

## Antimicrobial Stewardship in Outpatient Facilities

**Guillermo V. Sanchez, PA-C, MPH**

Office of Antibiotic Stewardship  
Division of Healthcare Quality Promotion  
National Center for Emerging and Zoonotic Infectious Diseases  
Centers for Disease Control and Prevention  
September 22, 2016

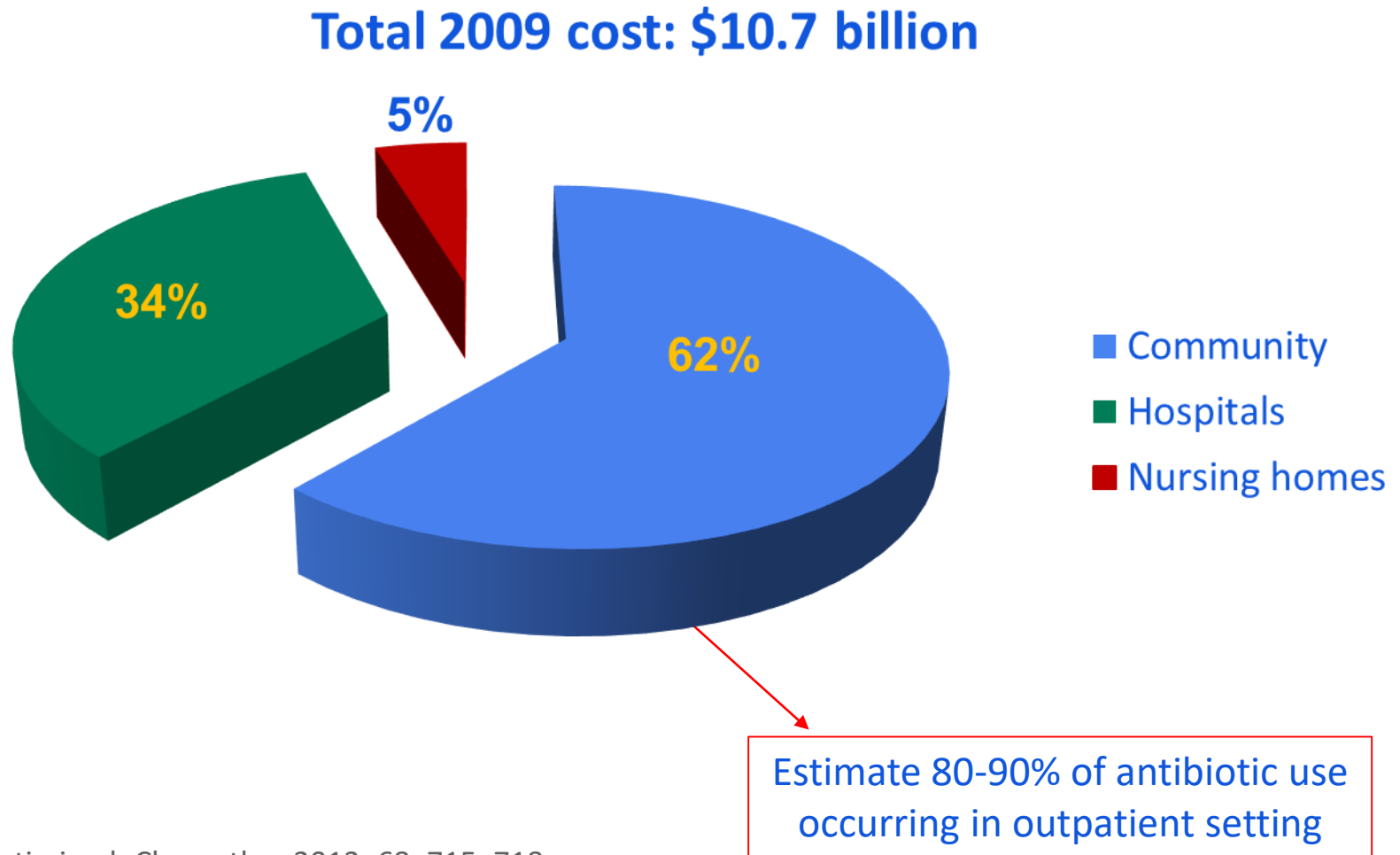
[gsanchez@cdc.gov](mailto:gsanchez@cdc.gov)



