Antimicrobial Stewardship in Primary Care and Long Term Care in Ontario

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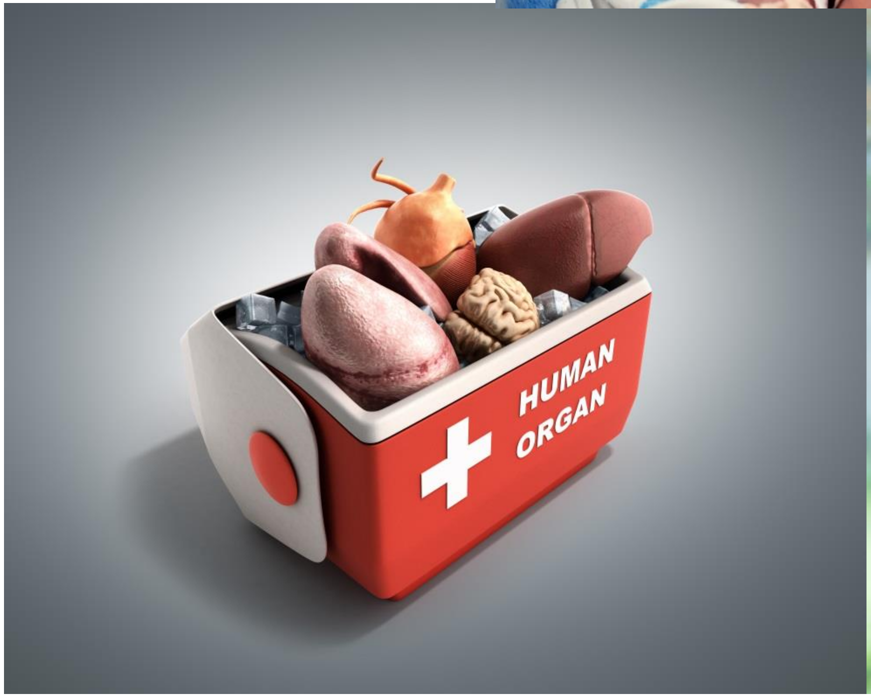
Objectives

- Overview on the importance of AMR
- Review antibiotic use in Ontario during COVID-19
- Discuss antimicrobial stewardship activities in primary care in Ontario
- Review approach to asymptomatic bacteriuria and antimicrobial stewardship in LTC in Ontario

Antimicrobial Resistance (AMR)

"AMR is a slow tsunami that threatens to undo a century of medical progress"
-Dr. Tedros, Director-General, WHO



Getty images

4·95 million (3·62–6·57) deaths associated with bacterial AMR in 2019

1·27 million (95% UI 0·911–1·71) deaths attributable to bacterial AMR

Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis

*Antimicrobial Resistance Collaborators**

Summary

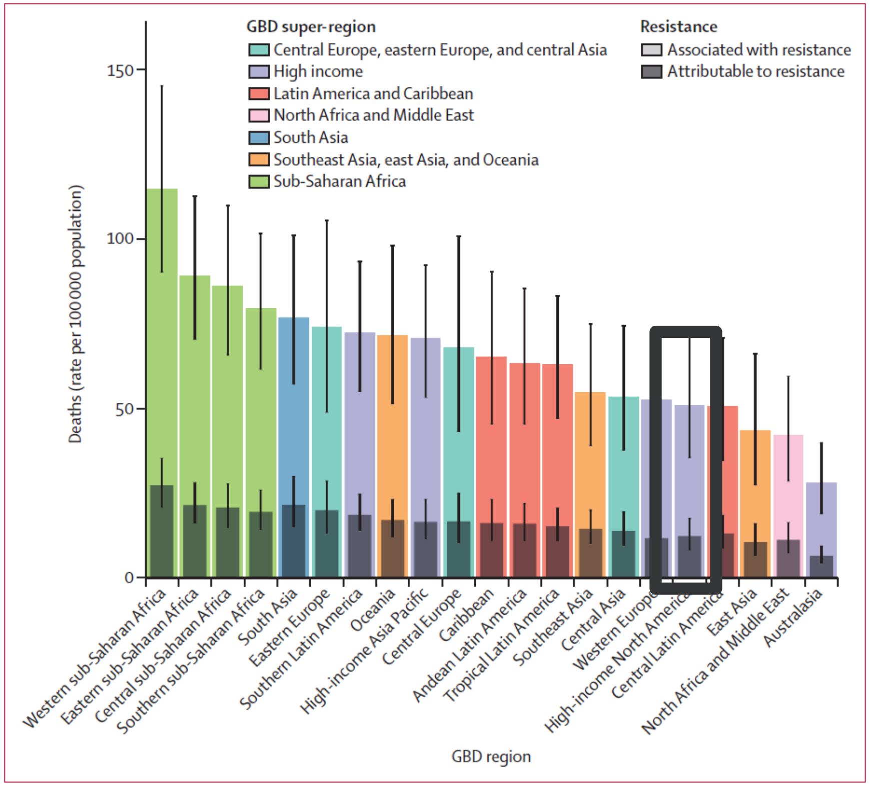
Background Antimicrobial resistance (AMR) poses a major threat to human health around the world. Previous publications have estimated the effect of AMR on incidence, deaths, hospital length of stay, and health-care costs for specific pathogen–drug combinations in select locations. To our knowledge, this study presents the most comprehensive estimates of AMR burden to date.

Methods We estimated deaths and disability-adjusted life-years (DALYs) attributable to and associated with bacterial AMR for 23 pathogens and 88 pathogen–drug combinations in 204 countries and territories in 2019. We obtained data from systematic literature reviews, hospital systems, surveillance systems, and other sources, covering 471 million individual records or isolates and 7585 study-location-years. We used predictive statistical modelling to produce estimates of AMR burden for all locations, including for locations with no data. Our approach can be divided into five broad components: number of deaths where infection played a role, proportion of infectious deaths attributable to a given infectious syndrome, proportion of infectious syndrome deaths attributable to a given pathogen, the percentage of a given pathogen resistant to an antibiotic of interest, and the excess risk of death or duration of an infection associated with this resistance. Using these components, we estimated disease burden based on two counterfactuals: deaths attributable to AMR (based on an alternative scenario in which all drug-resistant infections were replaced by drug-susceptible infections), and deaths associated with AMR (based on an alternative scenario in which all drug-resistant infections were replaced by no infection). We generated 95% uncertainty intervals (UIs) for final estimates as the 25th and 975th ordered values across 1000 posterior draws, and models were cross-validated for out-of-sample predictive validity. We present final estimates aggregated to the global and regional level.

Findings On the basis of our predictive statistical models, there were an estimated 4·95 million (3·62–6·57) deaths associated with bacterial AMR in 2019, including 1·27 million (95% UI 0·911–1·71) deaths attributable to bacterial AMR. At the regional level, we estimated the all-age death rate attributable to resistance to be highest in western sub-Saharan Africa, at 27·3 deaths per 100 000 (20·9–35·3), and lowest in Australasia, at 6·5 deaths (4·3–9·4) per 100 000. Lower respiratory infections accounted for more than 1·5 million deaths associated with resistance in 2019, making it the most burdensome infectious syndrome. The six leading pathogens for deaths associated with resistance (*Escherichia coli*, followed by *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*) were responsible for 929 000 (660 000–1 270 000) deaths attributable to AMR and 3·57 million (2·62–4·78) deaths associated with AMR in 2019. One pathogen–drug combination, meticillin-resistant *S aureus*, caused more than 100 000 deaths attributable to AMR in 2019, while six more each caused 50 000–100 000 deaths: multidrug-resistant excluding extensively drug-resistant tuberculosis, third-generation cephalosporin-resistant *E coli*, carbapenem-resistant *A baumannii*, fluoroquinolone-resistant *E coli*, carbapenem-resistant *K pneumoniae*, and third-generation cephalosporin-resistant *K pneumoniae*.

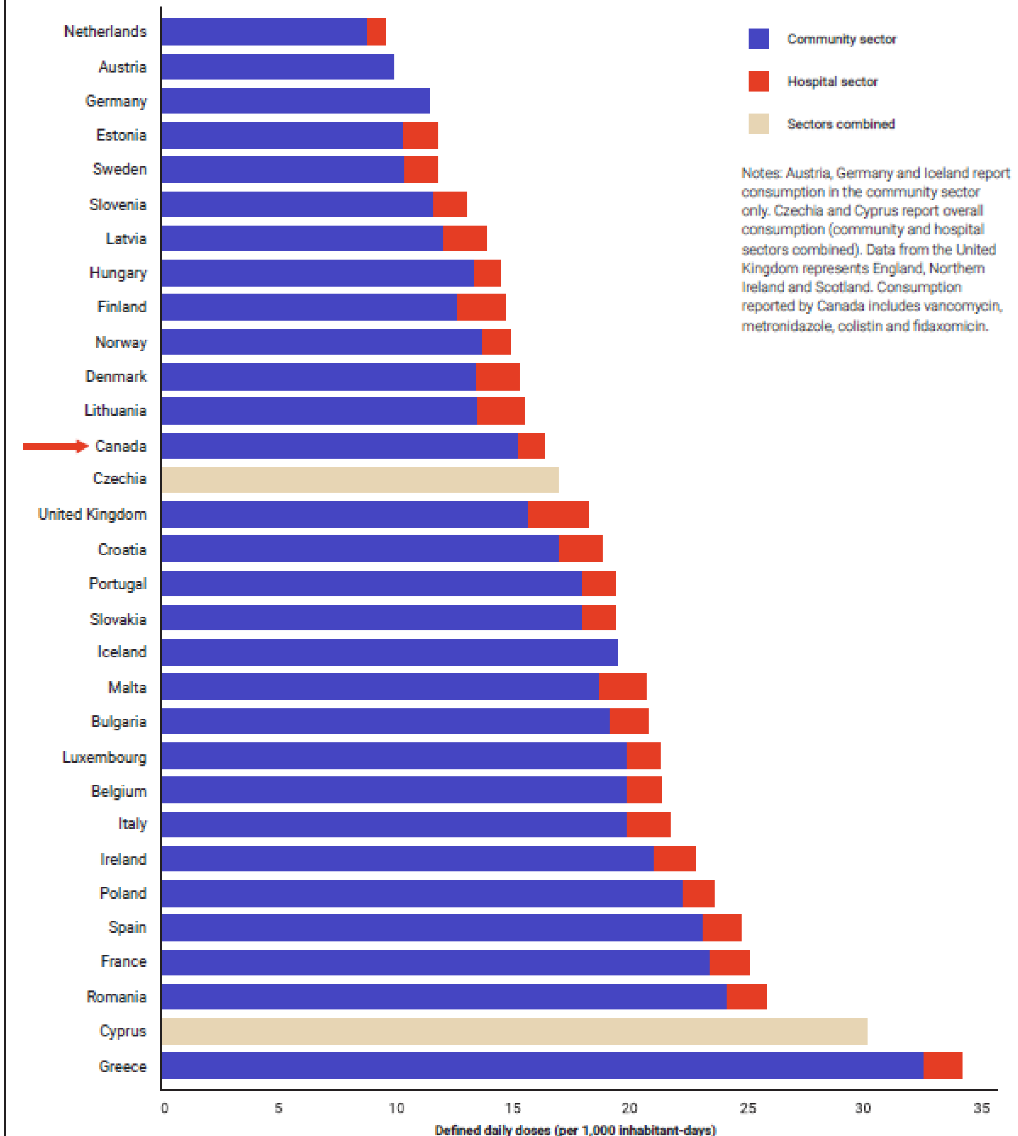
Interpretation To our knowledge, this study provides the first comprehensive assessment of the global burden of AMR, as well as an evaluation of the availability of data. AMR is a leading cause of death around the world, with the highest burdens in low-resource settings. Understanding the burden of AMR and the leading pathogen–drug combinations contributing to it is crucial to making informed and location-specific policy decisions, particularly about infection prevention and control programmes, access to essential antibiotics, and research and development of new vaccines and antibiotics. There are serious data gaps in many low-income settings, emphasising the need to expand microbiology laboratory capacity and data collection systems to improve our understanding of this important human health threat.

Funding Bill & Melinda Gates Foundation, Wellcome Trust, and Department of Health and Social Care using UK aid funding managed by the Fleming Fund.



