pharmacists conduct a visual inspection of the affected area if appropriate, with the patient's permission.¹⁷ Care should also be taken to rule out the possibility of other conditions which may mimic the symptoms.⁶

Trigger points for referral include severe infection, such as onychomycosis with involvement of the entire nail matrix; patients who have experienced treatment failure with non-prescription treatments or suspected poor compliance to treatment, and patients indicated for systemic treatment.¹⁷

In cases where the microorganism is unknown, or there is evidence of bacterial involvement, pharmacists should also consider a broad spectrum antifungal.³⁴ In cases where inflammation is present, a combination antifungal with a steroid should be recommended, with follow-on treatment with an antifungal until symptoms resolve.³⁵

Recommendation of treatment should be followed with adequate counselling on the importance of compliance.² Patient compliance is an extremely important factor to achieve optimal therapeutic success.² This is particularly true for onychomycosis where treatment durations can be prolonged.² Treatments with shorter treatment durations and fewer adverse reactions can have better acceptance with patients.²

Pharmacists can play a vital role in patient education, which can help achieve better therapeutic outcomes.² Because fungal infections have a high recurrence rate, pharmacists should also provide patients with helpful tips and advice that can aid in prevention.² ●

ABOUT THE AUTHOR

Leanne Waterson BSc (UNSW) is a freelance medical copywriter. She was commissioned by Bayer Australia to write this article.

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Fungal infections: tinea pedis and onychomycosis

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Expiry date: 01/03/2019.

Each question has only ONE correct answer.

1. Which statement is FALSE?

- A** Interdigital tinea pedis is characterised by white macerated areas, fissuring and scaling in the interdigital spaces of the 3rd, 4th and 5th toes.
- B** Interdigital tinea pedis is the least common form of tinea pedis but most severe.
- C** Moccasin tinea pedis is characterised by a distribution of infection on the soles, heels and sides of the feet.
- D** Vesiculobullous is a form of tinea pedis characterised by vesicles and pustules.

2. Which statement is FALSE?

- A** Distal lateral subungual onychomycosis is caused by dermatophytes entering the distal nail end.
- B** Proximal subungual onychomycosis is caused by dermatophytes entering through the nail fold.
- C** Superficial white onychomycosis is caused by dermatophytes colonising the superficial nail surface as well as deeper penetration of the nail plate.
- D** Total dystrophic onychomycosis is characterised by damage to the entire nail matrix.

3. Which of the following statements is TRUE about topical antifungal treatments for onychomycosis

- A** Topical antifungal treatments may be recommended for onychomycosis that is superficial or involves the distal ends (<50%) of 1-3 nails.
- B** Topical antifungal treatments may be recommended for patients with superficial onychomycosis, proximal onychomycosis or distal onychomycosis.
- C** Topical antifungals may be effective in patients with total dystrophic onychomycosis if used in conjunction with a chemical avulsive or debridement.
- D** Topical antifungal treatments may only be recommended in superficial or proximal onychomycosis.

4. Which of the following statements is FALSE about the use of antifungal treatments for tinea of the skin?

- A** All topical azole antifungal treatments are suitable for use in pregnancy.
- B** Topical terbinafine has a rapid duration of action compared to azoles, which may be useful when compliance is poor.
- C** Bifonazole 1% cream is usually well tolerated and may be used in pregnancy.
- D** Combination clotrimazole plus hydrocortisone could be used in cases of tinea pedis where inflammation is present for a maximum of 7 days.

5. Which of the following statements is FALSE about preventing recurrence of fungal infection:

- A** Use a broad-spectrum antifungal treatment for the recommended time.
- B** Washing contaminated clothing cold, soapy water is sufficient for removing dermatophyte spores.
- C** Maintaining and improving chronic health conditions (e.g. controlling diabetes, smoking cessation) can lessen the risk of onychomycosis.
- D** Patients can help to prevent recurrence of infections through regular washing of contaminated clothing, towels and linen with a hygiene wash.

6. Which of the following statements about the role of community pharmacists is FALSE?

- A** When assisting patients with product requests for antifungals pharmacists should check for symptoms of cross-infection.
- B** Uncertainty about diagnosis or severe fungal infection are trigger points for onward referral.
- C** It is not necessary to visually inspect the patient's feet to diagnose the presence of tinea pedis or onychomycosis
- D** Patients should be counselled about the importance of compliance as well as advice on prevention and recurrence of infection.

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