Antimicrobial Stewardship Matters

Antimicrobial Stewardship | September 2025

Antibiotics: Consider the Risks

At a Glance:

Think twice before prescribing an antibiotic and ensure your patient is counseled about the potential harms:

- Antibiotics are a leading cause of adverse drug reaction – and each day increases the risk.
- Any antibiotic carries a risk of *C. difficile* infection (CDI), and is higher than you think.
- Associations exist between antibiotic use and the development of chronic disease.

First, Do No Harm

While antibiotics have become a cornerstone of modern medicine, their harms extend well beyond antibiotic resistance. With 30 per cent of antibiotic use considered inappropriate,[1] "better safe than sorry" should be replaced with a clear assessment of the potential for harm.

Adverse Drug Reaction (ADR)

Antibiotics are the most common cause of ADR leading to emergency department attendance in children, and the fourth most common in adults.[2]

Half of all hospitalized patients receive an antibiotic, with a fifth experiencing an ADR.[3] Each day of therapy increases the odds of an ADR by four per cent.

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Clostridioides difficile

All antibiotics predispose to CDI. The risk increases with:

- Broader spectrum antibiotics
- Longer duration - **each additional day** is associated with an 8-13% increase in odds of developing CDI.[5]

Adjusted risk ratio of CDI versus no antibiotics:

- Cefixime: **4.3**
- Amoxicillin-Clavulanate: **2.4**
- Azithromycin: **2.2**
- Ciprofloxacin: **1.9**

Long Term Effects

Research is increasingly associating early life antibiotic use with:

- Asthma, Eczema, Allergic Rhinitis[7]
- Obesity[8]
- Inflammatory Bowel Disease, Celiac Disease[7]
- Juvenile Idiopathic Arthritis[9]

With the broad impact our microbiome has on our health, the decision to provide antibiotics should not be made lightly.

In addition to the common gastrointestinal effects and *C. difficile* risk, below are a few additional antibiotic-specific harms to be aware of for a select group of antibiotics:

Antibiotic	Serious Harms	Mitigating Measures
Doxycycline	Hypersensitivity or serum sickness reaction Esophagitis Phototoxicity	• Counsel patient of signs • Take with full glass of water • Sun protection measures
Linezolid	Myelosuppression Lactic acidosis Peripheral/optic neuropathy	• Monitor CBC and lactate • Counsel patient of symptoms, assess if present during follow up
Macrolides	Cardiac arrhythmia Hearing loss	• Use with caution or avoid in those with known QT prolongation or QT prolonging medications • Counsel patient, assess if present during follow up
Metronidazole	Seizures Peripheral neuropathy (prolonged use)	• In those with known seizure disorder, ensure pharmacologic and nonpharmacologic preventative measures are optimized • Counsel patient, assess if present during follow up
Nitrofurantoin	Pulmonary toxicity (irreversible) Drug-induced liver injury Anemia (aplastic or hemolytic) Peripheral neuropathy	• Avoid prolonged use, counsel patient and assess if signs or symptoms present during follow up
Fluoroquinolones	Tendonitis and Achilles tendon rupture Increased risk of abdominal aorta rupture Dysglycemia Psychiatric disturbances Peripheral neuropathy	• Use with caution in those >60 years of age, current corticosteroid use, inadequately controlled diabetes, or known mental health disorders • Counsel patient, assess if present during follow up
Trimethoprim-sulfamethoxazole	Hyperkalemia Hypersensitivity reactions (eg. Severe cutaneous drug reactions, interstitial nephritis, vasculitis etc)	• Monitor potassium in those with impaired renal function or current use of medications impairing renal excretion of potassium • Counsel patient of signs, assess if present during follow up.

Adapted from Mohsen et al. Can Fam Physician. 2020;66(9):651-659.

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References

1. Hersh AL, King LM, Shapiro DJ, Hicks LA, Fleming-Dutra KE. Unnecessary Antibiotic Prescribing in US Ambulatory Care Settings, 2010–2015. *Clin Infect Dis*. 2021;72(1):133-137. doi:10.1093/cid/ciaa667
2. Budnitz DS, Shehab N, Lovegrove MC, Geller AI, Lind JN, Pollock DA. US Emergency Department Visits Attributed to Medication Harms, 2017-2019. *JAMA*. 2021;326(13):1299. doi:10.1001/jama.2021.13844
3. Tamma PD, Avdic E, Li DX, Dzintars K, Cosgrove SE. Association of Adverse Events With Antibiotic Use in Hospitalized Patients. *JAMA Intern Med*. 2017;177(9):1308. doi:10.1001/jamainternmed.2017.1938
4. Curran J, Lo J, Leung V, et al. Estimating daily antibiotic harms: an umbrella review with individual study meta-analysis. *Clin Microbiol Infect*. 2022;28(4):479-490. doi:10.1016/j.cmi.2021.10.022
5. Gilboa M, Regev-Yochay G, Meltzer E, et al. Antibiotic Use and the Risk of Hospital-Onset *Clostridioides Difficile* Infection. *JAMA Netw Open*. 2025;8(8):e2525252. doi:10.1001/jamanetworkopen.2025.25252
6. Brown KA, Langford B, Schwartz KL, Diong C, Garber G, Daneman N. Antibiotic Prescribing Choices and Their Comparative *C. Difficile* Infection Risks: A Longitudinal Case-Cohort Study. *Clin Infect Dis*. 2021;72(5):836-844. doi:10.1093/cid/ciaa124
7. Aversa Z, Atkinson EJ, Schafer MJ, et al. Association of Infant Antibiotic Exposure With Childhood Health Outcomes. *Mayo Clin Proc*. 2021;96(1):66-77. doi:10.1016/j.mayocp.2020.07.019
8. Meng X, Zhu Y, Di H, et al. Dose-response association of early-life antibiotic exposure and subsequent overweight or obesity in children: A meta-analysis of prospective studies. *Obes Rev*. 2021;22(11):e13321. doi:10.1111/obr.13321
9. Hestetun S, Andersen S, Sanner H, Størdal K. Antibiotic exposure in prenatal and early life and risk of juvenile idiopathic arthritis: a nationwide register-based cohort study. *RMD Open*. 2023;9(3):e003333. doi:10.1136/rmdopen-2023-003333
10. Mohsen S, Mb JAD, Frcpc RS. Update on the adverse effects of antimicrobial therapies in community practice. Can Fam Physician. 2020;66(9):651-659.