Antibiotic Use

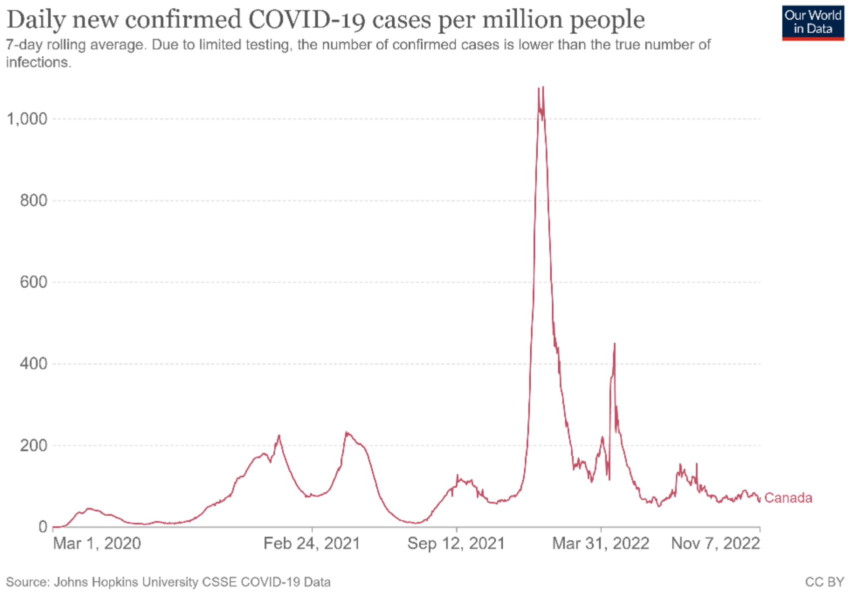
Figure 12: Consumption of antimicrobials in defined daily doses per 1,000 inhabitant-days, Canada and 30 European countries, 2019

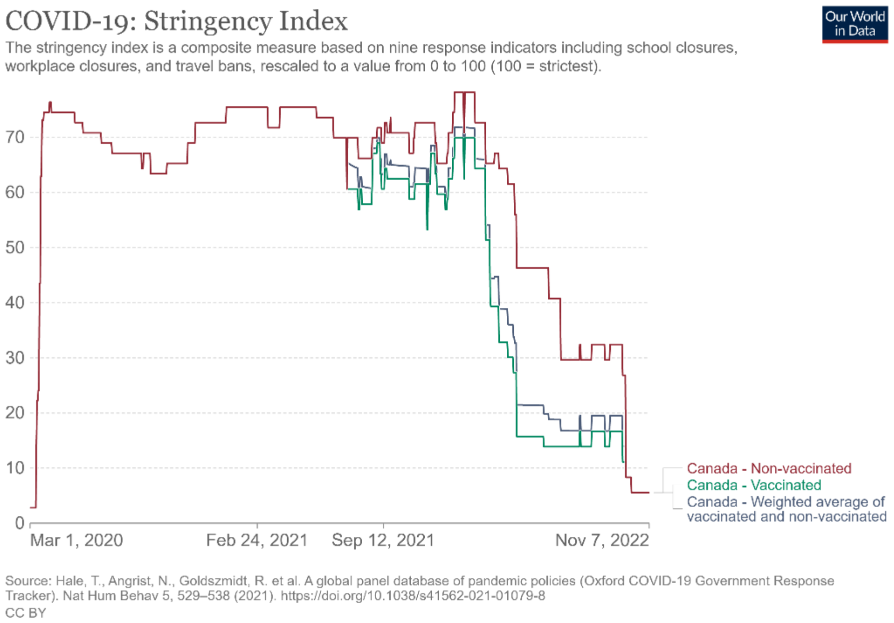


Source: The European Centre for Disease Prevention and Control and the Public Health Agency of Canada

CARSS report 2021

COVID-19

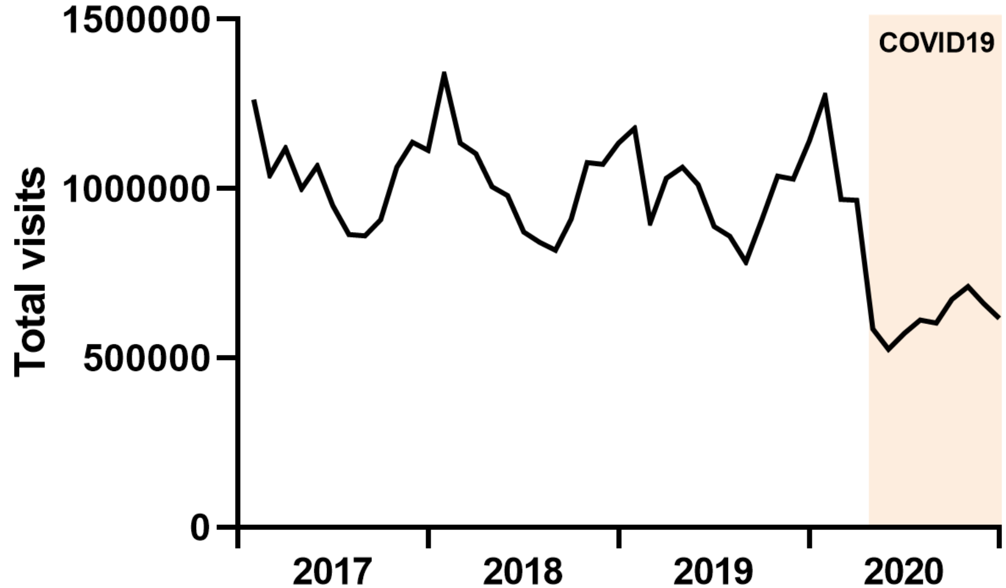

Daily new confirmed COVID-19 cases per million people
7-day rolling average. Due to limited testing, the number of confirmed cases is lower than the true number of infections.
Our World in Data
1,000
800
600
400
200
0
Mar 1, 2020
Feb 24, 2021
Sep 12, 2021
Mar 31, 2022
Nov 7, 2022
Canada
Source: Johns Hopkins University CSSE COVID-19 Data
CC BY


COVID-19: Stringency Index
The stringency index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest).
Our World in Data
70
60
50
40
30
20
10
0
Mar 1, 2020
Feb 24, 2021
Sep 12, 2021
Nov 7, 2022
Canada - Non-vaccinated
Canada - Vaccinated
Canada - Weighted average of vaccinated and non-vaccinated
Source: Hale, T., Angrist, N., Goldszmidt, R. et al. A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). Nat Hum Behav 5, 529–538 (2021). https://doi.org/10.1038/s41562-021-01079-8
CC BY

ACCEPTED MANUSCRIPT

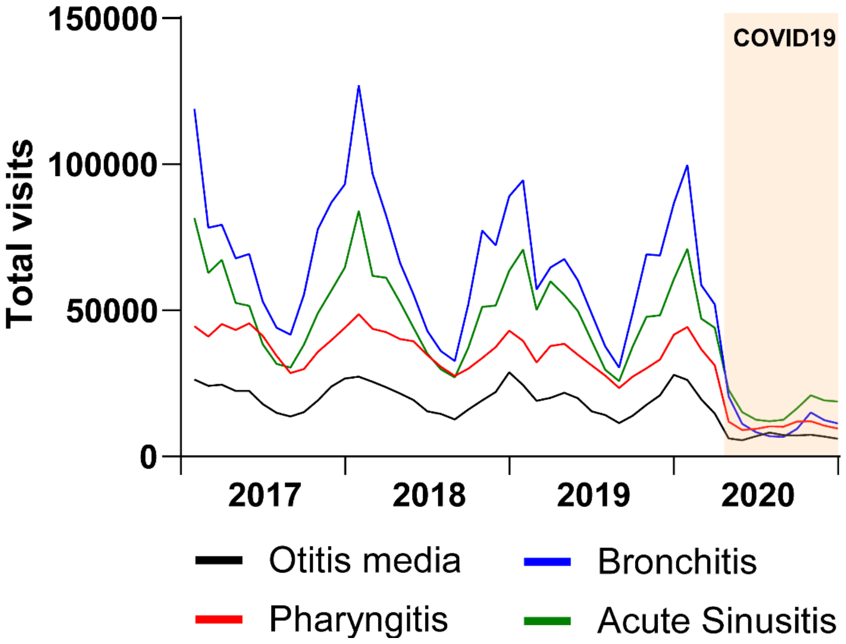
The collapse of infectious disease diagnoses commonly due to communicable respiratory pathogens during the COVID-19 pandemic: A time series and hierarchical clustering analysis

Ali Zhang, Matthew D. Surette, Kevin L. Schwartz, James I. Brooks, Dawn M.E. Bowdish, Roshanak Mahdavi, Douglas G. Manuel, Robert Talarico, Nick Daneman, Jayson Shurgold, Derek MacFadden

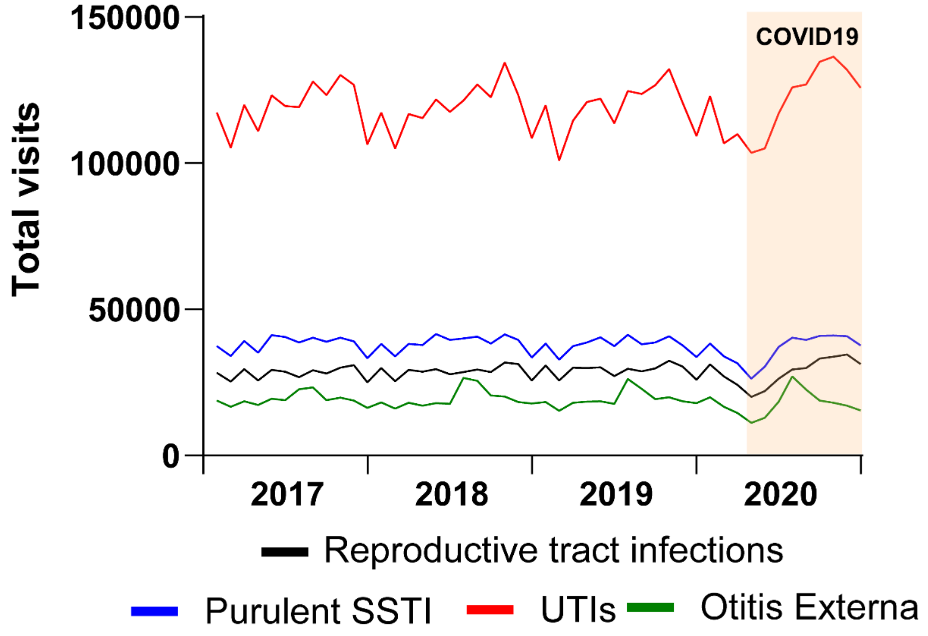


Visits for Infectious Diseases during COVID-19

Highly impacted



Minimally impacted



Open Forum Infectious Diseases

MAJOR ARTICLE

Infectious Diseases Society of America
hiv medicine association
OXFORD

The Impact of COVID-19 on Outpatient Antibiotic Prescriptions in Ontario, Canada; An Interrupted Time Series Analysis

Taito Kitano,[1,2] Kevin A. Brown,[2,3,4] Nick Daneman,[2,4,5] Derek R. MacFadden,[4,6] Bradley J. Langford,[2] Valerie Leung,[2,7] Miranda So,[8,9] Elizabeth Leung,[9,10,11] Lori Burrows,[12] Douglas Manuel,[4,6] Dawn M. E. Bowdish,[13] Colleen J. Maxwell,[4,14] Susan E. Bronskill,[4,5,15,16] James I. Brooks,[17,18] and Kevin L. Schwartz[2,3,4,19]

