MSH + UHN
ASP ANTIMICROBIAL STEWARDSHIP PROGRAM

An Approach to Appropriate Antibiotic Prescribing in Outpatient and LTC Settings?

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Joseph and Wolf Lebovic Health Complex

UHN
Toronto General
Toronto Western
Princess Margaret
Toronto Rehab

Disclosures

The MSH Antimicrobial Stewardship Program received a generous donation of $1M (over 3 years, 2009-2011) from Pfizer Canada, Inc. None of this money was used to support the clinical efforts of the ASP.

Pfizer produces **anidulafungin** (Eraxis), **azithromycin** (Zithromax), **clindamycin** (Dalacin), **doxycycline** (Vibramycin), **erythromycin** (ERYC), **fluconazole** (Diflucan), **linezolid** (Zyvoxam), **piperacillin-tazobactam** (Tazocin), **tigecycline** (Tygacil), and **voriconazole** (Vfend)

I have served as an expert witness on medicolegal cases involving appropriateness of antimicrobial therapy.

Total income over past two years is < $50K

I receive salary support for my ASP activities at MSH and UHN.

This amounts to 0.6 FTE.

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Objectives

- Understand the Growing Incidence of Antibiotic Resistance
- Develop an Approach to the Appropriate Prescribing of Antibiotics
- Recognize Opportunities to Practice Antimicrobial Stewardship in Your Practice Setting

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Question 1: Which of the following is not a significant risk to your patients

A. Allergic drug reactions from antimicrobials

B. Drug interactions between newly prescribed antimicrobials and other medications they may be on

C. Emergence of drug-resistance because patients fail to complete a course of antimicrobials

D. Development of *C. difficile* infection

E. Emergence of drug-resistance because of prolonged antimicrobial use

Question 1: Which of the following is not a significant risk to your patients

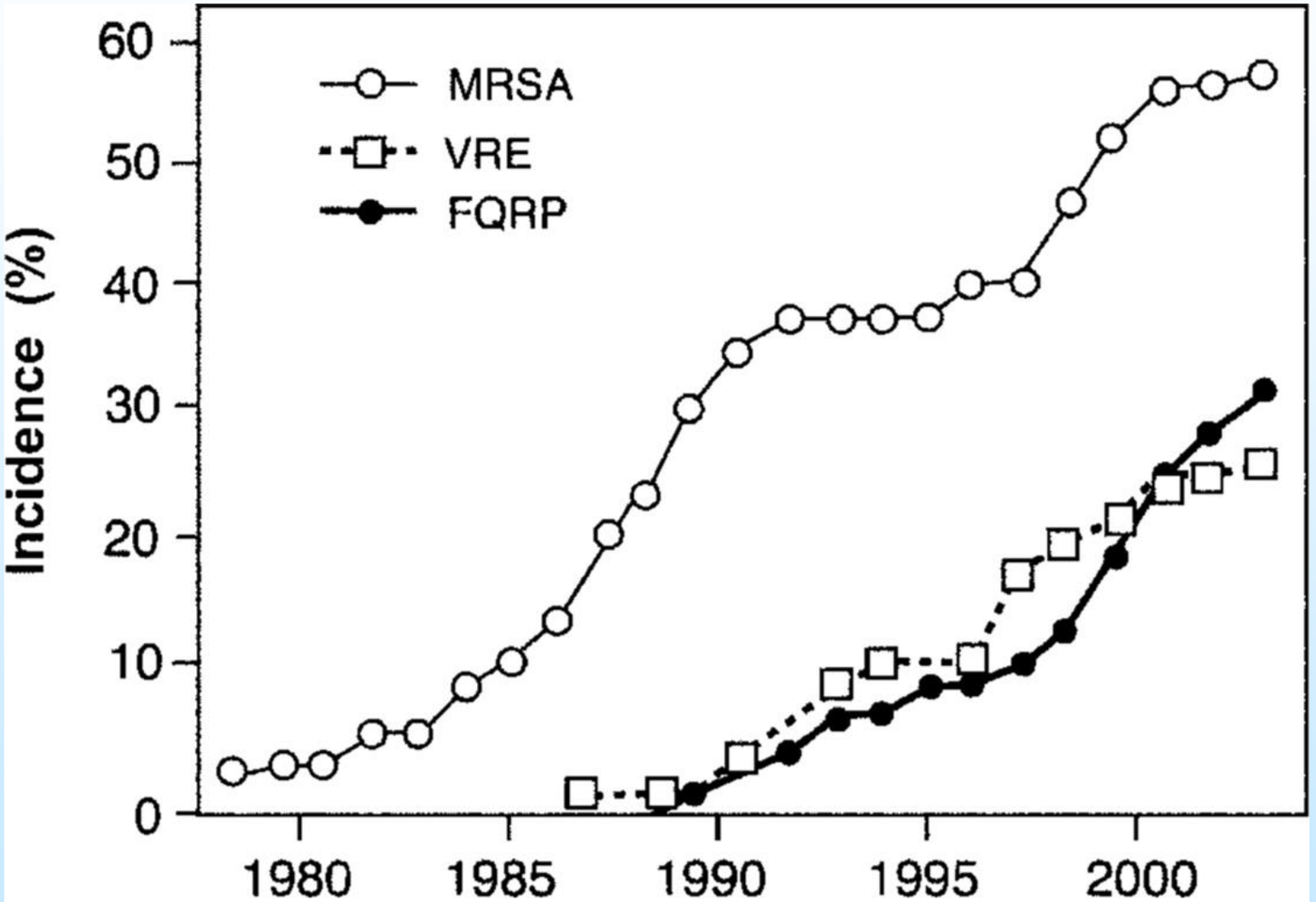
C. Emergence of drug-resistance because patients fail to complete a course of antimicrobials

Antimicrobial resistance emerges in the presence of antimicrobials. By discontinuing antimicrobials, you do not promote resistance but (if anything) avoid it. The risk of premature discontinuation is treatment failure, but there are only a handful of infections (e.g. *S. aureus* bacteremia, endocarditis, osteomyelitis, etc.) where that is a significant risk.

