**Name:** metronidazole (me-tro-ni-da-zole)  
**Brand Names:** Flagyl, FlagylER, MetroCream, MetroGel, MetroGel-Vaginal, MetroLotion, Metro IV, Nidagel, Noritate, Novonidazol, Trikacide, Vandazole  
**Classification:** Anti-infective, Antiprotozoal, Antacid Agent

**Pregnancy Category B**

**Indications**
- **PO, IV:** Treatment of the following anaerobic infections: Intra-abdominal infections (may be used with a cephalosporin), Gynecologic infections, Skin and skin structure infections, Bone and joint infections, CNS infections, Septicemia, Endocarditis. IV Pre- and postoperative prophylactic agent in colorectal surgery.
- **PO:** Amebicidal in the management of amebic dysentery, amebic liver abscess, and amebic meningitis. Treatment of pseudomembranous colitis.
- **Topical:** Treatment of acne rosacea.
- **Vag:** Management of bacterial vaginosis.
- **Unlabeled Use:** Treatment of giardiasis. Treatment of anti-infective associated pseudomembranous colitis.

**Action**
- Disrupts DNA and protein synthesis in susceptible organisms.
- **Therapeutic Effects:** Bactericidal, trichomonacidal, or amebicidal action.

**Spectrum:** Most notable for activity against anaerobic bacteria, including: *Bacteroides*, *Clostridium*. In addition, is active against: *Trichomonas vaginalis*, *Entamoeba histolytica*, *Giardia lamblia*, *H. pylori*, *Clostridium difficile*.

**Pharmacokinetics**
- **Absorption:** 80% absorbed after oral administration. Minimal absorption after topical or vaginal application.
- **Distribution:** Widely distributed into most tissues and fluids, including: CSF. Crosses the placenta and enters fetal circulation rapidly; enters breast milk in concentrations equal to plasma levels.
- **Metabolism and Excretion:** Partially metabolized by the liver (30–60%), partially excreted unchanged in the urine, 6–15% eliminated in the feces.
- **Half-life:** Neonates: 25–75 hr; Children and adults: 6–12 hr.

**Time/Action Profile**  
<table>
<thead>
<tr>
<th>Route</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>rapid</td>
<td>1–3 hr</td>
<td>8 hr</td>
</tr>
<tr>
<td>PO-ER</td>
<td>rapid</td>
<td>unknown</td>
<td>up to 24 hr</td>
</tr>
<tr>
<td>IV</td>
<td>rapid</td>
<td>end of infusion</td>
<td>6–8 hr</td>
</tr>
<tr>
<td>Topical</td>
<td>3 wk</td>
<td>9 wk</td>
<td>12 hr</td>
</tr>
<tr>
<td>Vag</td>
<td>unknown</td>
<td>6–12 hr</td>
<td>12 hr</td>
</tr>
</tbody>
</table>

**Contraindications/Precautions**
- **Contraindicated in:** Hypersensitivity; Hypersensitivity to parabens (topical only); OB: First trimester of pregnancy.
- **Use Cautiously in:** History of blood dyscrasias; History of seizures or neurologic problems; Severe hepatic impairment (dose suggested); OB: Although safety not established, has been used to treat trichomoniasis in 2nd- and 3rd-trimester pregnancy—Instructed to use single dose and interrupt nursing for 24 hr thereafter. Patients receiving corticosteroids or predisposed to edema (injection contains 28 mEq sodium/g metronidazole).

**Adverse Reactions/Side Effects**
- **CNS:** SEIZURES, dizziness, headache, aseptic meningitis (IV), encephalopathy (IV).
- **EENT:** Optic neuropathy, tearing (topical only).
- **GI:** Abdominal pain, anorexia, nausea, diarrhea, dry mouth, furry tongue, glossitis, unpleasant taste, vomiting.
- **Derm:** STEVENS-JOHNSON SYNDROME, rash, urticaria, burning, mild dryness, skin irritation, transient redness.
- **Hemat:** Leukopenia.
- **Local:** Phlebitis at IV site.
- **Neuro:** Peripheral neuropathy.
- **Misc:** Superinfection.