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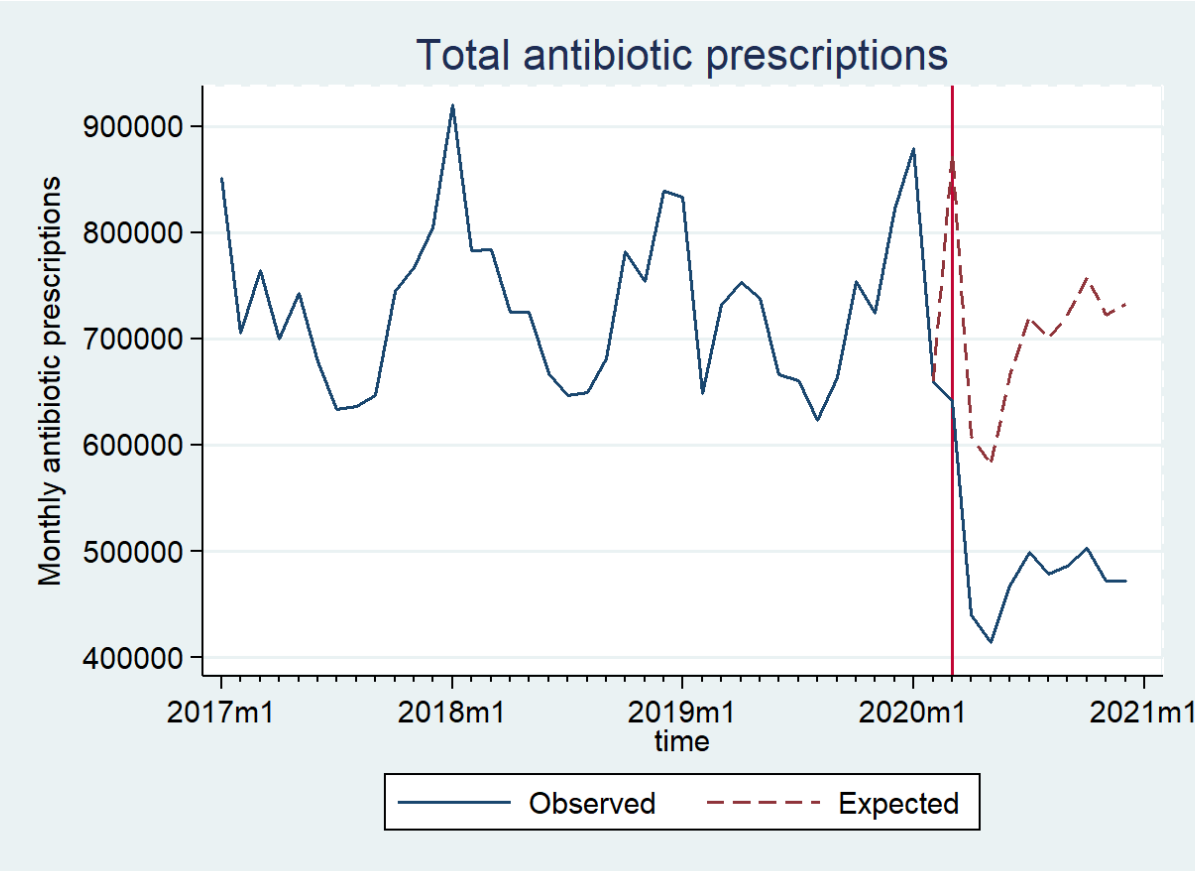
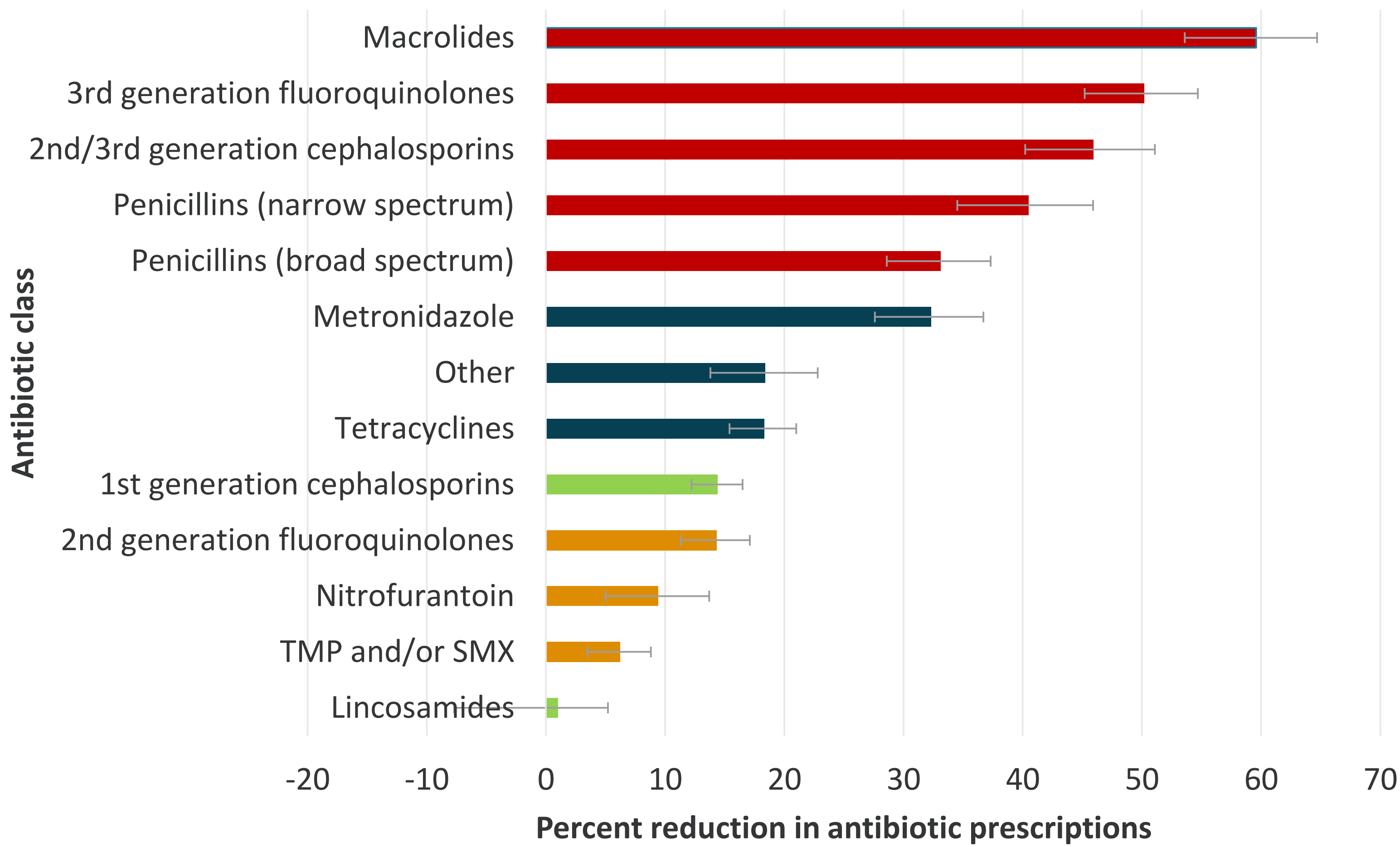
Antibiotic Prescriptions

Adjusted Relative Change -31.2% (95%CI -35.1% to -27.0%)



Reduction in Antibiotic Prescriptions by Class



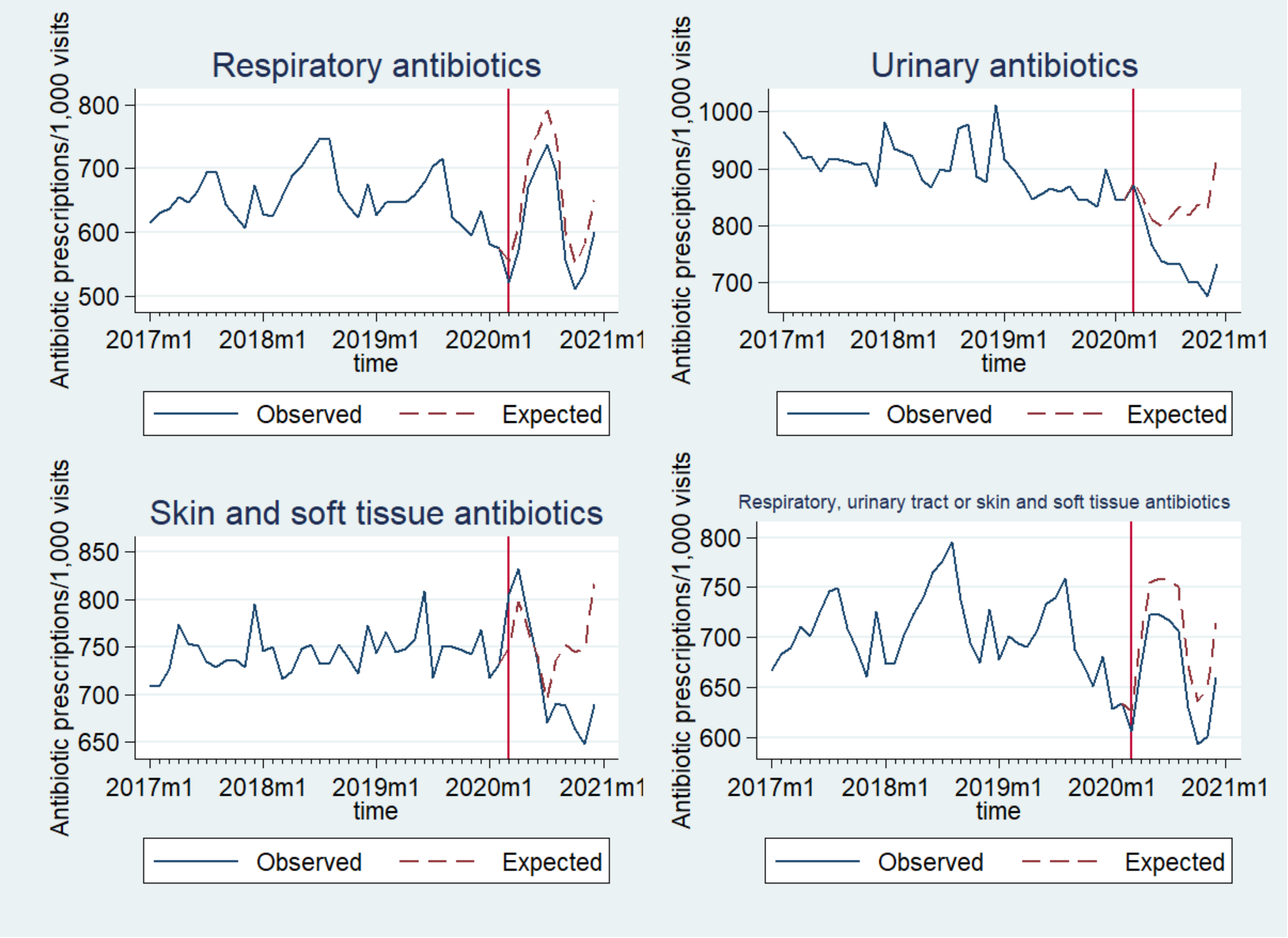
Indication Specific Antibiotic Prescriptions per 1,000 Patient Visits