Summary

- antimicrobials pose risk because of resistance (and lack of new drugs), drug interactions, allergic reactions, and *C. difficile*
- stewarding antimicrobials is the best opportunity to minimize this risk
- in older adults the best ways to start antimicrobial stewardship are:
  - not treating asymptomatic bacteriuria, URTIs and wound colonization
  - minimizing treatment durations

The Rise in Antimicrobial Resistance



The rapid spread of resistant bacterial strains. FQRP, fluoroquinolone-resistant *Pseudomonas aeruginosa*; MRSA, methicillin-resistant *Staphylococcus aureus*; VRE, vancomycin-resistant enterococci.

Dalovisio JR.*Clin Infect Dis*. 2005;**40**:574-8

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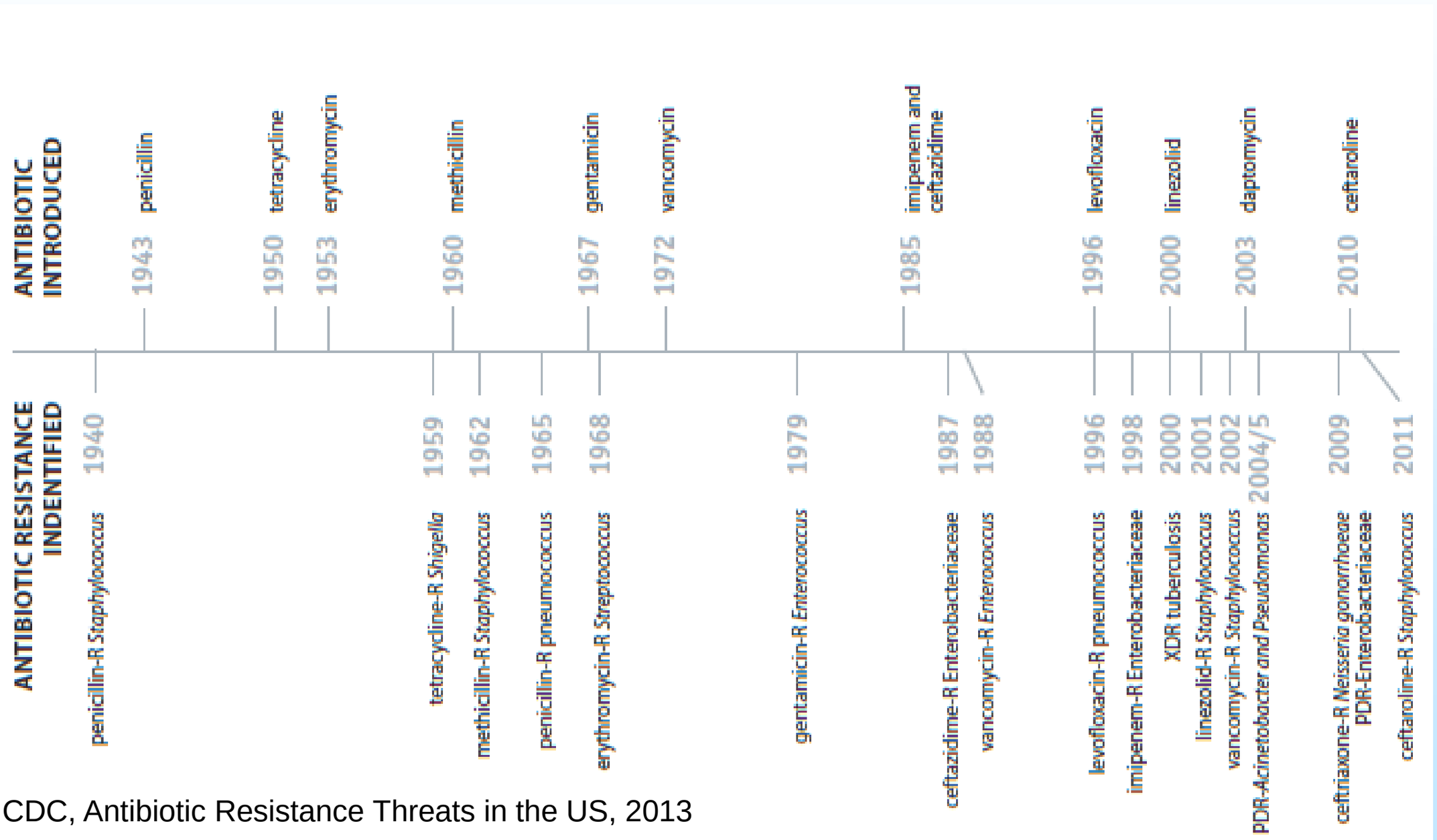
The Rise in Antimicrobial Resistance