**Interactions**
- **Drug-Drug:** Cimetidine may **p** metabolism. Phenobarbital and rifampin q **p** metabolism and may q **e** effectiveness. Metronidazole q **e** the effects of phenytoin, lithium, and warfarin. Disulfiram-like reaction may occur with alcohol ingestion. May cause acute psychosis and confusion with disulfiram. Risk of lamotrigine with disulfiram may **e** effectiveness in carmustine.

**Route/Dosage**
- **PO (Adults):**  
  - Anaerobic infections: 7.5 mg/kg q6h (not to exceed 4 g/day).
  - Trichomoniasis: 250 mg 4 times.
  - Amebiasis: 500–750 mg q8h for 5–10 days.

**TIME/ACTION PROFILE (PO, IV = blood levels; topical = improvement in rosacea)**

[Table with time/action profile data]
daily or 500 mg twice daily for 1–2 wk (with other agents). Bacterial vaginosis—750 mg once daily as ERT tablets for 7 days. Antibiotic-associated pseudomembranous colitis—30 mg/kg/day divided q 6 hr; maximum dose is 5 g/day. Postoperative—15–50 mg/kg/day divided q 6 hr for 5–10 days. Amebiasis—55–80 mg/kg/day divided q 12 hr for 5–10 days (not to exceed 750 mg/day). Metronidazole-associated pseudomembranous colitis—30 mg/kg/day divided q 6 hr for 5–10 days. H. pylori—15–20 mg/kg/day divided twice daily for 7–10 days.

PO (Infants and Children): Anaerobic infections—30 mg/kg/day divided q 6 hr; maximum dose is 5 g/day. Postoperative—15–50 mg/kg/day divided q 6 hr for 5–10 days. Amebiasis—55–80 mg/kg/day divided q 12 hr for 5–10 days. H. pylori—15–20 mg/kg/day divided twice daily for 7–10 days.

PO (Neonates 0–4 weeks, <1250 g): 7.5 mg/kg q 48 hr. Postnatal age <7 days, 1200–2000 g—7.5 mg/kg q 12 hr. Postnatal age <7 days, 2200–2400 g—15 mg/kg/day divided q 12 hr. Postnatal age >7 days, 2200–2400 g—15 mg/kg/day divided q 12 hr. Postnatal age >7 days, >2400 g—30–50 mg/kg/day divided q 12 hr.

PO (Adults): Anaerobic infections—Initial dose 15 mg/kg, then 7.5 mg/kg q 6–8 hr or 500 mg q 6–8 hr (not to exceed 4 g/day). Pneumocystis jirovecii—Initial dose: 15 mg/kg 1 hr before surgery, then 7.5 mg/kg q 6 and 12 hr later. Amebiasis—500–750 mg q 6–8 hr for 5–10 days.

IV (Children): Anaerobic infections—30 mg/kg/day divided q 6 hr, maximum dose is 5 g/day.

Topical (Adults): Decrease amount—Apply thin film to affected area bid.

NURSING IMPLICATIONS

Assessment

- Assess for infection (initial signs, appearance of wound, sputum, urine, and stool).
- Obtain specimens for culture and sensitivity before initiating therapy. First dose may be given before receiving results.
- Monitor neurologic status during and after IV infusions. Inform health care professional if numbness, paresthesia, weakness, ataxia, or seizures occur.
- Monitor intake and output and daily weight, especially for patients on sodium restriction. Each 500 mg of premixed injection contains 14 mEq of sodium.
- Assess for rash periodically during therapy. May cause Stevens-Johnson syndrome. Discontinue therapy if severe or if accompanied with fever, general malaise, fatigue, muscle or joint aches, blisters, or oral lesions, conjunctivitis, hepatitis, and/or eosinophilia.

- Guardrails: Monitor three oral samples taken several days apart; begin therapy 3–4 wk after treatment.

- Lab Test Considerations: May alter results of serum AST, ALT, and LDI tests.

Potential Nursing Diagnoses

- Infection (Indications)
- Diarrhea (Indications)

Implementation

- Do not confuse metronidazole with metformin.
- PO: Administer on an empty stomach, or may administer with food or milk to minimize taste/tart sensation. Tablets must be crushed for patients with difficulty swallowing. Small extended-release tablets whole do not break, crush, or chew.