-6.8%

-11.0%

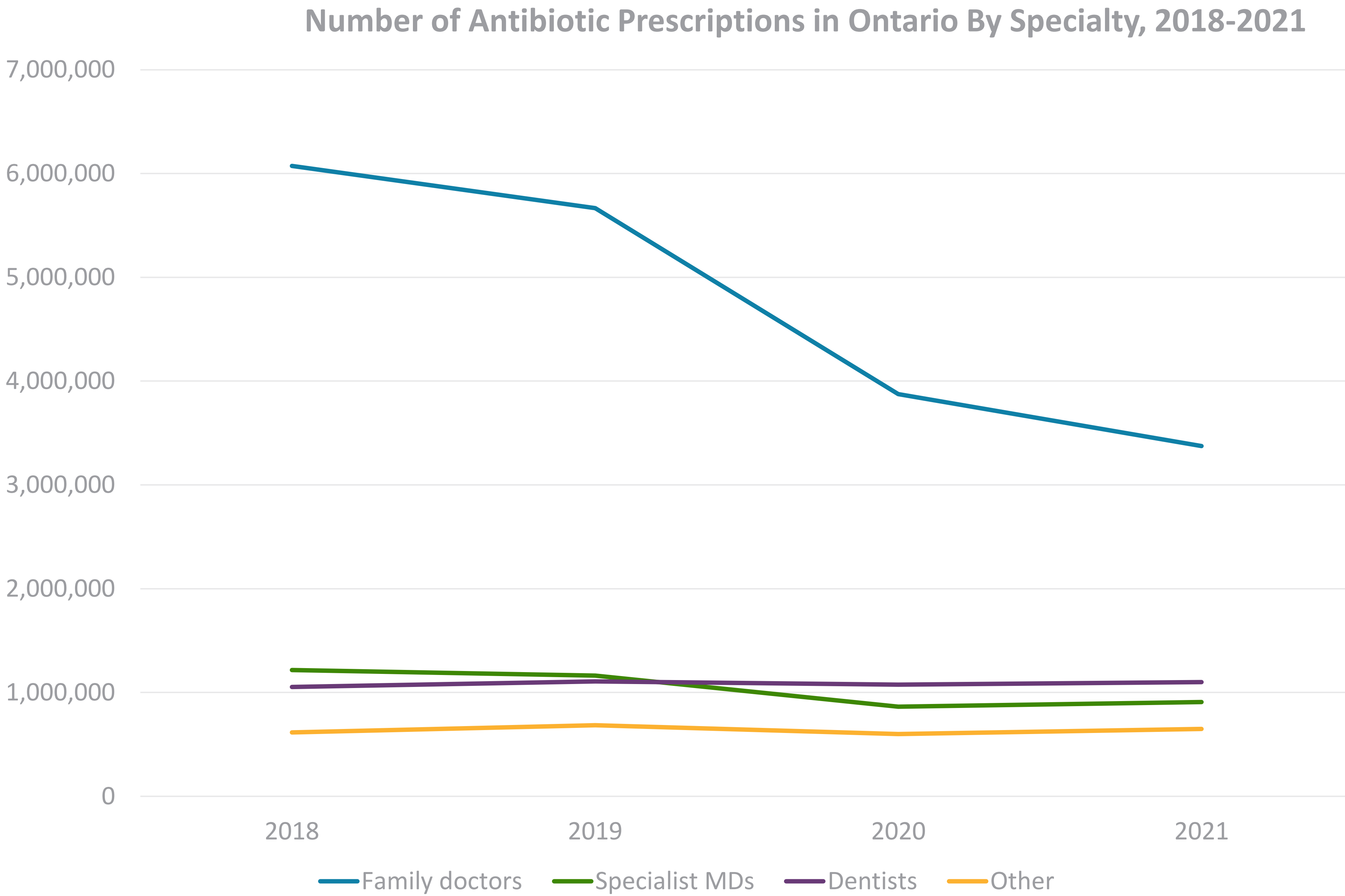
-4.7%

-5.5%



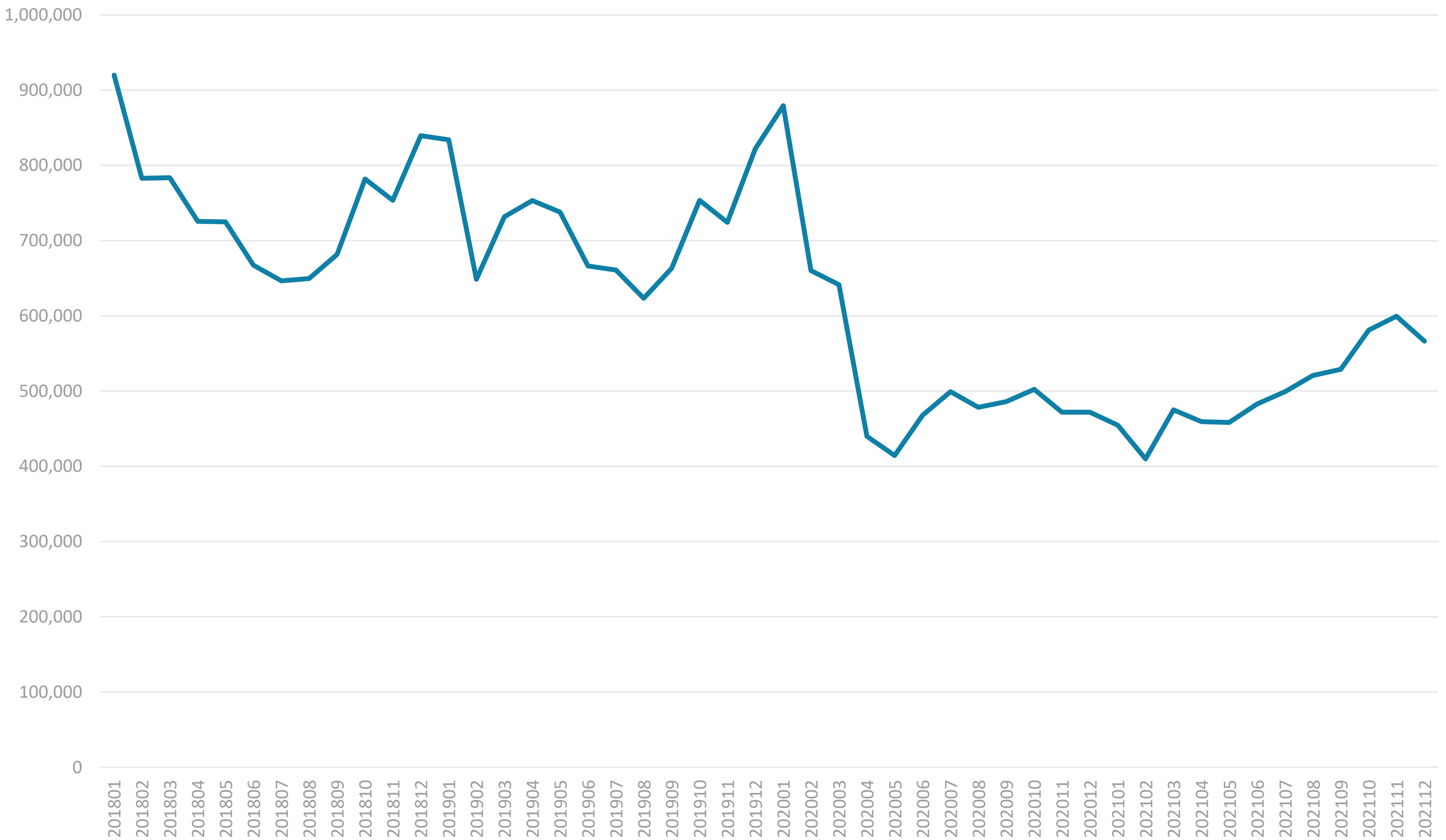
COVID-19 and Antibiotic Use

- 30% decrease in antibiotic use in 2020
- Largely explained by a decrease in respiratory infections
  - Most of these are viral
- Prescribing has **not** fundamentally changed
- Expect to see a rebound to pre-pandemic levels



Source: IQVIA

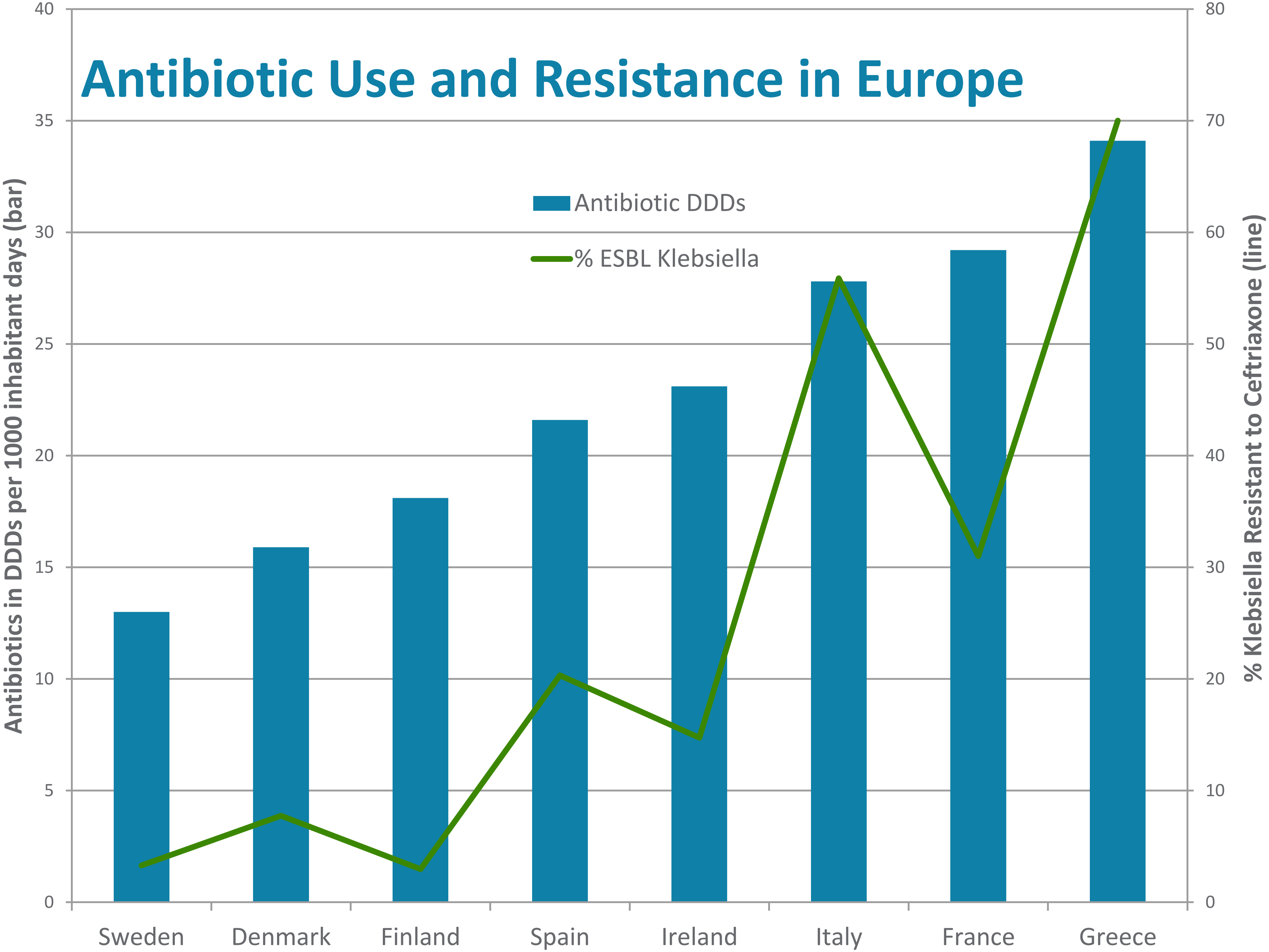
Monthly AMU in Ontario 2018 - 2021



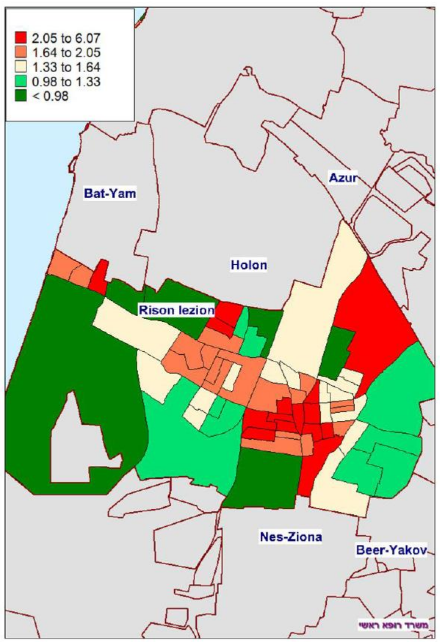
Source: IQVIA

ANTIBIOTIC USE → RESISTANCE

Antibiotic Use and Resistance in Europe



Fluoroquinolone neighborhood consumption by GSA (DDD/1,000 patients per day)



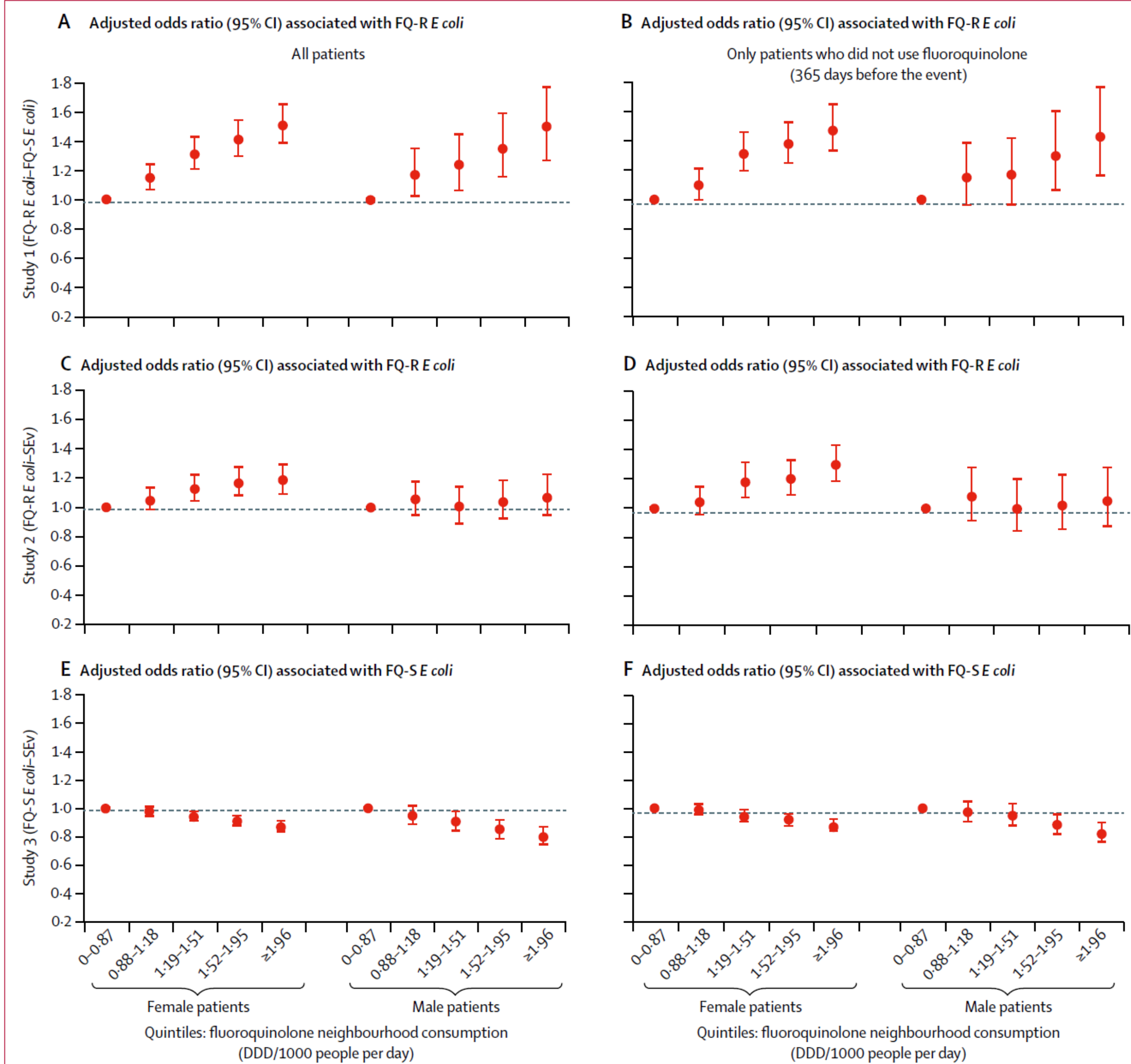


Figure 1: **Multiple logistic regression adjusted* odds ratios for *Escherichia coli* resistant and susceptible bacteria growth associated with neighbourhood fluoroquinolone consumption**

FQ-R=fluoroquinolone resistant. FQ-S=fluoroquinolone susceptible. SEv=sterile event. *Adjusted for: age, nursing home residence, ethnicity, BMI, comorbidity score, number of hospitalisations in the previous year, and personal consumption of fluoroquinolones, socioeconomic status, population density, proportion of people insured by CHS, and neighbourhood fluoroquinolone consumption in the previous year.

Low LancetID 2019

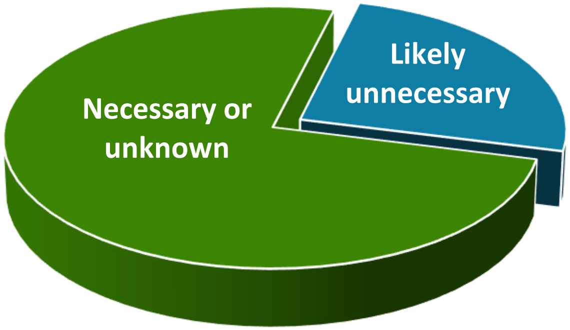
Antimicrobial Stewardship

=

How the appropriate use of antibiotics can maximize both their current effects and the chances of their being available for future generations

Unnecessary antibiotic prescribing in a Canadian primary care setting: a descriptive analysis using routinely collected electronic medical record data

Figure 2: Percentage of all antibiotics prescribed, by tier classification system.[19] Tier 1 = conditions for which antibiotics are always indicated (expected prescribing rate 100%), tier 2a = conditions for which antibiotics are frequently indicated (expected prescribing rate 51%–99%), tier 2b = conditions for which antibiotics are sometimes indicated (expected prescribing rate 21%–50%), tier 2c = conditions for which antibiotics are rarely indicated (expected prescribing rate 1%–20%), tier 3 = conditions for which antibiotics are never indicated (expected prescribing rate 0%). *These antibiotics were not associated with an encounter included in the study.



Schwartz KL CMAJ Open 2020

EDITORIAL

The New Antibiotic Mantra—"Shorter Is Better"

Brad Spellberg, MD

In AD 321, Roman Emperor Constantine the Great codified that there would be 7 days in a week. Even in the modern era of evidence-based-medicine, this 1695-year-old decree remains a primary reference for duration of antibiotic therapy: it leads physicians to treat infections in intervals
gratifying when clinical trials challeng
otic duration of 7 to 14 days.