CDC, Antibiotic Resistance Threats in the US, 2013

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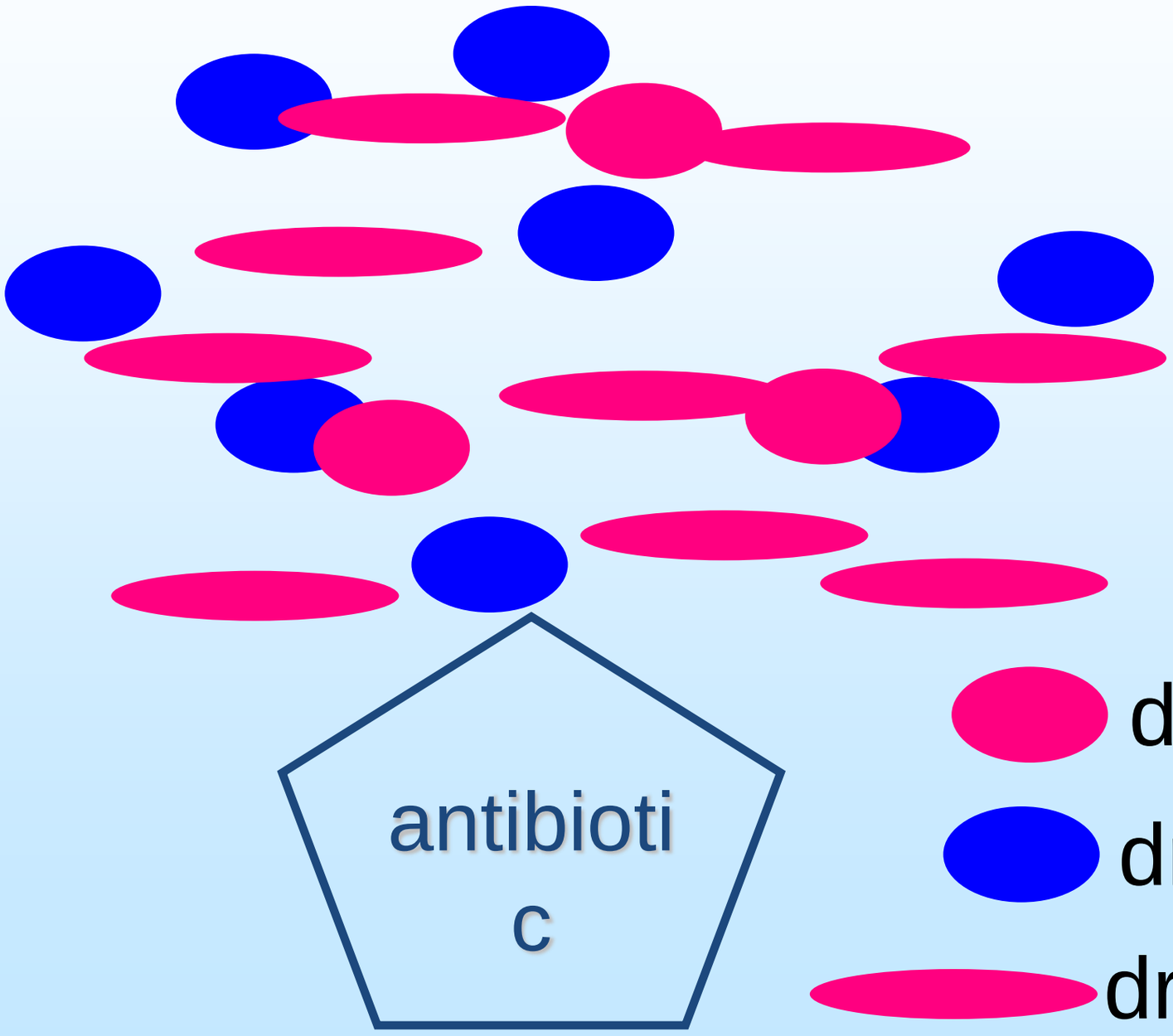
Selection of a drug-resistant organism



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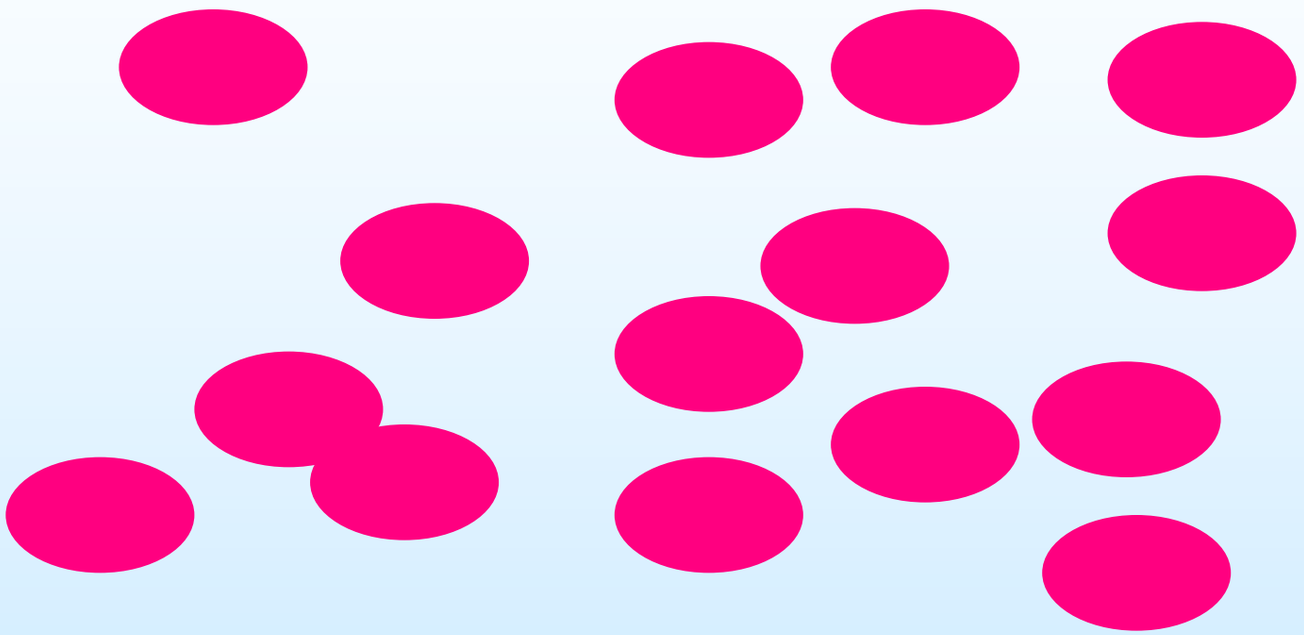