# Objectives

- Identify opportunities for improvement in outpatient antibiotic prescribing
- Understand barriers to appropriate outpatient antibiotic prescribing and identify methods to overcome these barriers
- Identify effective interventions to improve outpatient antibiotic prescribing

# Antibiotic expenditures in United States by treatment setting



Suda et al. J Antimicrob Chemother 2013; 68: 715–718

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/362374/ESPAUR\\_Report\\_2014\\_\\_3\\_.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362374/ESPAUR_Report_2014__3_.pdf)

<https://www.folkhalsomyndigheten.se/pagefiles/20281/Swedres-Svarm-2014-14027.pdf>

# Where Do We Want to Be?

- Every patient gets optimal antibiotic treatment
  - Antibiotics only when they are needed
  - The right antibiotic
  - At the right dose
  - For the right duration
- Every provider and healthcare facility incorporate antibiotic stewardship



Identify opportunities for improvement in outpatient antibiotic prescribing

**How much antibiotics are we prescribing in the outpatient setting and for what?**

# NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

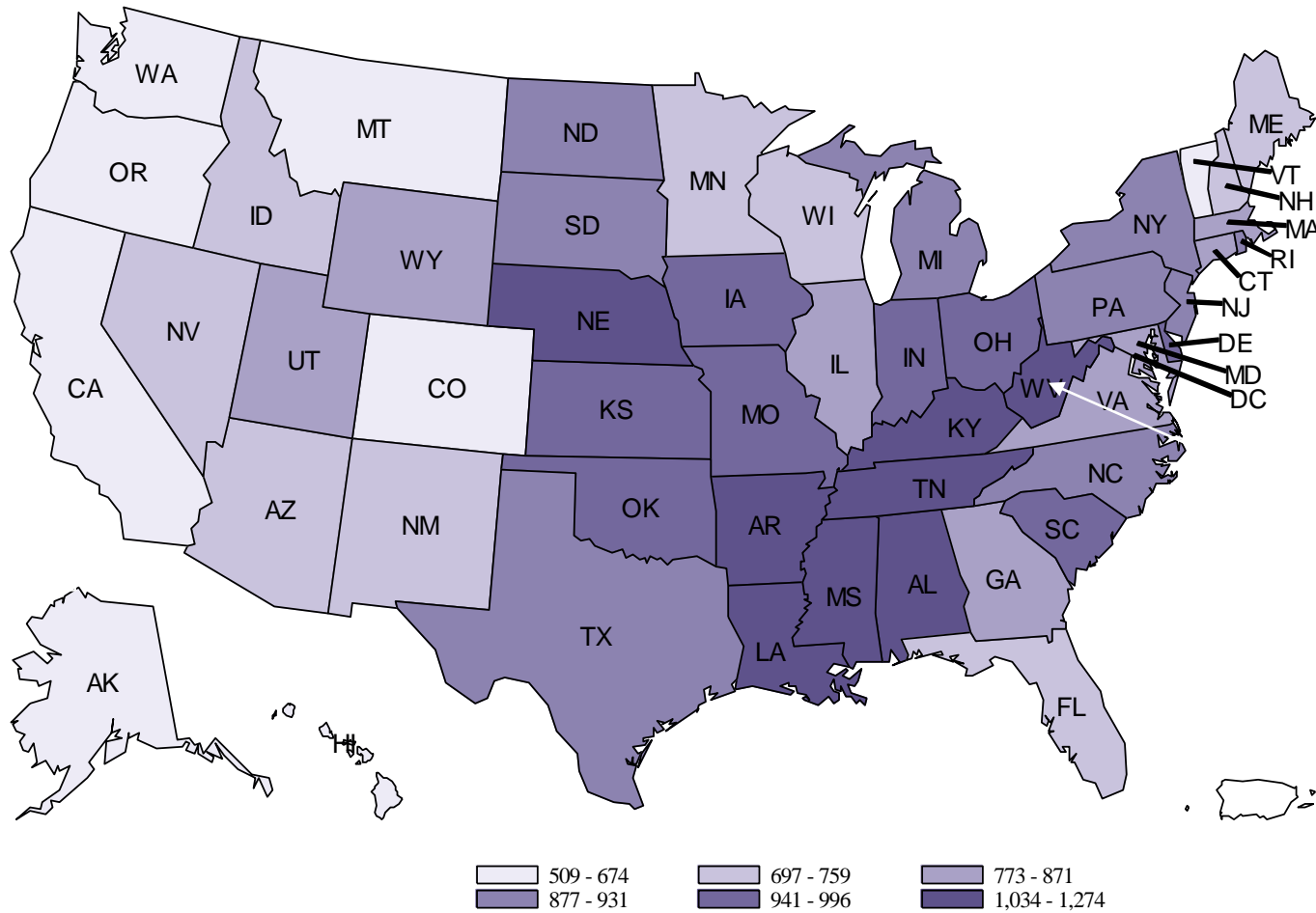
By 2020, significant outcomes of Goal 1 will include:

