Onychomycosis for Pharmacists: Part 2, Determining the Appropriate Therapeutic Approach for Patients With Fungal Infections of the Nail

Post-test/Rationale

1. Which pathogen is MOST COMMONLY associated with onychomycosis?
   A. Candida rugosa
   B. Fusarium tricinctum
   C. Trichomonas tenax
   D. Trichophyton rubrum***
   **Correct answer: D**
   Onychomycosis is caused by dermatophytes, yeasts, and molds. Most cases (80% and 90%) are caused by *T. rubrum* or *Trichophyton mentagrophytes*, while less than 15% are caused by yeasts and molds.

2. Which patient has the MOST risk factors for onychomycosis?
   A. A man 27 years of age with hypertension who swims competitively
   B. A woman 35 years of age with migraines who enjoys recreational biking
   C. A man 3 years of age with diabetes who showers at the gym before work***
   D. A woman 81 years of age with peripheral vascular disease (PVD) who smokes
   **Correct answer: C**
   Risk factors for onychomycosis are found in Table 1. “A” has one risk factor (man); “B” has one risk factor (biking); “C” has 4 risk factors (age older than 60, man, diabetes, communal bathing); “D” has 3 risk factors (age older than 60, PVD, smoker)

3. Which one of the following statements is TRUE regarding onychomycosis and diabetes mellitus (DM):
   A. Patients with DM have approximately a 2.5-times greater risk of secondary bacterial infections compared with those who do not have DM***
   B. Women with DM are 3-times more likely to develop onychomycosis than men with DM
   C. Oral antifungal therapies are contraindicated in patients with DM who take insulin
   D. Topical antifungal therapies provide higher mycological cure rates for patients with DM compared with oral agents
   **Correct answer: A**
   One study reported that the rate of secondary infections is 6% for patients with DM compared with a 15% rate for patients with DM and onychomycosis (i.e., approximately 2.5-times greater chance). Onychomycosis is 3-times more prevalent in patients with DM compared with those who do not have DM; furthermore, men are at the greatest risk. The approach to treating onychomycosis for patients with DM is the same as it is for patients who do not have DM, although drug-drug interactions must be taken into account.
4. Which one of the following statements is **TRUE** regarding the diagnosis of onychomycosis:
   A. A patient with all fingernails infected is confirmatory for the diagnosis of onychomycosis
   B. Clinical appearance distinguishes onychomycosis from other nail infections
   C. Inflammatory diseases, such as psoriasis, can mimic onychomycosis***
   D. Performing a fungal culture should only be done in refractory cases
   **Correct answer: C**
   Onychomycosis can mimic many other conditions that affect the nail, including psoriasis, iron deficiency, eczematous conditions, trauma, contact dermatitis, yellow-nail syndrome, periungual squamous-cell carcinoma, and lichen planus. As such, clinical appearance alone should not be confirmatory for the diagnosis of onychomycosis and neither should the number of nails affected; although, if all nails are infected, the chance of an onychomycosis diagnosis diminishes. Cultures should be done with every fungal nail infection (not just refractory cases), but this does not happen because of drawbacks (e.g., false-negative and, more so, the length of time for results).

5. What is considered a barrier to achieving effective treatment outcomes for patients with onychomycosis?
   A. The drug penetration into the nail plate***
   B. The duration of active nail infection
   C. The number of nails infected
   D. The patient’s age and gender
   **Correct answer: A**
   How long the patient has had the infection does not affect outcomes, nor the person’s age or gender. Although those who are older may have more medication interactions, it still is not associated with poorer outcomes. The number of nails infected is also not associated with how successful treatment will be. However, the ability to penetrate the site of action – the nail – is.