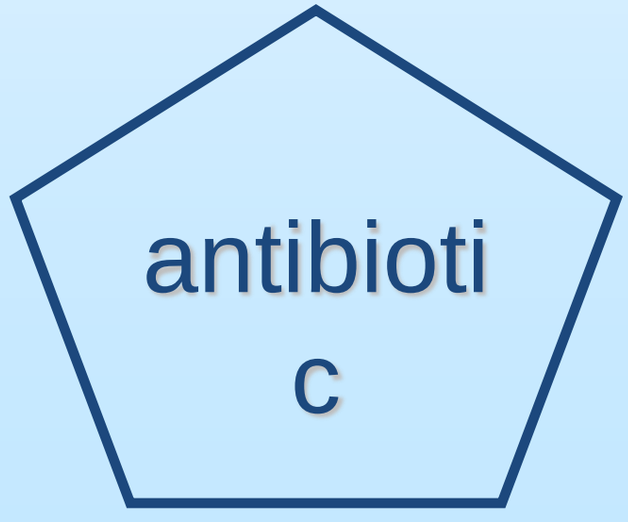

drug-resistant GN cocci

drug-sensitive GP cocci

drug-sensitive GN bacilli

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The antimicrobial pipeline is drying up

http://www.mistymountaingraphics.com/gallery6.html

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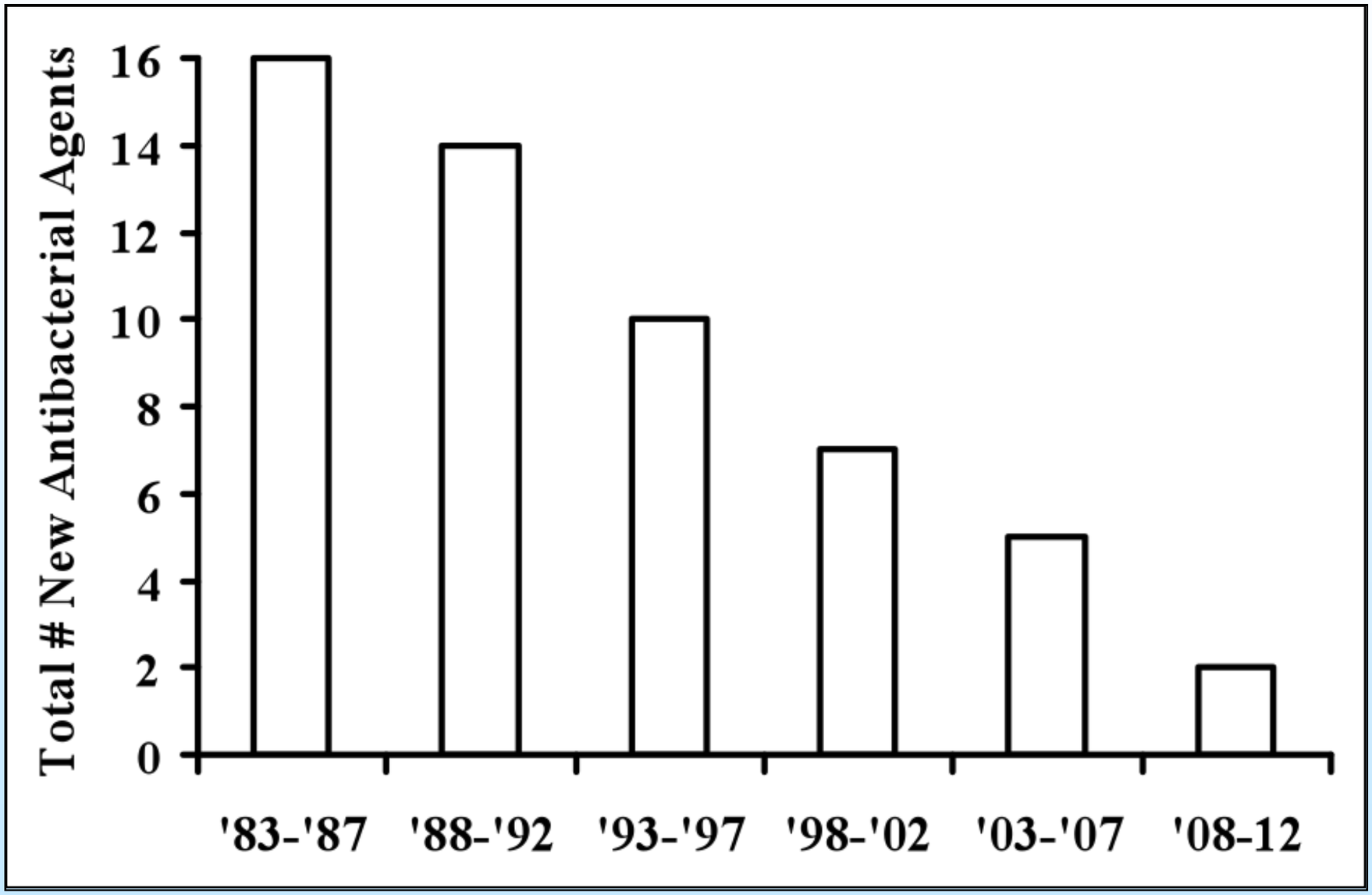

Cooper MA, Shlaes D. *Nature*. 2011;**472**:32.