- Establishment of antibiotic stewardship programs in all acute care hospitals and improved antibiotic stewardship across all healthcare settings.
- Reduction of inappropriate antibiotic use by 50% in outpatient settings and by 20% in inpatient settings.

# Community Antibiotic Prescriptions per 1000 Persons in the United States, 2013

- 269 million prescriptions dispensed annually in the US
  - 849 antibiotic prescriptions dispensed per 1000 population in outpatient settings
  - 4 prescriptions for every 5 people
- IMS Health Xponent
  - Sales data from community pharmacies
  - No indication or diagnoses associated with these prescriptions
    - Can't assess appropriateness

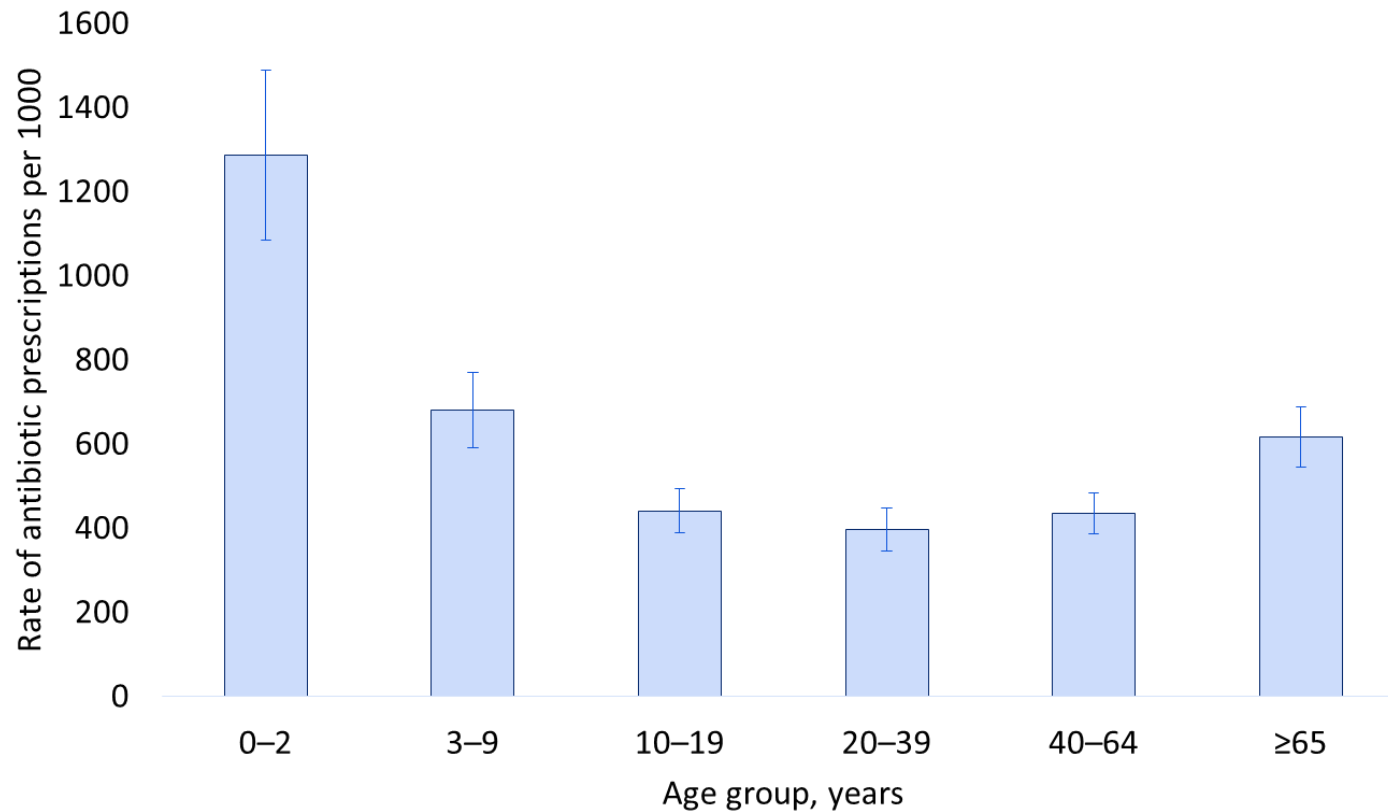
# Community Antibiotic Prescriptions per 1000 Persons in the United States, 2013