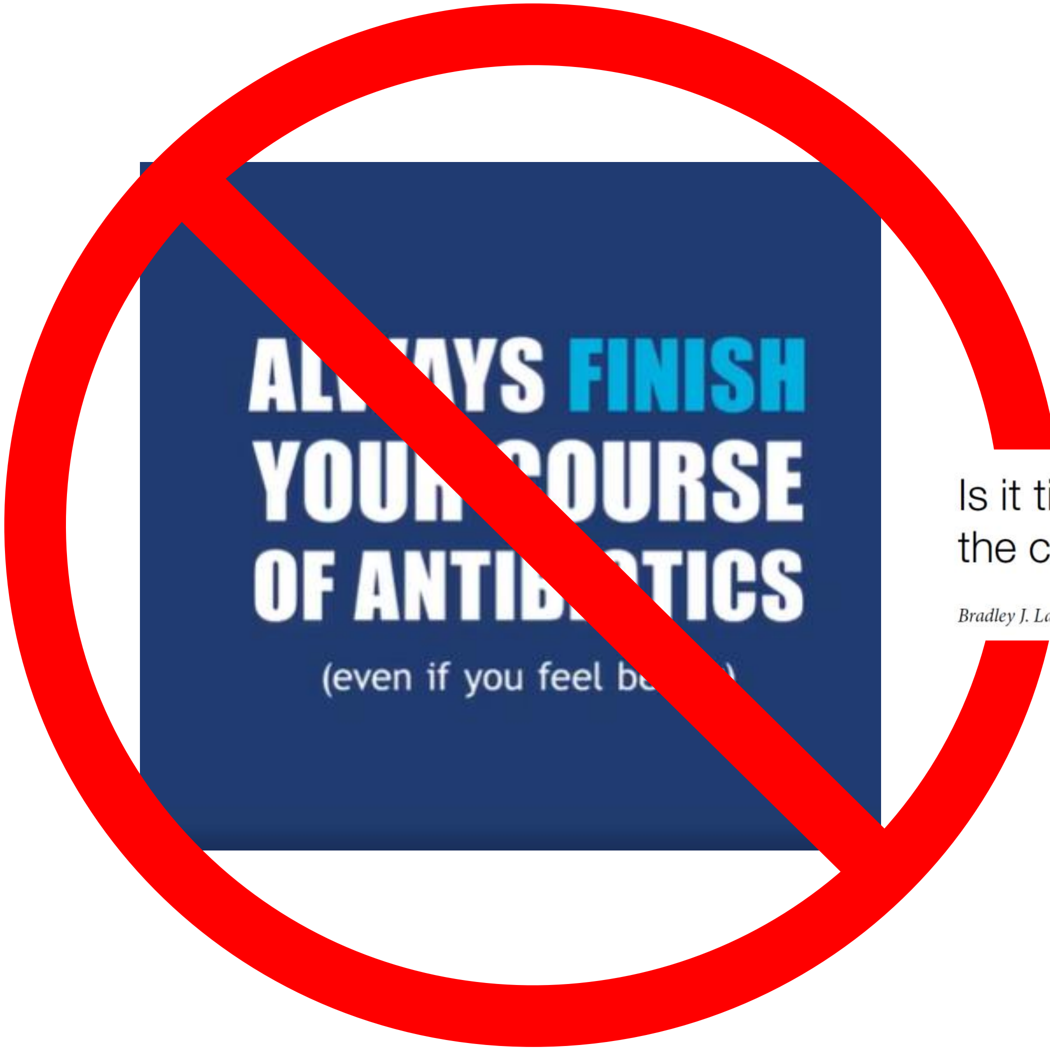
In the past, community-acquired p
with a 7- to 14-day course of antibiot
trials in the early 2000s demonstrat
protocol-specified antibiotics are as
courses of therapy for patients with

biotic therapy is at least as effective as 10 days for the treatment of community-acquired pneumonia.[3]

In his keynote address at an annual meeting of the Infectious Diseases Society of America, Louis B. Rice, MD, pointed

Table. Infections for Which Short-Course Therapy Has Been Shown to Be Equivalent in Efficacy to Longer Therapy

	Treatment, Days	
Disease	Short	Long
Community-acquired pneumonia[1-3]	3-5	7-10
Nosocomial pneumonia[6,7]	≤8	10-15
Pyelonephritis[10]	5-7	10-14
Intraabdominal infection[11]	4	10
Acute exacerbation of chronic bronchitis and COPD[12]	≤5	≥7
Acute bacterial sinusitis[13]	5	10
Cellulitis[14]	5-6	10
Chronic osteomyelitis[15]	42	84



WHO educational video

NONSENSE!!

(warning rant to follow)

Is it time to stop counselling patients to "finish the course of antibiotics"?

Bradley J. Langford, BScPhm, ACPR, PharmD, BCPS; Andrew M. Morris, MD, SM(Epi), FRCPC

Variability in antibiotic duration of treatment by Ontario family physicians

Public Health Ontario
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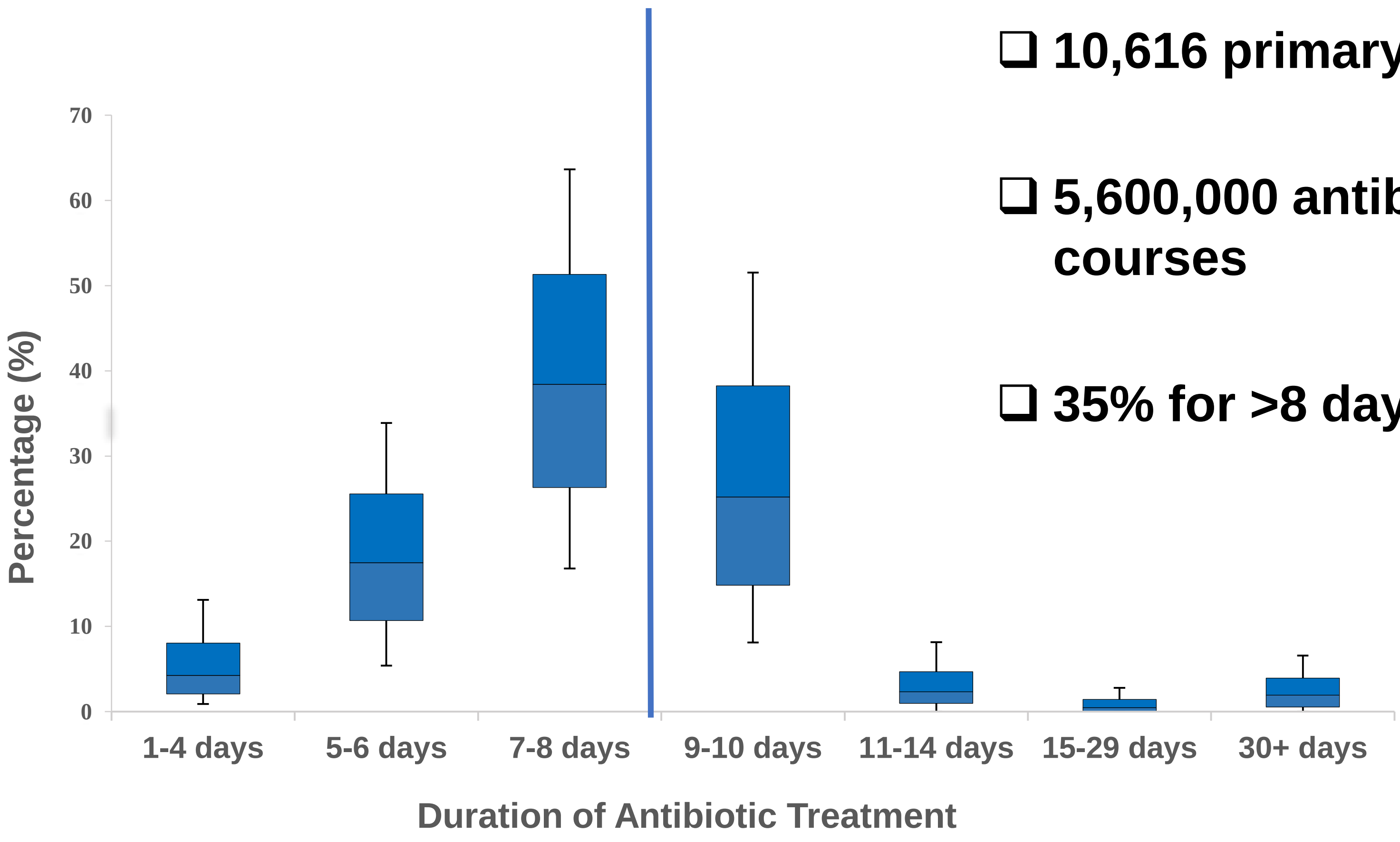
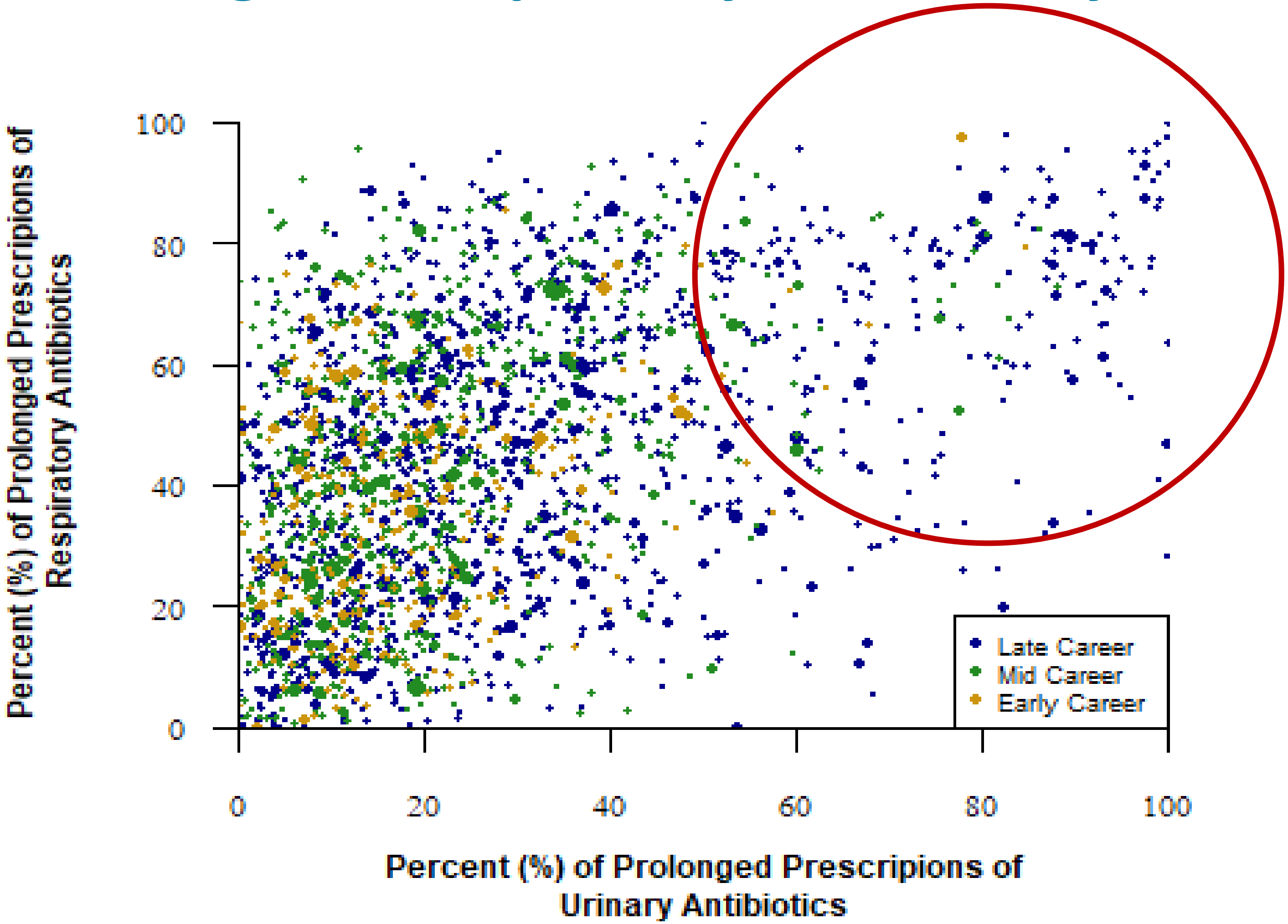


- ❑ 10,616 primary care MDs
- ❑ 5,600,000 antibiotic courses
- ❑ 35% for >8 days

Inter-physician variability in prolonged duration by career stage for respiratory and urinary antibiotics



Fernandez CID

Estimating Daily Antibiotic Harms

Umbrella Review and Meta-Analysis

Public Health Ontario | Santé publique Ontario

35 Systematic Reviews

71 Short vs. Long Antibiotic Duration Trials

92% studies evaluated respiratory tract and urinary tract infections

23,174 patients evaluated

Adverse Events N=20,345	4%↑	odds ratio/day
Antibiotic Resistance N=2,330	3%↑*	odds ratio/day
Super-infections N=5,776	2%↓*	odds ratio/day

* Non-statistically significant difference

Each Additional Day Can Cause Harm

5 vs 3 Days → **9%↑** odds ratio
Of adverse events

7 vs 3 Days → **19%↑** odds ratio
Of adverse events

Source: Curran J et al. Estimating daily antibiotic harms: An Umbrella Review with Individual Study Meta-analysis Clin Micro Infect. 2021

Ontario
Agency for Health Protection and Promotion
Agence de protection et de promotion de la santé

