Therapeutic Recommendations for the Treatment of Toenail Onychomycosis in the US

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SYNOPSIS
- Onychomycosis—a fungal infection of the nail bed or plate—affects up to 14% of individuals in North America.1
- It is underdiagnosed and untreated or unchallenged to treat toenail infection, and disease recurrence is common.2
- National guidelines and consensus documents on onychomycosis diagnosis and treatment were last published more than 5 years ago in 2014 (British J Dermatol) and 2015 (Canad J Infect Dis Med Microbiol)–reviewing the time that both topical efinaconazole and terbinafine were first approved in the US in 2004.
- Since then, more clinical data, post hoc analyses, meta-analyses, and FDA-approved indications have become available for onychomycosis drugs.
- As such, updated medical guidelines are needed.

OBJECTIVE AND METHODS
- To provide recommendations for the diagnosis and therapeutic treatment of toenail onychomycosis following a roundtable discussion with the authors on March 31, 2021.
- Included here is a decision tree for choosing appropriate medications based on disease severity and patient characteristics, as well as an example handout intended for patients on best practices to mitigate disease recurrence.

RESULTS

Diagnosis, Testing, and Clinical Presentation
- Careful assessment and testing must be performed when diagnosing onychomycosis, nail changes can be induced by other disorders, and many conditions that can mimic onychomycosis can be ruled out (Figure 1).
- Laboratory testing should also be performed to identify the infecting organism and exclude non-fungal conditions; Figure 2 shows common options that are used in conjunction with clinical diagnosis.

FIGURE 1. Differential Diagnosis Decision Tree

Table 1. Differential Diagnoses for Onychomycosis

<table>
<thead>
<tr>
<th>Differential diagnoses that can cause nail dystrophy</th>
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<tbody>
<tr>
<td>• Trauma/overhydration</td>
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<tr>
<td>• Chemical (aceton, decomposed nail)</td>
</tr>
<tr>
<td>• Insect (louse)</td>
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<tr>
<td>• Infection (infecting organism)</td>
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<tr>
<td>• Systemic disease (e.g., connective tissue disease, diabetes)</td>
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<tr>
<td>• Trauma (previous injury, nail biting)</td>
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<td>• Contact dermatitis/poisonous reaction</td>
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<tr>
<th>Laboratory tests recommended to verify diagnosis</th>
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<tbody>
<tr>
<td>• Fungal culture</td>
</tr>
<tr>
<td>• Periodic acid-Schiff (PAS) stain</td>
</tr>
<tr>
<td>• Tissue/DNA PCR for dermatophyte</td>
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<tr>
<td>• Dermatoscopy as a preliminary test to evaluate nail dystrophy/roughness</td>
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<tr>
<th>Topical therapeutics for onychomycosis</th>
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<tbody>
<tr>
<td>• Topical terbinafine</td>
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<td>• Topical fluconazole</td>
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<table>
<thead>
<tr>
<th>Topical monotherapy</th>
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<tbody>
<tr>
<td>• N/A (efficacy limited)</td>
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<table>
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Topical monotherapy recommended in patients with onychomycosis due to susceptible dermatophyte or Candida albicans infection; moderate to severe disease is defined as >20% nail involvement.

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Recommended Medications
- The authors all agreed that treatment should be individualized for each patient based on nail involvement (nurber, surface area, thickness), infecting organism, patient characteristics (including comorbidities), current medications, biomechanics, cost/wavibility/accessibility by insurance, and patient preference.
- A decision tree to provide practical guidance on therapeutic recommendations in onychomycosis treatment developed by the authors is shown in Figure 2.
- Therapeutic recommendations by drug are also detailed in Figure 3.

Patient Education
- It is important to manage patient expectations when treating onychomycosis: optimal outcomes can take over a year and can be challenging to identify an appearance may not be possible.
- Patients should also be educated on the high recurrence rates (6.5%–53%), so regular follow-up visits with patients are recommended (3–6 months after oral or 1 year after topical treatment).
- A physical handout (Figure 4) should also be provided to patients, explaining follow-up care, maintenance and highlighting that long-term treatment is more than just pharmacologic (e.g., personal care, footwear selection/care, laundry).

FIGURE 4. Patient Education Handout

- Use treatments recommended by your doctor and follow the steps below to help prevent new infections:
  - Personal Care and Laundry
    - Keep nails short and clean.
    - Only use a clean manicure/pedicure, bring your own tools and clean them.
    - Don’t pick or scratch your nails and keep your hands and feet dry.
    - Don’t use the same clippers/foil used on abnormal nail on normal nail.
    - Don’t share personal care items, such as nail clippers.
    - Wash and dry your hands after contact with infested toilet or nails.
    - Dry your hands often.
    - Use a moisturizer.
    - Use a hairbrush and comb.
    - Wash towels, socks, and clothes after every use.
    - Socks and other contaminated clothing should be washed at >130°F.
  - Footwear
    - Wear properly sized shoes with adequate toe box. Avoid narrow shoes or shoes that are too tight.
    - Avoid open-toed sandals or flip flops.
    - Avoid slipping or scratching your nails and keep your hands and feet dry.
    - Wear antibiotic socks to prevent infection.
    - Wear moisture-absorbing socks or a low-acidic emollient.
    - Alternately wash socks to allow power to dry thoroughly for >2–3 days between uses.
    - Replace athletic shoes after 500–1000 miles of use.

When to contact your doctor
- If you have signs of infection using topical treatment, such as redness or swelling, see a medical provider immediately.
- If you see signs of infection using topical treatment, such as redness or swelling, see a medical provider immediately.

CONCLUSIONS
- These therapeutic recommendations, based on new clinical data, provide important updates to previous guidelines/consensus documents to assist healthcare practitioners in the diagnosis and treatment of toenail onychomycosis.


REFERENCES


AUTHOR DISCLOSURES

• Shari R Lipner has served as a consultant for Ortho Dermatologics, Hoth Therapeutics, and Verrica. Warren S Joseph has served as a consultant and speaker for Ortho Dermatologics. Tracey C Vlahovic has served as a consultant for Ortho Dermatologics, Hoth Therapeutics, and Verrica.
• Alessandro Voci, MD, PhD, has served as a consultant and speaker for Ortho Dermatologics, Zentiva Pharmaceuticals, and Verrica. He has also received research support from Ortho Dermatologics, Hoth Therapeutics, and Verrica.
• Susan M Neuberg has served as a consultant for Ortho Dermatologics and as a speaker for Verrica.
• The other authors: no relevant conflicts of interest to disclose.

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