Hicks CID 2015; 60(9):1308-16; CDC. Outpatient antibiotic prescriptions — United States, 2013. Available via the internet: [http://www.cdc.gov/getsmart/community/pdfs/annual-reportssummary\\_2013.pdf](http://www.cdc.gov/getsmart/community/pdfs/annual-reportssummary_2013.pdf)



# Annual rate of antibiotics prescriptions per 1000 population by age — US, 2010-11



Research

Original Investigation

## Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011

Katherine E. Fleming-Dutra, MD; Adam L. Hersh, MD, PhD; Daniel J. Shapiro; Monina Bartoces, PhD; Eva A. Enns, PhD; Thomas M. File Jr, MD; Jonathan A. Finkelstein, MD, MPH; Jeffrey S. Gerber, MD, PhD; David Y. Hyun, MD; Jeffrey A. Linder, MD, MPH; Ruth Lynfield, MD; David J. Margolis, MD, PhD; Larissa S. May, MD, MSPH; Daniel Merenstein, MD; Joshua P. Metlay, MD, PhD; Jason G. Newland, MD, MEd; Jay F. Piccirillo, MD; Rebecca M. Roberts, MS; Guillermo V. Sanchez, MPH, PA-C; Katie J. Suda, PharmD, MS; Ann Thomas, MD, MPH; Teri Moser Woo, PhD; Rachel M. Zetts; Lauri A. Hicks, DO

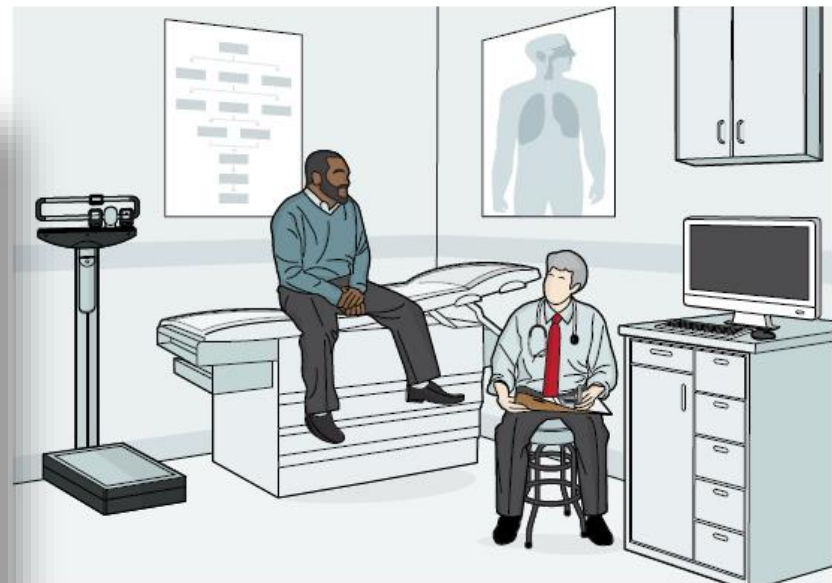
**IMPORTANCE** The National Action Plan for Combating Antibiotic-Resistant Bacteria set a goal of reducing inappropriate outpatient antibiotic use by 50% by 2020, but the extent of inappropriate outpatient antibiotic use is unknown.