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So where to start?

- Use antibiotics wisely
- Can start with “Choosing Wisely Campaigns”:
  - **Don’t use antimicrobials to treat bacteriuria in older adults unless specific urinary tract symptoms are present**
  - Don’t use antibiotics for upper respiratory infections that are likely viral in origin, such as influenza-like illness, or self-limiting, such as sinus infections of less than seven days of duration.

So where to start?

- Use antibiotics wisely
- Can start with “Choosing Wisely Campaigns”:
  - **Don’t use antimicrobials to treat bacteriuria in older adults unless specific urinary tract symptoms are present**
  - Don’t use antibiotics for upper respiratory infections that are likely viral in origin, such as influenza-like illness, or self-limiting, such as sinus infections of less than seven days of duration.

Question 2: Do you prescribe antibiotics wisely?

A. All the time

B. Most of the time

C. Some of the time

D. Rarely

E. Never

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Question 3: Consider the person to the left or right of you. Do you think they prescribe antimicrobials wisely?

A. All the time

B. Most of the time

C. Some of the time

D. Rarely

E. Never

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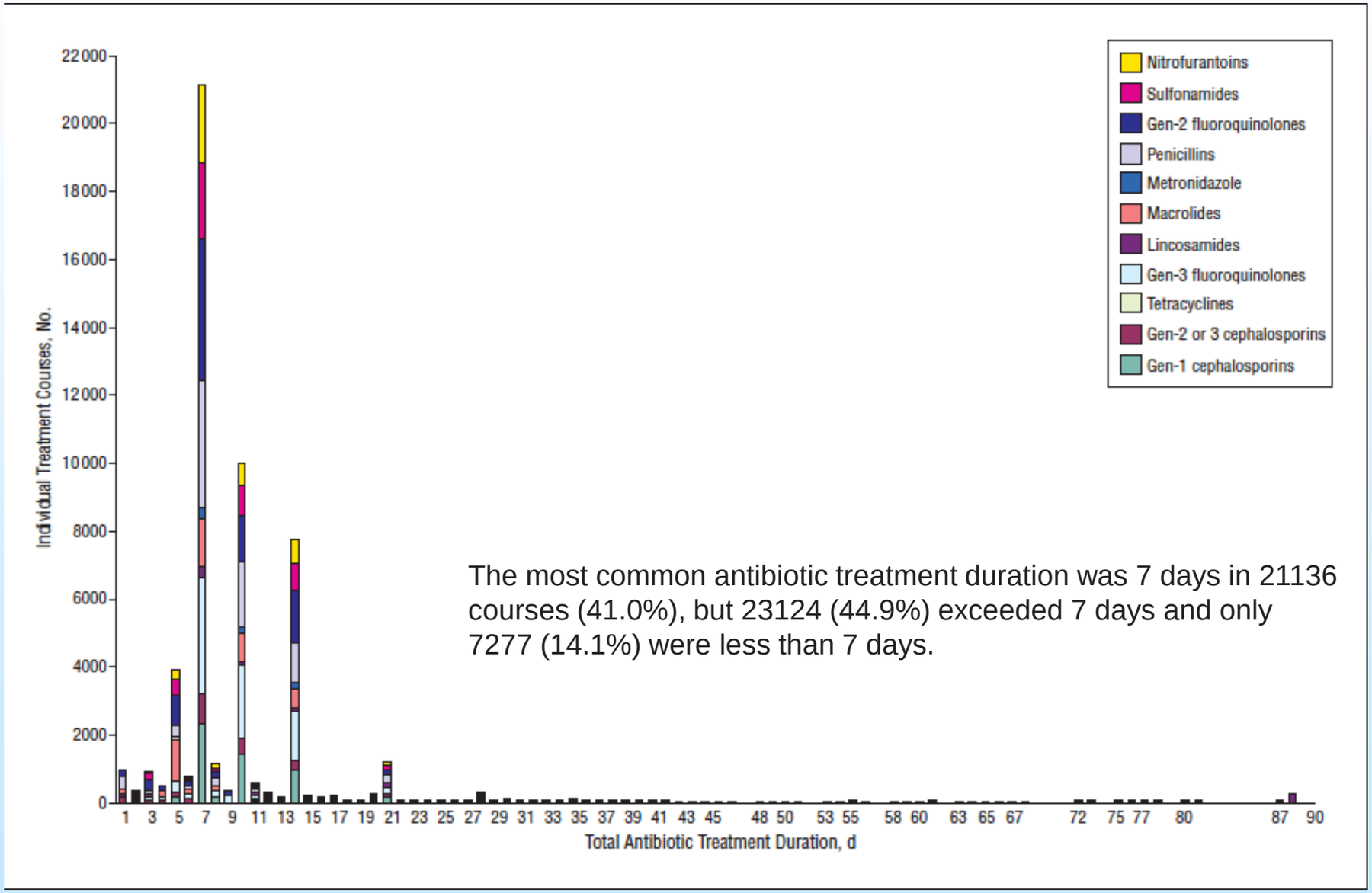
Physicians Prescribe Differently: Distribution of antibiotic treatment durations



The most common antibiotic treatment duration was 7 days in 21136 courses (41.0%), but 23124 (44.9%) exceeded 7 days and only 7277 (14.1%) were less than 7 days.