6. Which of the following statements is **TRUE** when comparing the FDA-approved oral antifungal therapies for onychomycosis:
   A. Fluconazole is fungicidal, with the highest mycological cure rate
   B. Griseofulvin is fungistatic, with the shortest treatment duration
   C. Itraconazole is fungistatic, with the greatest overall safety profile
   D. Terbinafine is fungicidal, with the lowest chance for drug interactions***
   **Correct answer: D**
   Weighing the pros and cons of oral agents is an important way to select therapy. Fluconazole is not fungicidal; but, it is fungistatic, with the lowest mycological cure rate. It is also not U.S. Food and Drug Administration (FDA) approved. Griseofulvin, while fungistatic, has the longest duration of therapy compared with other agents (1 year or longer), which is one of the many reasons why it is not used any more. Itraconazole is fungistatic, but it is plagued with several warnings and precautions, as well as adverse effects. It is also contraindicated for those with heart failure or liver dysfunction. Terbinafine is fungicidal, with minimal drug interactions and better tolerated; hence, why it is the first-line agent.
7. AK, a woman, 67 years of age, presents to the clinic with nail pain and discomfort. After visual inspection and a culture taken, she is diagnosed with a mild case of onychomycosis in 2 toenails. She has a past medical history of hypertension; she takes lisinopril and hydrochlorothiazide. She is allergic to sulfa. What is the MOST APPROPRIATE therapeutic recommendation for AK’s nail infection at this time?
A. Nail debridement
B. Systemic antifungal therapy
C. Topical antifungal therapy***
D. Combination therapy with topical and systemic antifungal therapy
Correct answer: C
Nail debridement, while effective, should not be used as monotherapy. Systemic antifungal therapies are effective, but, because of their disadvantages, should be reserved for more severe onychomycosis. Topical antifungal agents avoid the inherent concerns of oral drugs and have been shown to have good efficacy. Furthermore, topical agents are best suited for patients who have mild-to-moderate disease and who are likely to be adherent to the treatment regimen. Combination therapy outcomes are conflicting and, therefore, cannot be fully supported for treatment.

8. Which FDA-approved topical therapy for onychomycosis has the highest mycological cure rate based on clinical trial data?
A. Amorolfine
B. Ciclopirox
C. Efinaconazole***
D. Tavaborole
Correct answer: C
See Table 2. Amorolfine is not FDA approved for the treatment of onychomycosis, although a topical agent. Ciclopirox = 29-36%; Efinaconazole = 55.2%; Tavaborole = 31.1-35.9%.

9. Which of the following statements is TRUE regarding investigational therapies for onychomycosis?
A. Albaconazole, a new topicalazole antifungal, 400 mg daily for 36 weeks, had the highest rate of effective treatment
B. Booster therapy strategies have demonstrated higher mycological cure rates compared with traditional regimens
C. Luliconazole, a new oral azole antifungal, has demonstrated higher clinical cure rates compared with terbinafine
D. Vicks VapoRub has demonstrated higher clinical cure rates compared with currently approved FDA topical agents***
Correct answer: D
Albaconazole is not a topical azole; it is an oral azole that has demonstrated a high effective treatment rate at 400 mg weekly for 36 weeks. The mycological cure rates observed after treatment with booster therapies do not differ from the cure rates observed after treatment with traditional regimens. Luliconazole is a new topical azole under investigation. Vicks VapoRub has demonstrated higher clinical cure rates compared with currently FDA-approved topicals.
10. Which of the following statements would be most appropriate to include when counseling a patient who has onychomycosis of the toenails:

A. Be patient because you may not see improvement in the appearance of your toenails for one year or longer; even after one year, your nails may not appear normal

B. Transmission to other parts of the body or to contacts is unlikely because nail infections stay localized and are not contagious

C. Reoccurrence is unlikely because the currently available antifungal therapies completely eradicate the infection

D. After completion of therapy and the infection is cured, consider more occlusive footwear to prevent future infections

Correct answer: A

Transmission is possible to both another part of the body and to others. Reoccurrence can occur even after completion of therapy because no agent has a 100% cure rate. Nonocclusive footwear is actually recommended to prevent infections. Patients should be counseled about the outcomes of therapy and what to expect; including the fact that it may take up to a year or longer, depending on the growth the nail, to see a change in the appearance of the nail and, even then, the nail may never appear normal again.