← Editorial page

+ Supplemental  
jama.com

+ CME Quiz at

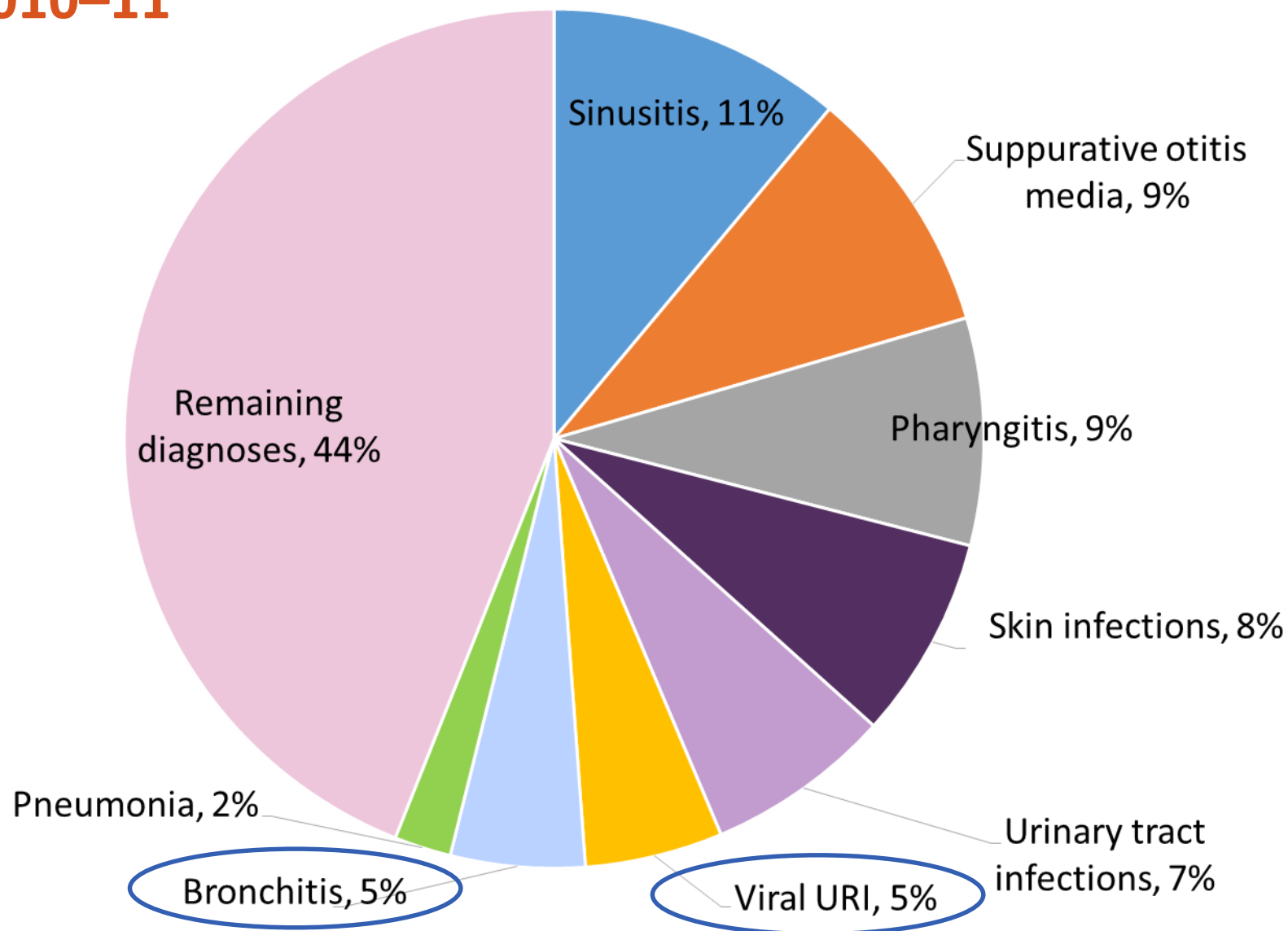
Fleming-Dutra et al. JAMA 2016;315(17): 1864-1873.  
The Pew Charitable Trusts. May 2016.