How to perform antimicrobial stewardship in the community

Box. The Imbalance in Factors Related to Antibiotic Prescribing

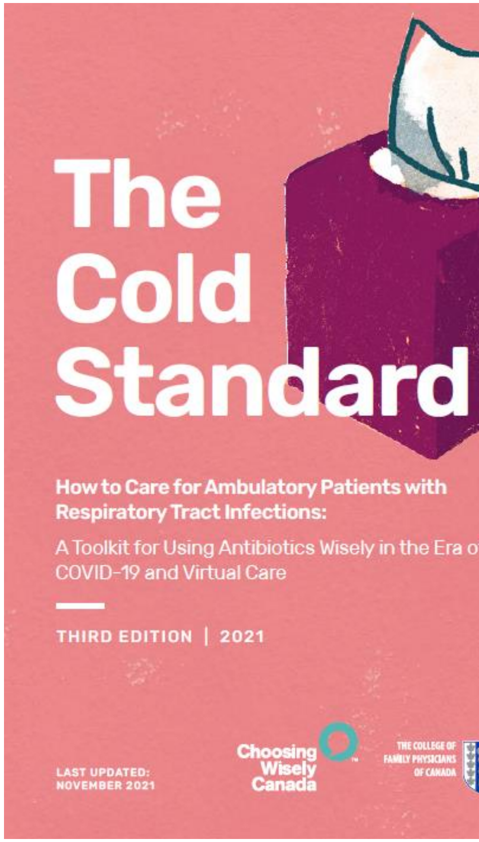
Factors Driving Antibiotic Prescribing: Immediate and Emotionally Salient

- Belief that a patient wants antibiotics
- Perception that it is easier and quicker to prescribe antibiotics than explain why they are unnecessary
- Habit
- Worry about serious complications and "just to be safe" mentality

Factors Deterring Antibiotic Prescribing: More Remote and Less Emotionally Salient

- Risks of adverse reactions and drug interactions
- Recognizing the need for antibiotic stewardship
- Desire to deter low-value care and decrease unnecessary health care spending
- Prefer to follow guidelines

Mehrotra JAMA Intern Med 2016



Managing Respiratory Tract Infections

	CAN BE MANAGED VIRTUALLY OR IN PERSON (Use Viral Prescription)	SHOULD BE ASSESSED IN PERSON (To assess the need for immediate or delayed antibiotics, whether or not antibiotics are prescribed*)
SUSPECTED OR CONFIRMED COVID-19	• Fever • Respiratory symptoms • No shortness of breath	• Shortness of breath or hypoxia (if monitoring available) • Concerns of dehydration • Suspicion of secondary b • Any red flags**
EAR PAIN (In children over 6 months of age)	• Symptoms <48 hours • Fever <39°C • Pain controlled with oral pain medication • Otherwise feels well	• Symptoms >48 hours des pain medications • Fever ≥39°C • Feels unwell
SORE THROAT	• Mild symptoms <48 hours • Low suspicion for bacterial pharyngitis, e.g.: ◦ Over 15 or less than 3 years of age ◦ No fever ◦ Presence of cough or runny nose	• Persistent or worsening s >48 hours, OR • High suspicion of bacteria ◦ Severe pain ◦ No cough or runny nos ◦ Fever without alternate
SINUS CONGESTION	• Mild symptoms <7 days • No red flags***	• Presence of red flags***
COPD EXACERBATION	• Patient able to do their activities of daily living • Patient known to provider and reliable for virtual follow-up	• Patient is too short of bre activities of daily living
SUSPECTED PNEUMONIA	• Assess in person	• Assess in person
INFLUENZA-LIKE ILLNESS, BRONCHITIS, COMMON COLD, ASTHMA	• High fever controllable with antipyretic • Cough • Congestion • Body aches • Mild GI symptoms	• Concerns of dehydration • Suspicion of secondary b • Any red flags**

***See table on role of antibiotics**

****Red flags for patient with viral infection:**
- For children, may include fast breathing or trouble breathing, bluish lips or face, ribs pulling each breath, chest pain, child refuses to walk, signs of dehydration, history of seizure, any f weeks of age.
- In adults, may include difficulty breathing or shortness of breath, acute chest pain or abdon pain, dizziness, confusion, signs of dehydration.

*****Red flags for patient with sinusitis:**
- Altered mental status, headache, systemic toxicity, swelling of the orbit, change in visual ac neurologic deficits.

Points to Remember: The Role of Antibiotics

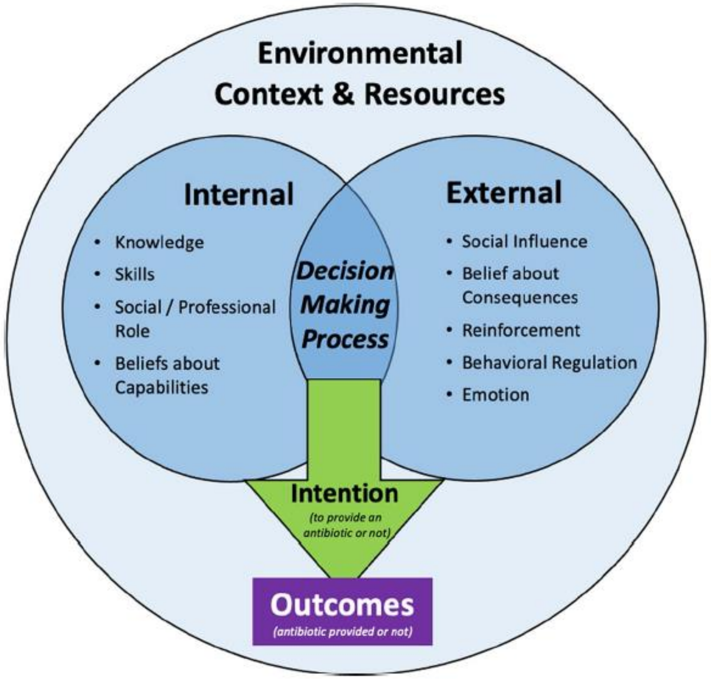
Syndrome	Specific Situations Where Antibiotics Are Recommended	Recommended Antibiotic Duration
UPPER RESPIRATORY TRACT INFECTION (COMMON COLD)	• Not indicated	• Antibiotics never indicated
BRONCHITIS/ ASTHMA	• Not indicated	• Antibiotics never indicated
OTITIS MEDIA*	• Perforated tympanic membrane with purulent discharge or a bulging tympanic membrane with either: ◦ Fever ≥ 39°C OR ◦ Moderately or severely ill OR ◦ Symptoms lasting > 48 hours	• **Age 6 months to 2 years:** 10 days • **Age greater than 2 years:** 5 days
PHARYNGITIS	• Centor score is ≥ 2 **AND** throat swab culture (or rapid antigen test if available) confirms presence of Group A *Streptococcus* • Don't perform throat swabs at all for patients with Centor score ≤ 1 OR if there are accompanying symptoms of a viral infection such as rhinorrhea, oral ulcers or hoarseness (since a positive swab in that circumstance would only represent colonization).	• 10 days
SINUSITIS	• Patient has at least 2 of the below **PODS** symptoms, one of those being **O** or **D** **AND**: ◦ Symptoms lasting greater than 7–10 days OR ◦ The symptoms are severe OR ◦ There is no response after a 72-hour trial with nasal corticosteroids **P** = Facial **P**ain/pressure/fullness **O** = Nasal **O**bstruction **D** = Purulent nasal or postnasal **D**ischarge **S** = Hyposmia/anosmia (**S**mell)	• 5 days
PNEUMONIA	• If the patient has compatible symptoms AND radiographic confirmation of pneumonia • Chest x-ray should not be performed routinely unless there are abnormal vital signs and/or physical exam findings	• 5 days
ACUTE EXACERBATION OF COPD	• Increase in sputum purulence with either increase in sputum volume and/or increased dyspnea	• 5 days

*In patients with childhood immunizations

RESEARCH Open Access

Coping with 'the grey area' of antibiotic prescribing: a theory-informed qualitative study exploring family physician perspectives on antibiotic prescribing

Michelle Simeoni[1,3], Marianne Saragosa[2], Celia Laur[3], Laura Desveaux[4,5], Kevin Schwartz[1] and Noah Ivers[3,5*]




Sorry, but no amount of antibiotics will get rid of your cold.
The best way to treat most colds, coughs or sore throats is with plenty of fluids and rest. Talk to your health care provider.
Choosing Wisely Canada
THE COLLEGE OF FAMILY PHYSICIANS OF CANADA
LE COLLÈGE DES MÉDECINS DE FAMILLE DU CANADA
To learn more, visit: www.choosingwiselycanada.org/antibiotics

Original Investigation

Nudging Guideline-Concordant Antibiotic Prescribing
A Randomized Clinical Trial

Daniella Meeker, PhD; Tara K. Knight, PhD; Mark W. Friedberg, MD, MPP; Jeffrey A. Linder, MD, MPH;
Noah J. Goldstein, PhD; Craig R. Fox, PhD; Alan Rothfeld, MD; Guillermo Diaz, MD; Jason N. Doctor, PhD

Table 4. Changes in Adjusted Rates[a] of Inappropriate Antibiotic Prescribing for ARIs

	Poster Condition		Control Condition	
Characteristic	Baseline	Final Measurement	Baseline	Final Measurement
Inappropriate prescribing rate, % (95% CI)	43.5 (38.5 to 49.0)	33.7 (25.1 to 43.1)	42.8 (38.1 to 48.1)	52.7 (44.2 to 61.9)
Absolute percentage change, baseline to final measurement (95% CI)	−9.8 (0.0 to −19.3)		9.9 (0.0 to 20.2)	
Difference in differences between poster conditi and control (95% CI)	−19.7 (−5.8 to −33.04)[b]			

Abbreviation: ARI, acute respiratory infection.

[a] Adjusted for demographic characteristics and insurance status.

Meeker JAMA IM 2014

Cochrane Library

Cochrane Database of Systematic Reviews

Audit and feedback: effects on professional practice and healthcare outcomes (Review)

Ivers N, Jamtvedt G, Flottorp S, Young JM, Odgaard-Jensen J, French SD, O'Brien MA, Johansen M, Grimshaw J, Oxman AD

Audit and Feedback = Measuring an individuals professional practice compared to standards or targets

JAMA Internal Medicine

RCT: Effect of Antibiotic-Prescribing Feedback to High-Volume Primary Care Physicians on Number of Antibiotic Prescriptions

POPULATION

2405 Men, 1060 Women

Primary care physicians (PCPs) with high antibiotic-prescribing volume

SETTINGS / LOCATIONS

3500 PCPs across Ontario, Canada

INTERVENTION

3500 Randomized

1500 Initiation letter
Informed PCP that they were in the highest quartile of prescribers and provided guidance on appropriate antibiotic initiation for respiratory infections

1500 Duration letter
Informed PCP that they were in the highest quartile of prescribers and provided guidance on appropriate antibiotic durations

500 Control
PCP did not receive a letter

PRIMARY OUTCOME

Total antibiotic volume based on number of prescriptions at 12 mo

FINDINGS

Receipt of the antibiotic duration letter resulted in a small relative difference in fewer antibiotic prescriptions compared with controls at 12 mo; there was no statistical difference with receipt of the initiation letter

Difference for fewer antibiotic prescriptions

Initiation letter: relative risk, 0.96; 97.5% CI, 0.92-1.01; $P = .06$
Duration letter: relative risk, 0.95; 97.5% CI, 0.91-1.00; $P = .01$

Schwartz KL, Ivers N, Langford BJ, et al. Effect of antibiotic-prescribing feedback to high-volume primary care physicians on number of antibiotic prescriptions: a randomized clinical trial. *JAMA Intern Med*. Published online July 6, 2021. doi:10.1001/jamainternmed.2021.2790

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Tools and resources from: Choosing Wisely Ontario

November 23, 2018

Dr. Jane Smith
123 Family Doctor Ave.
Toronto, ON
M1N 2O3

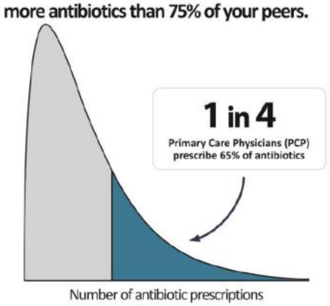
Dear Dr. Smith

Every day, family doctors like you are doing everything you can to help your patients become and stay healthy. Choosing when and how you prescribe antibiotics is a crucial decision-making step, especially during flu season. That's why we're writing to you personally, to support you in prescribing antibiotics appropriately for your patients.

Across care settings, research has shown that practice habits and expectations around antibiotic prescribing are leading causes of over-prescription. Knowing where each of us are on the spectrum of prescribing habits provides a chance to reflect and consider changes.

How you prescribe antibiotics compared to your peers

You are receiving this letter because you prescribe more antibiotics than 75% of your peers.



As context, it might be useful for you to be aware that **you're one of the 25% of primary care physicians who prescribe 65% of antibiotics.** Reviewing the reasons why that may be happening, and considering how unnecessary prescriptions can be avoided are important ways to improve the health of your patients. Enclosed, you'll find tools and information to help reduce antibiotics safely.

Aside from the immediate risks of adverse reactions, research shows us that antibiotics are over-prescribed for many respiratory infections, and this is contributing to growing antibiotic resistance in many of our communities. We're putting patients and families at risk when we over-prescribe antibiotics. Each time you're faced with the choice, you'll now have options that make our communities' future safer, so we have antibiotics that still work when we really need them.

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Tools and resources from: Choosing Wisely Ontario

With your own eyes, you've seen how medical treatments have come a long way in recent decades. New and growing bodies of evidence give us more reassurance that we're doing the right thing when we choose to avoid or delay initiating antibiotics. **Enclosed you'll find a quick reference guide from Choosing Wisely Canada with tools and information to help you decide if you need to initiate antibiotics in clinical settings.** This gives you options to help safely reduce the medication and side effect burden for your patients.