IV Administration

- Continuous Infusion: Diluent: Administer premixed injection (500 mg/50 mL) undiluted. Do not refrigerate. Once taken out of overwrap, premixed infusion is stable for 30 days at room temperature. Concentration: 10 mg/mL. Rate: Infuse over 30–60 min.

- Y-Site Compatibility: acyclovir, allopurinol, allopurinol, amifostine, amikacin, amphotericin B, ampicillin, ampicillin/sulbactam, anidulafungin, argatroban, atracurium, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium acetate, calcium chloride, calcium gluconate, carboplatin, carmustine, cyclophosphamide, cyclophosphamide, cytarabine, daunorubicin, dexamethasone, doxorubicin, doxorubicin liposome, doxycycline, droperidol, enalapril, epinephrine, epirubicin, etoposide, etoposide phosphate, famotidine, fenoldopam, fentanyl, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, growth hormone, heparin, insulin, interleukin-2, interferon, losartan, mezlocillin, metoclopramide, metoprolol, methotrexate, mitomycin, mitoxantrone, nitrofurantoin, paclitaxel, pentamidine, piperacillin, piperacillin/tazobactam, posaconazole, prednisone, prochlorperazine, quinupristin/dalfopristin, ranitidine, ranolazine, sargramostim, simvastatin, tamoxifen, taxol, tacrolimus, teniposide, thiopeta, theophylline, thiotepa, tienilic acid, ticarcillin, ticlopidine, ticlopidine, tizanidine, topotecan, toremifene, trimethoprim/sulfamethoxazole, urokinase, vancomycin, voriconazole, warfarin, zidovudine.
Continued

Metronidazole is an antibiotic used for different infections. It is important to understand the proper use of this medication for its effectiveness.

● **Y-Site Incompatibility:** amphotericin B cholesteryl, amphotericin B colloidal, amphotericin B lipid complex, amphotericin B liposome, aztreonam, dantrolene, daptomycin, filgrastim, ganciclovir, pantoprazole, pemetrexed, phenytoin, procainamide, quinupristin/dalfopristin.

● **Topical:** Cleanse affected area before application. Apply and rub in a thin film twice daily, morning and evening. Avoid contact with eyes.

### Patient/Family Teaching

- Instruct patient to take medication as directed with evenly spaced times between doses, even if feeling better. Do not skip doses or double up on missed doses. Take missed doses as soon as remembered if not almost time for next dose.
- Advise patients treated for trichomoniasis that sexual partners may be asymptomatic sources of reinfection and should be treated concurrently. Patient should also refrain from intercourse or use a condom to prevent reinfection.
- Caution patient to avoid intake of alcoholic beverages or preparations containing alcohol during and for at least 3 days after treatment with metronidazole, including vaginal gel. May cause a disulfiram-like reaction (flushing, nausea, vomiting, headache, abdominal cramps).
- May cause dizziness or headache. Caution patient to avoid driving or other activities requiring alertness and response to medications known.
- Instruct patient to notify health care professional promptly if rash occurs.
- Inform patient that medication may cause an unpleasant metallic taste.
- Advise patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult with health care professional before taking other medications.
- Advise patient that frequent mouth rinses, good oral hygiene, and negative gums or canker may minimize dry mouth. Notify health care professional if dry mouth persists for more than 2 wk.
- Inform patient that medication may cause urine to turn dark.
- Advise patient to consult health care professional if no improvement in a few days or if signs and symptoms of superinfection (black, furry overgrowth on tongue; vaginal itching or discharge; loose or foul-smelling stools) develop.
- Advise patient to avoid alcohol use or preparations containing alcohol during and for at least 3 days after treatment with metronidazole, including vaginal gel. May cause a disulfiram-like reaction (flushing, nausea, vomiting, headache, abdominal cramps).

### Evaluation/Desired Outcomes

- Resolution of the signs and symptoms of infection. Length of time for complete resolution depends on organism and site of infection.
- Significant results should be seen within 3 wk of application of topical gel. Application may be continued for 9 wk.

Why was this drug prescribed for your patient?