Daneman, N., et al. (2013). *JAMA Intern Med* **173**: 673-82.

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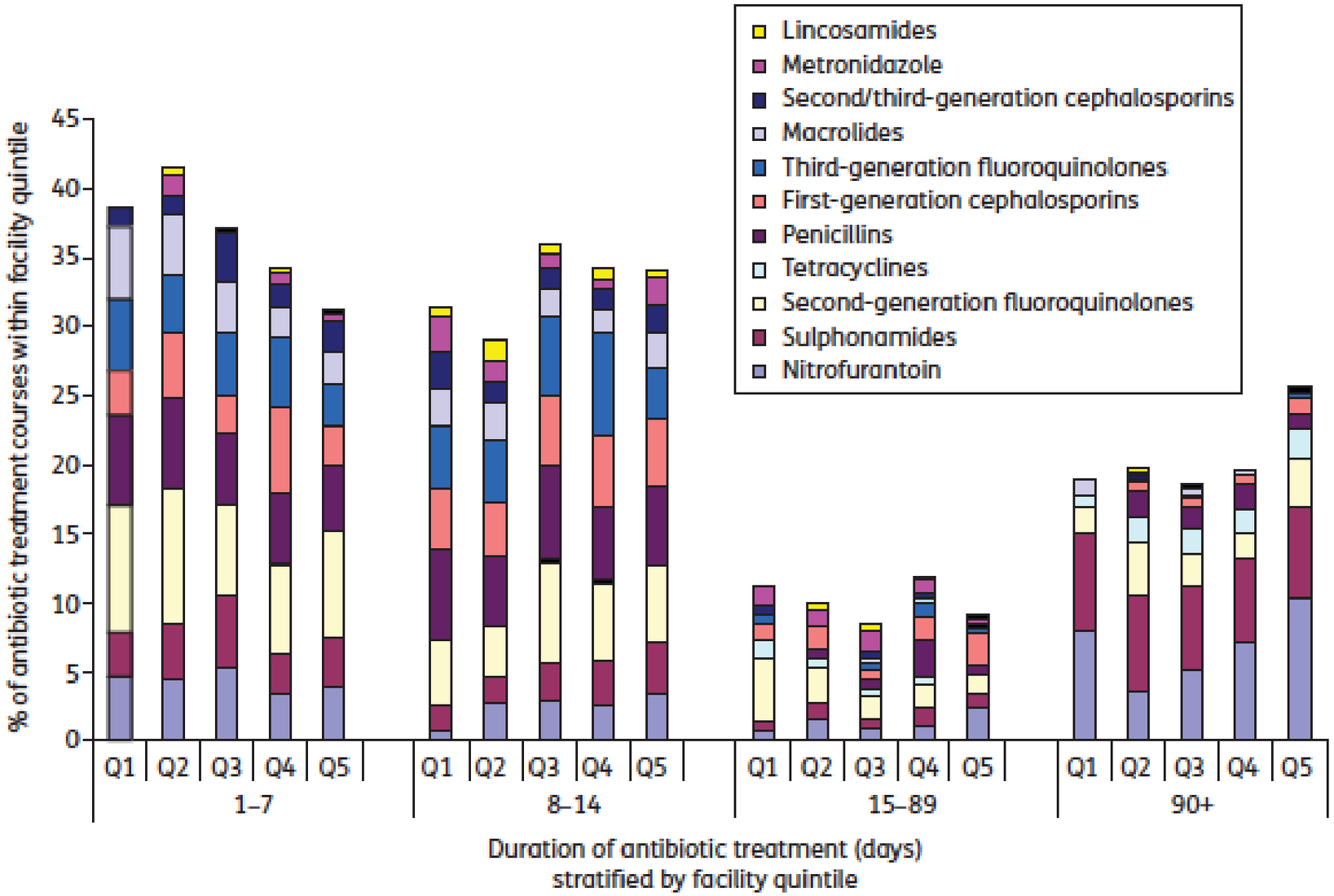
LTC Facilities can be characterized by their treatment durations



J Antimicrob Chemother. 2011;**66**:2856-63.