By taking on the challenges to improve their care for patients, family physicians have shown incredible adaptive skills and abilities. We see the evidence in the greater depth and breadth of care you provide every day. Your commitment to assess and improve the quality of care your patients receive can be seen in your daily efforts, and there are resources to support you to achieve that goal.

How can you receive a confidential practice report from Health Quality Ontario to support you in caring for your patients?

As of right now, 3000+ of your peers have signed up to receive MyPractice Primary Care reports. If you're a non-salaried family physician, visit this website to sign up and see what indicators are currently available for your practice.
Use this link or scan the barcode with your smart phone
www.hqontario.ca/pc-sign-up.

Thanks for all you do to keep improving the care you provide for your patients! Each step you take in our shared fight against antimicrobial resistance helps to improve outcomes for our patients and communities.

Sincerely,

Dr. Gary Garber MD FRCPC
Chief, Infection Prevention and Control
Public Health Ontario

Dr. Asad Razzaque, MD CCFP
Family Physician
Chair, OMA Section on General and Family Practice

The data for this letter is derived from IQVIA Xponent^{TM}. If you have questions about this letter or wish to opt-out of future letters please email the Public Health Ontario antimicrobial stewardship team: asp@oahpp.ca

Page 2 of 3

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How can you optimize antibiotic prescribing for acute uncomplicated respiratory infections?

Here's some helpful tips endorsed by Choosing Wisely Canada. For more information and resources, visit: **choosingwiselycanada.org/antibiotics**

Syndrome	Criteria for antibiotics in Canadian primary care settings
Otitis media in vaccinated children >6 months	Perforated tympanic membrane with purulent discharge or a bulging tympanic membrane with either: • fever ≥39°C OR • moderately or severely ill OR • symptoms lasting > 48 hours
Pharyngitis	Centor score is ≥ 2 AND throat swab culture (or rapid antigen test if available) confirms presence of Group A Streptococcus. Don't perform throat swabs at all for patients with Centor score ≤ 1, OR if there are symptoms of a viral infection such as rhinorrhea, oral ulcers or hoarseness.
Sinusitis	Patient has at least 2 of the below PODS symptoms, one of those being O or D AND • Symptoms lasting greater than 7-10 days OR • The symptoms are severe OR • There is no response after a 72 hour trial with nasal corticosteroids. **P:** Facial Pain/pressure/fullness; **O:** Nasal Obstruction; **D:** Purulent/ discolored nasal or postnasal Discharge; **S:** Hyposmia/anosmia (Smell)
Pneumonia	Objective evidence on a chest x-ray if available.
Upper respiratory infection (Common cold)	Not indicated unless there is clear evidence of secondary bacterial infection (see the recommendations for otitis media, pharyngitis, sinusitis, pneumonia).
Bronchitis/asthma	Not indicated
Acute exacerbation of Chronic Obstructive Pulmonary Disease	Increase in sputum purulence with either increase in sputum volume and/or increased dyspnea.

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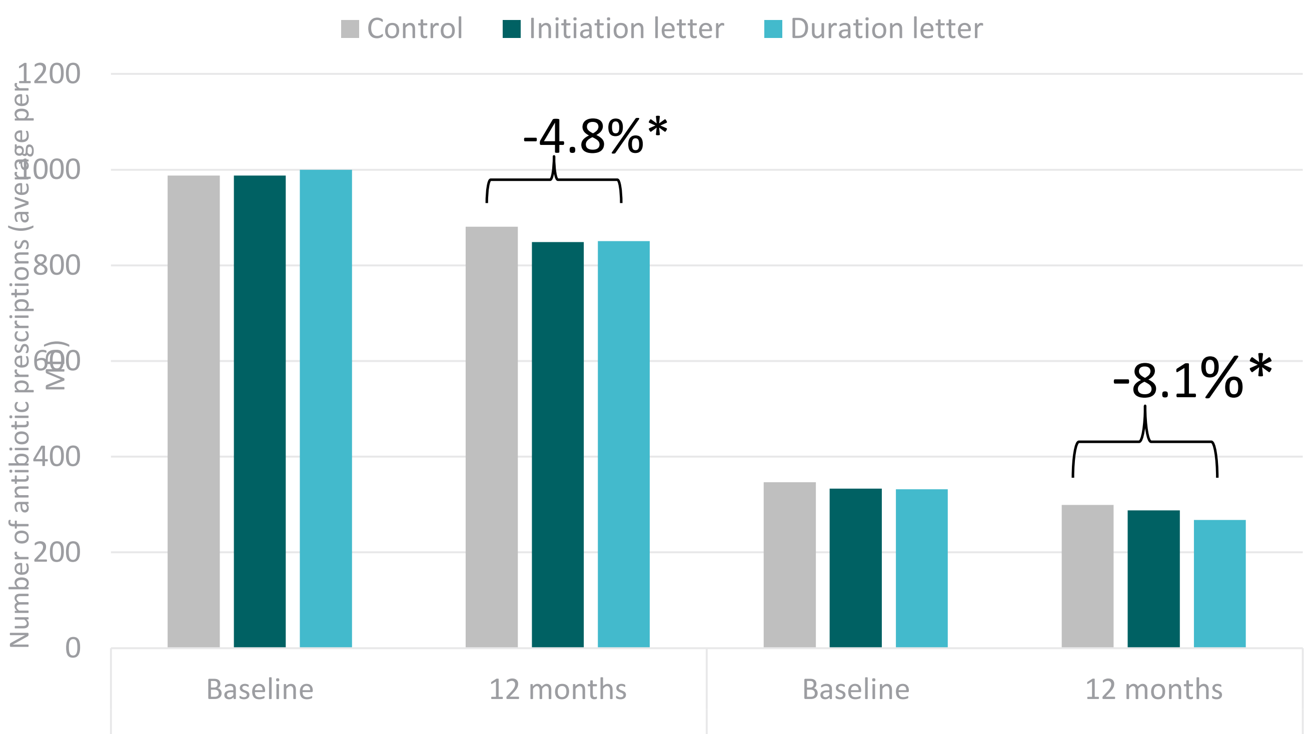
How can you optimize antibiotic prescribing durations?

Antibiotics are often prescribed for too long. As you may know, unnecessarily prolonged courses of antibiotics lead to antibiotic related side effects (e.g., diarrhea, allergic reactions) and resistance. The majority of bacterial infections can be treated with 7 days of antibiotics or less, however more than one third of antibiotic prescriptions by primary care physicians in Ontario are for more than 7 days.

These are the recommended antibiotic durations for treating uncomplicated bacterial infections based on most current evidence for the majority of patients:

Syndrome	Recommended duration
Acute sinusitis	5 days
Pneumonia	5 days
Cellulitis	5-7 days
Otitis Media	5 days (10 days in children <2 years)
Cystitis	3-5 days
Pyelonephritis	7 days
Acute exacerbation of Chronic Obstructive Pulmonary Disease	5 days

Primary results from Ontario Audit and Feedback RCT

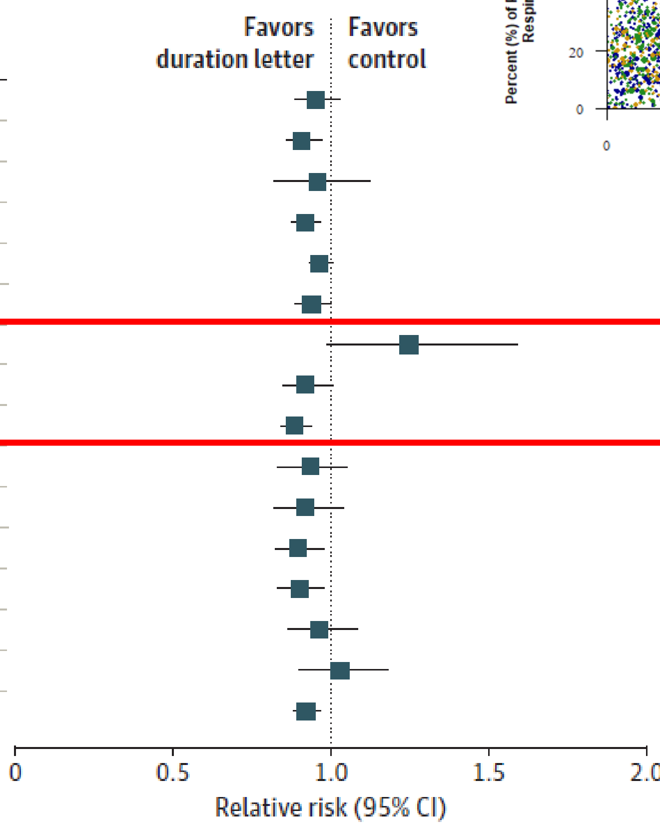


If all 3,500 MDs received the Duration Letter = ⬇147,000 total, ⬇84,000 prolonged, and ⬇ $2,700,000 per year

*p<0.025

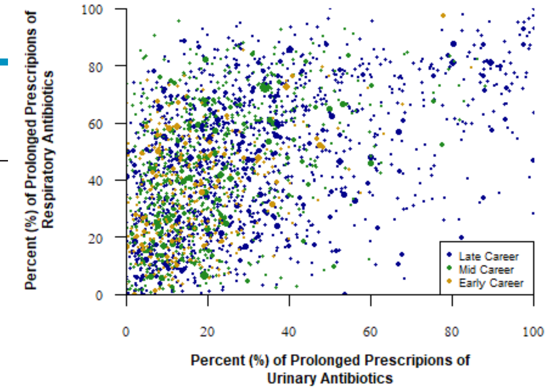
Figure 3. Forest Plot Showing Subgroup Analysis of Duration Letter Arm Compared With Control for the Outcome of Prolonged Antibiotic Duration

Subgroup	Relative risk (95% CI)
Female physicians	0.95 (0.89-1.02)
Male physicians	0.91 (0.85-0.96)
Physicians in rural regions	0.96 (0.82-1.12)
Physicians in urban regions	0.92 (0.87-0.96)
High baseline prescribing level (<90%)	0.94 (0.89-0.99)
Very high baseline prescribing level (≥90%)	0.91 (0.84-0.97)
<11 y Since medical graduation[a]	1.25 (0.98-1.59)
11-24 y Since medical graduation	0.92 (0.85-1.01)
≥25 y Since medical graduation[a]	0.88 (0.84-0.93)
Prescribing to female patients <18 y	0.93 (0.83-1.05)
Prescribing to male patients <18 y	0.92 (0.82-1.04)
Prescribing to female patients 18-64 y	0.90 (0.83-0.97)
Prescribing to male patients 18-64 y	0.90 (0.83-0.96)
Prescribing to female patients ≥65 y	0.96 (0.86-1.08)
Prescribing to male patients ≥65 y	1.03 (0.90-1.18)
All	0.92 (0.88-0.96)



Error bars indicate 95% CIs.

[a] P = .006 for interaction.



Antimicrobial Stewardship in Primary Care

- 90% of antibiotic use
- ~25% of antibiotic unnecessary
- ~1/3 too long
- Not a knowledge gap
  - Habit, fear, perceived patient expectations
- Need to use behavioural science tools to drive change
- Audit and Feedback including education on durations can be effective on a population scale

Long Term Care

Long Term Care Residents are Vulnerable to Infection and Antibiotic Associated Harms

- immuno-senescence with aging
- high frequency of comorbidities
- close proximity to other vulnerable individuals

Slide courtesy of Nick Daneman

Nicolle *ICHE* 2000; Daneman *Drugs Aging* 2012; Crnich *Drugs Aging* 2015

Asymptomatic Bacteriuria

Symptom Free Pee… Let it Be!

Asymptomatic Bacteriuria is Common in LTC

Up to **40%** of Men

Up to **50%** of Women

Up to **100%** of catheterized patients

Biggel M, et al. BMC geriatrics. 2019 Dec;19(1):170.