## Antibiotic Use in Outpatient Settings

Health experts create national targets to reduce unnecessary antibiotic prescriptions

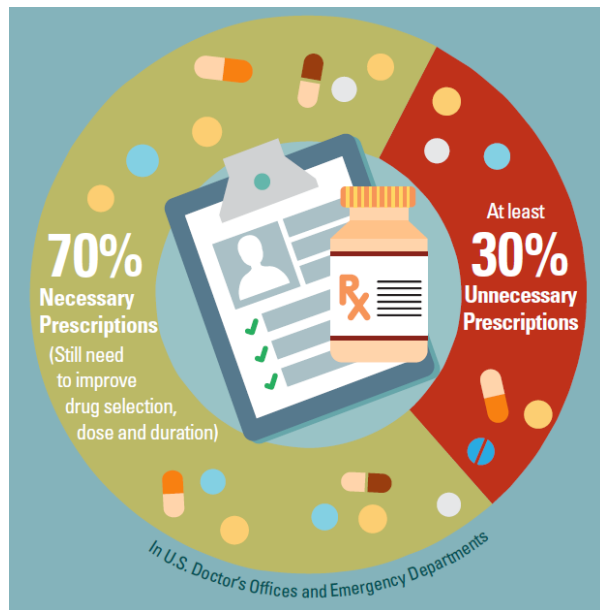
## Diagnoses leading to antibiotics — United States, 2010–11



# Tiered diagnosis system — strength of antibiotic indication

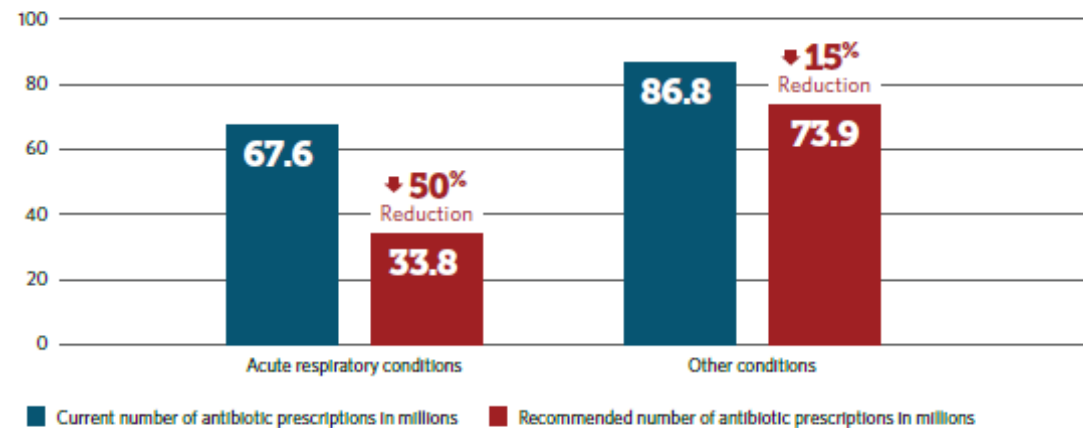
- **Tier 1: Almost always indicated**
  - Pneumonia
  - Urinary tract infections (UTI)
  - Miscellaneous bacterial infections (e.g., STDs, pertussis)
- **Tier 2: May be indicated**
  - Sinusitis
  - Suppurative otitis media
  - Pharyngitis
  - Skin, cutaneous, and mucosal infections
  - Gastrointestinal infections
  - Acne
- **Tier 3: Not indicated**
  - Bronchitis, bronchiolitis (excluding chronic bronchitis, COPD)
  - Viral upper respiratory infection (URI)
  - Influenza
  - Non-suppurative otitis media
  - Viral pneumonia
  - Asthma, allergy
  - Miscellaneous other infections (e.g. named viruses)
  - Other gastrointestinal; genitourinary; respiratory; and skin, cutaneous and mucosal conditions
  - Other all conditions

# Setting National Targets: Outpatient Antibiotic Prescribing



**47 million unnecessary antibiotic prescriptions per year**

Outpatient Antibiotic Prescribing Reduction Targets



Source: Analysis of NAMCS and NHAMCS data on U.S. antibiotic prescribing, 2010-2011  
© 2016 The Pew Charitable Trusts

Fleming-Dutra et al. JAMA 2016;315(17): 1864-1873.  
<http://www.pewtrusts.org/~media/assets/2016/05/antibioticuseinoutpatientsettings.pdf>;