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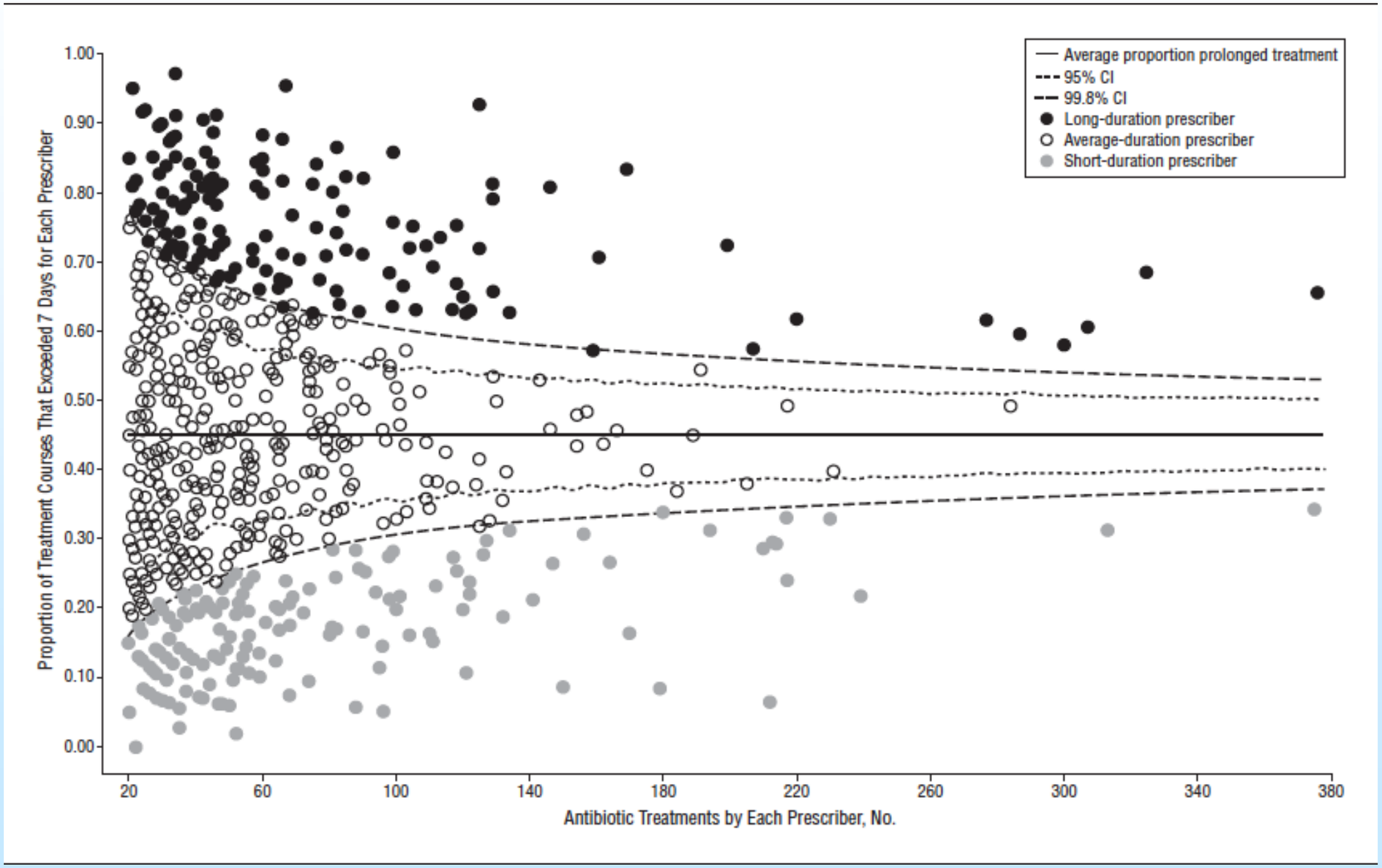
Physicians Prescribe Differently:
Proportion of antibiotic prescriptions exceeding 7 days (by prescriber)



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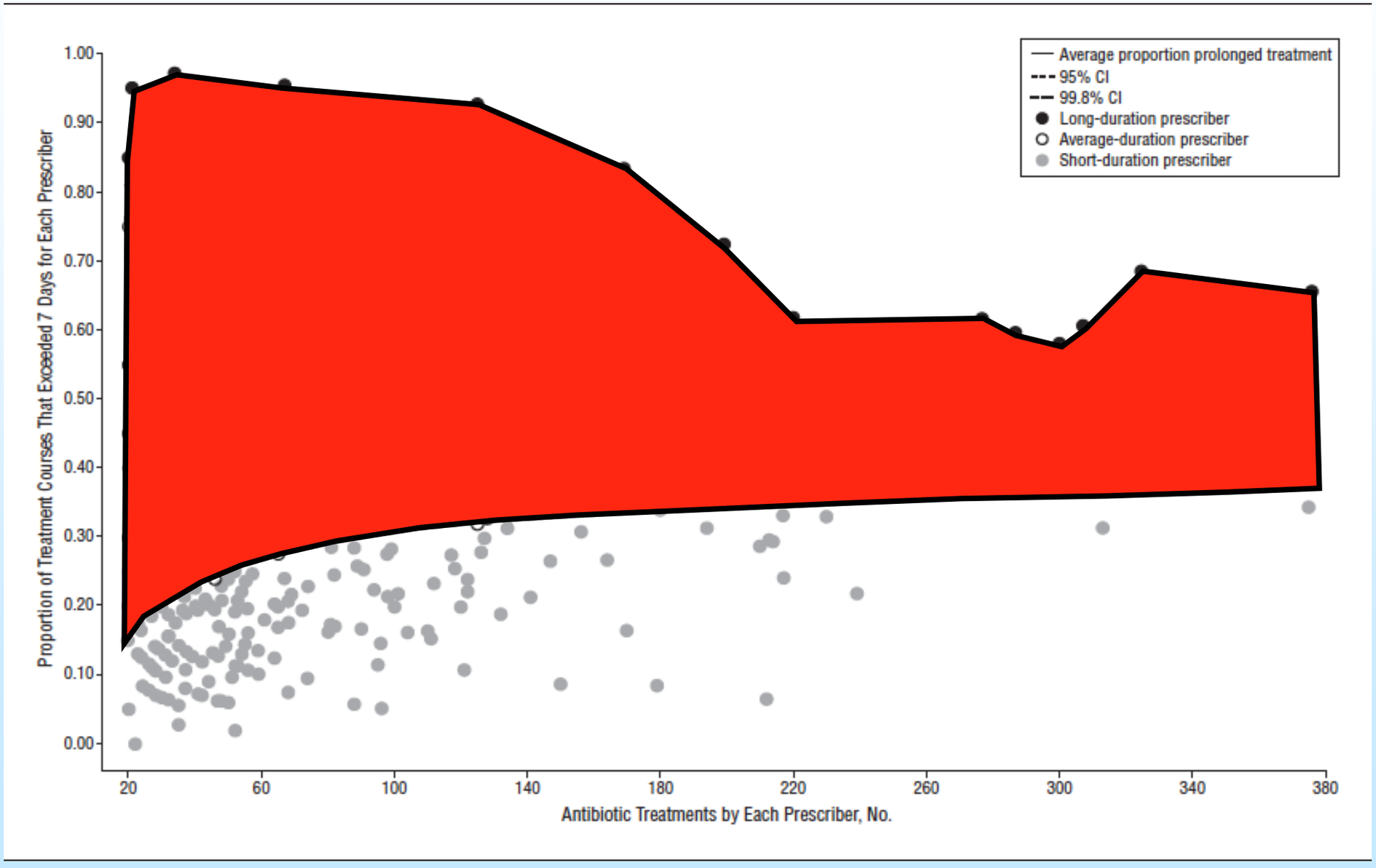
Potentially excessive antimicrobial use in Ontario