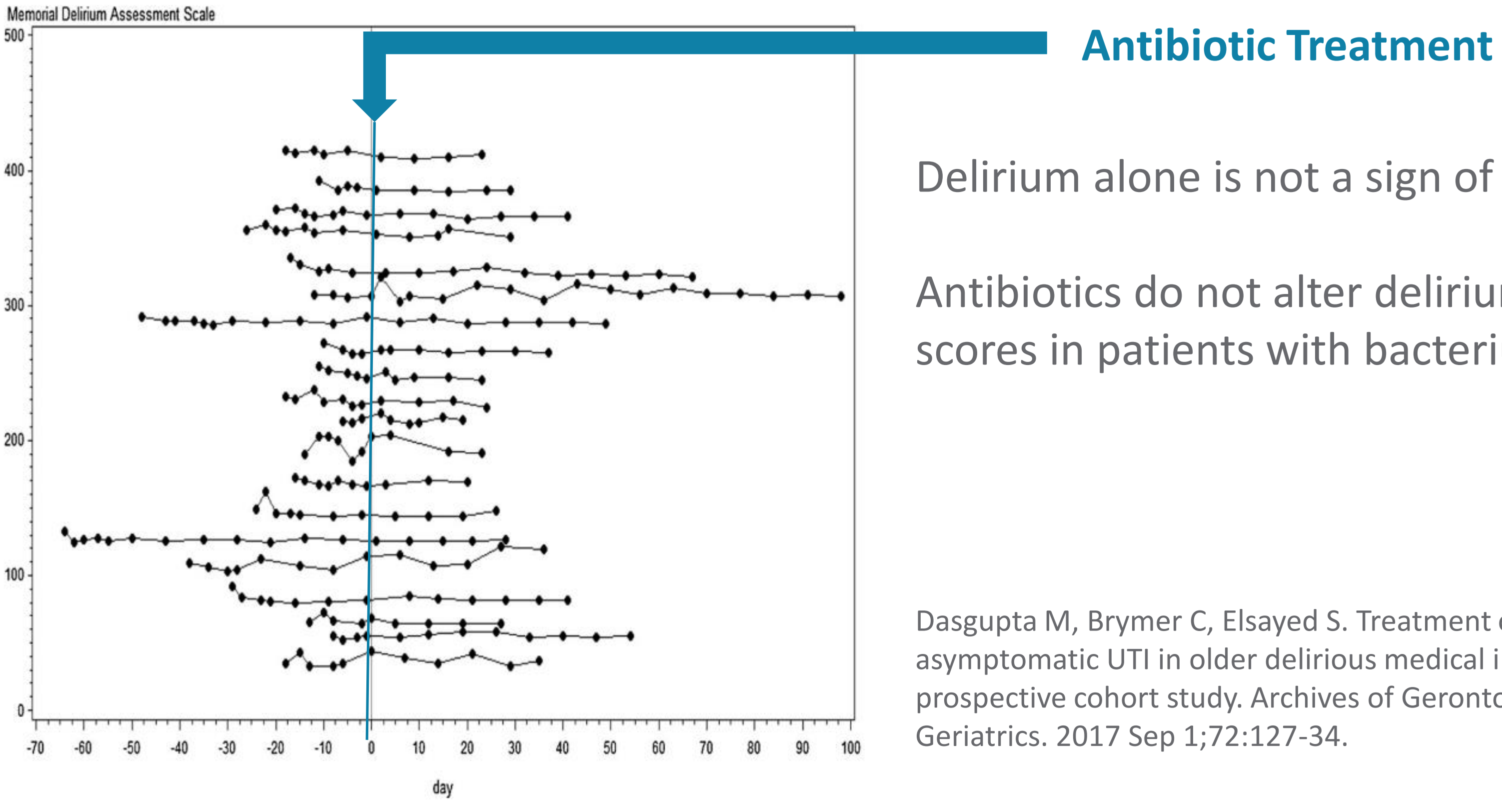
Asymptomatic bacteriuria (ASB) in non-pregnant adults:

- Six prospective trials showing no benefit

Study	Population
Nicolle LE et al, NEJM, 1983	Elderly non-catheterized men
Nicolle LE et al, *Am J Med*, 1987	Women in long-term care facilities
Boscia et al, JAMA, 1987	Elderly ambulatory women
Abrutyn et al, Ann Intern Med, 1994	Elderly ambulatory women
Harding et al, NEJM, 2002	Women with diabetes
Cai et al, *Clin Infect Dis*, 2012	Young women with recurrent UTI

Slide c/o Dr. Jerome Leis

What About Mental Status Changes?



Delirium alone is not a sign of UTI.

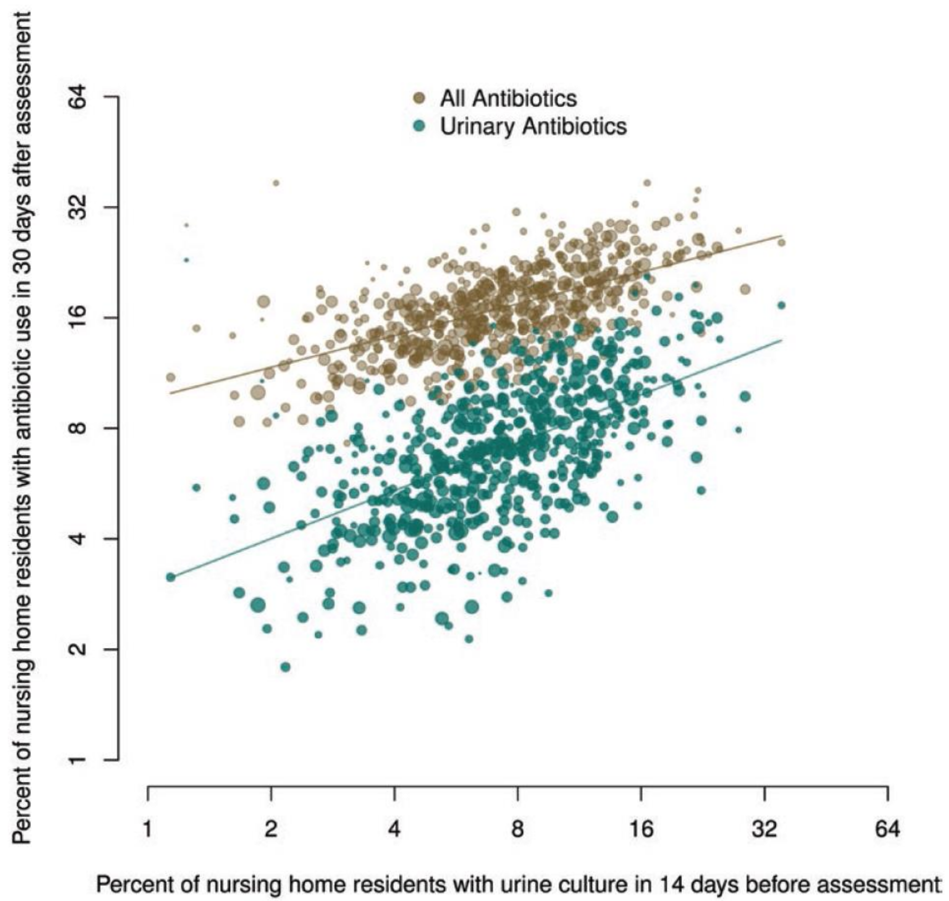
Antibiotics do not alter delirium scores in patients with bacteriuria.

Dasgupta M, Brymer C, Elsayed S. Treatment of asymptomatic UTI in older delirious medical in-patients: a prospective cohort study. Archives of Gerontology and Geriatrics. 2017 Sep 1;72:127-34.

Slide courtesy of Brad Langford

The Urine-culturing Cascade: Variation in Nursing Home Urine Culturing and Association With Antibiotic Use and *Clostridiodes difficile* Infection

Kevin Antoine Brown,[1,2,3] Nick Daneman,[1,2,4,5] Kevin L. Schwartz,[1,2,3,6] Bradley Langford,[1] Allison McGeer,[3,7] Jacquelyn Quirk,[1] Christina Diong,[2] and Gary Garber[1,8]



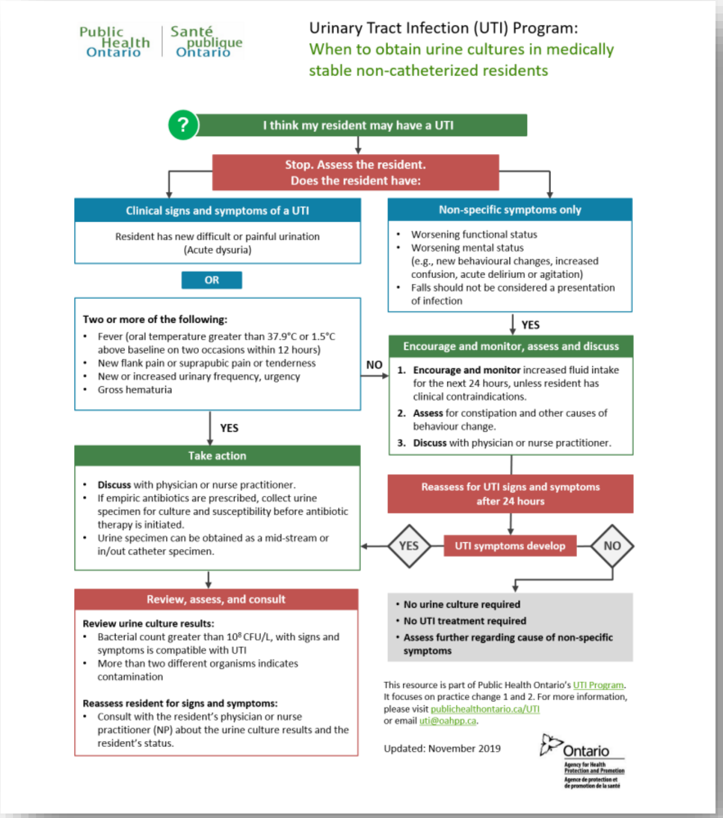
When to Send a Urine Culture

- Dysuria

<u>OR</u>

Two or more of:

- Fever
- New flank pain or suprapubic pain/tenderness
- New or increased frequency
- Gross hematuria



Visual Abstract

Virtual learning collaboratives reduce urine culturing and antibiotic prescribing in long-term care

Target

Unnecessary antibiotic use in long-term care. A focus on best practices to assess and manage urinary tract infections (UTIs). Targeting unnecessary urine culturing that can drive antibiotic overprescribing.

Intervention

Virtual learning collaborative sessions with 45 long-term care homes to support implementation of Public Health Ontario's UTI Program.

Impact

Compared to 127 matched controls

- Rates of **urine cultures** performed
  19% lower
- Rates of **antibiotic prescriptions**
  13% lower
- No signs of under treatment of UTIs (mortality, acute care admissions)

Chambers A, Chen C, Brown K, et al. Virtual learning collaboratives to improve urine culturing and antibiotic prescribing in long-term care: Controlled before-and-after study. BMJ Quality & Safety. 2021 doi: 10.1136/bmjqs-2020-012226

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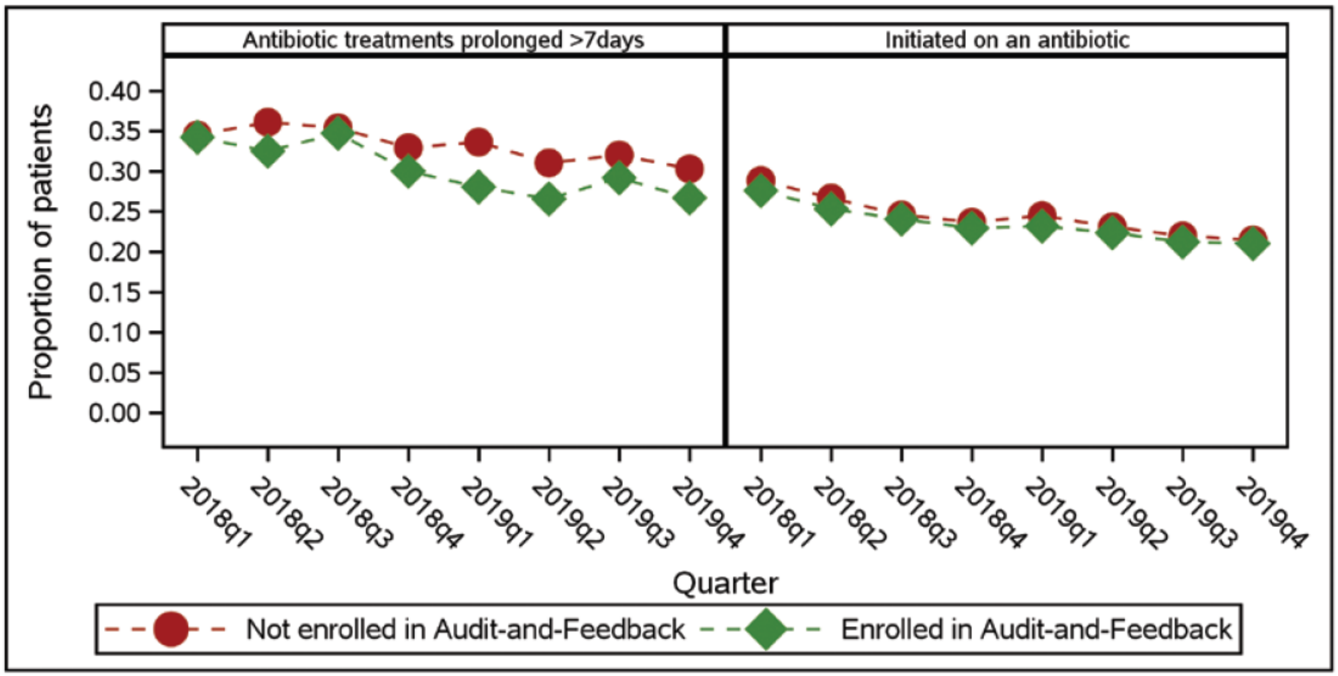
IC/ES

Population-Wide Peer Comparison Audit and Feedback to Reduce Antibiotic Initiation and Duration in Long-Term Care Facilities with Embedded Randomized Controlled Trial

Nick Daneman,[1,2,3,4,5] Samantha M. Lee,[3] Heming Bai,[6] Chaim M. Bell,[3,4,5,7] Susan E. Bronskill,[1,3,4,5,8] Michael A. Campitelli,[3] Gail Dobell,[6] Longdi Fu,[3] Gary Garber,[2,9] Noah Ivers,[3,5,8] Jonathan M.C. Lam,[6] Bradley J. Langford,[2] Celia Laur,[8] Andrew Morris,[5,7] Cara Mulhall,[6] Ruxandra Pinto,[1] Farah E. Saxena,[3] Kevin L. Schwartz,[2,3] and Kevin A. Brown[2,3]



Antimicrobial Stewardship in LTC

- Unnecessary urine culturing drives unnecessary antibiotic use for asymptomatic bacteriuria
- Learning collaborative intervention can improve urine cultures and antibiotic use
- Audit and Feedback to the physicians effective at reducing prolonged durations
- Essential to include nursing/PSWs

For More Information About This Presentation, Contact:

Kevin.schwartz@oahpp.ca

@DrKevinSchwartz

Questions?

Public Health Ontario keeps Ontarians safe and healthy.
Find out more at **PublicHealthOntario.ca**