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LTC factors affecting prescribing
Workflow

- logistical challenges with provision of medical care
- pharmacy support
- nurse-driven infection management
- institutional policies and guidelines
- external expertise and diagnostic facilities

Medical Journal of Australia 2014; **201**: 101-105

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LTC factors affecting prescribing
Cultural

- pressure from family to prescribe
- lack of nursing knowledge in antimicrobials
- institutional use of advance care directives

Medical Journal of Australia 2014; **201**: 101-105

UTI in LTC and Older Women
Urinalysis

- 45% of LTC residents have asymptomatic pyuria
- using leuks (leukocyte esterase) and nitrites on urine dipstick is sensitive to pick up bacteriuria (65-100%)
- positive predictive value of urine dipstick is <50% … so a positive test means nothing
- negative predictive value of urine dipstick is >90% … so a negative test means there is no urinary tract infection

Ann Intern Med. 1992;**117**:135-40
Infect Control Hosp Epidemiol. 2007;**28**:889-91

Facts about UTI in LTC and Older Women
Urine Culture

- 25-50% of LTC residents have asymptomatic bacteriuria (believed to be higher in women than men)
- positive urine cultures are, therefore, of little value in independently determining UTI in older patients
- UTI clinical criteria in older women include 2 of:
  - fever
  - suprapubic tenderness
  - CVA pain or tenderness
  - increased urinary frequency or urgency
  - acute dysuria

BMC Fam Pract. 2011;**12**:36
JAMA. 2014;**311**:844-854

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The Asymptomatic Bacteriuria Cycle

1. LTC resident “not right”
2. Urine culture ordered
3. Urine growing drug-susceptible *E. coli*
4. Patient treated with ciprofloxacin
5. Patient again felt to be not right
6. Urine culture ordered
7. Urine growing ciprofloxacin-**resistant** *Klebsiella*
8. Patient treated with amoxicillin-clavulanic acid
9. etc ...

Solutions for Asymptomatic Bacteriuria

- an educational intervention to a) discourage nurses from collecting urine cultures in the absence of UTI symptoms and b) discourage physicians from treating asymptomatic bacteriuria in LTC had a sustained effect:
  - 30% reduction in antibiotic days
  - 65% reduction in urine cultures collected
- a systems intervention to reduce the routine reporting of non-catheterized urine specimens by Leis et al resulted in:
  - a reduction in treatment from 48% to 12%

Am J Infect Control. 2008;**36**:476-80
Clinical Infectious Diseases 2014;**58**:980–3

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Solution for Asymptomatic Bacteriuria

stop ordering urine cultures

AND/OR

have microbiology lab stop reporting urine cultures

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Upper Respiratory Tract Infections

- in 1998, there were roughly 76 million primary care visits for URTI in the US, resulting in 41 million prescriptions
- data in the UK last year showed an excess of antimicrobial prescribing for URTI
- decision support systems at time of prescribing can dramatically reduce ABx treatment of URTI

Clinical Infectious Diseases 2001;**33**:757-62
PLoS One. 2012;**7**:e51147
BMJ Open 2014;**4**:e006245

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Wound Swabs & Infections

- upwards of 50% of women in LTC have asymptomatic bacteriuria
- 100% of men and women in LTC have asymptomatic bacteridermia (and asymptomatic bactericolonosis and asymptomatic bacterinasopharyngeria, etc …)
- the positive predictive value for “chronic infected wounds” is believed to be 77% when compared to biopsy
- the non-sterile wound swab should therefore probably be banned
- there is a paucity of data describing the utility of wound swabs … even in diabetic foot ulcers

Adv Skin Wound Care. 2013;**26**:211-9
Diabet Med. 2006;**23**:341-7

What is Antimicrobial Stewardship

- Several complicated definitions have been proposed
- Put simply: Making sure patients get the right antibiotics … when they need them (and **only** when they need them)

Antimicrobial Stewardship in LTC

- very little is known
- we know that there is a need of education of healthcare providers in LTC
- we also know that the interventions will likely require addressing the factors demonstrated to influence antimicrobial prescribing:
  - cultural factors
  - workflow factors

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Antimicrobial Stewardship in LTC

- the starting points should be:
  - avoiding the treatment of asymptomatic bacteriuria
  - minimizing the duration of therapy whenever antimicrobials are prescribed
  - don’t use swabs do diagnose infection
  - don’t treat URTI symptoms with antibiotics

Summary

- antimicrobials pose risk because of resistance (and lack of new drugs), drug interactions, allergic reactions, and *C. difficile*
- stewarding antimicrobials is the best opportunity to minimize this risk
- in older adults the best ways to start antimicrobial stewardship are:
  - not treating asymptomatic bacteriuria, URTIs and wound colonization
  - minimizing treatment durations