## Meeting the CARB goal

# NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

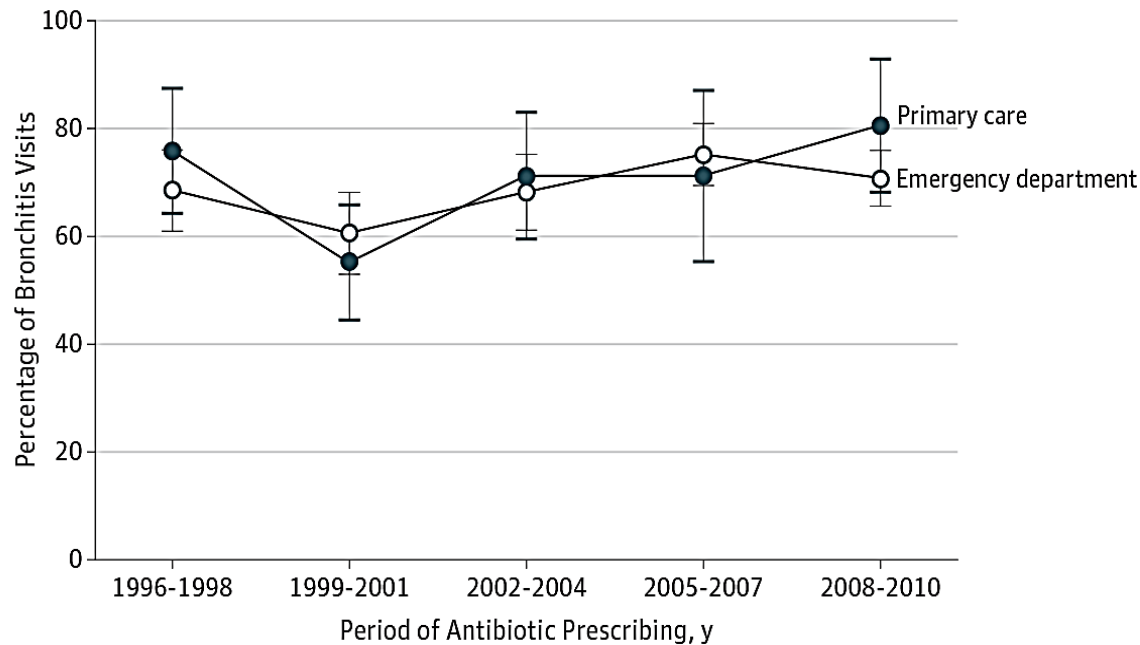
- Reduction of inappropriate outpatient antibiotic use by 50% by 2020
- 30% of outpatient antibiotic use is inappropriate
- Goal: Reduction of overall outpatient antibiotic use by 15% by 2020

Understand barriers to appropriate prescribing

**Why are providers prescribing antibiotics inappropriately? What can we do?**

## Case Study: Acute Bronchitis

- High quality evidence demonstrates no benefit from antibiotics since 1990s.
- National guidelines and performance measures have discouraged use.
- Yet prescribing for acute bronchitis has not improved in 20 years.



Barnett et al. JAMA. 2014; 311(19):2020-22.



# Drivers of Inappropriate Antibiotic Prescribing: Clinician Perspective

- Perceived patient expectations
- Concern for misdiagnoses and potential negative consequences
- Time pressure
- Cycle of broad-spectrum prescribing – concern for resistance leads to broad-spectrum use



**Clinicians are increasingly concerned with antibiotic overuse and resistance**

Barden et al. Clin Pediatr 1998 Nov;37(11):665-71

Finkelstein et al. Clin Pediatr 2013 Oct 17.

Sanchez et al. Emerg Infect Dis. 2014. **20**(12): 2041-2047.

# Drivers of Inappropriate Antibiotic Prescribing: Patient Perspective

- Want symptoms resolved quickly
- Want clear explanations, even when there is no “cure”
- May harbor misconceptions about when antibiotics work
- Cycle of expectations – previous experiences influence current behaviors

**Patients are increasingly concerned with antibiotic overuse and resistance**

# Insight From In-Depth Interviews with Primary Care Providers

- “We as doctors are business people. We’re no different than running a shoe store. If somebody comes in and wants black shoes, you don’t sell them white shoes. And if you do, they get upset.
- ...patients in general don’t understand that concept of not taking [an antibiotic] if you don’t need it... [and] if you don’t give it to them, they don’t come back to you.”

# Insight From In-Depth Interviews with Primary Care Providers

- “[Broad-spectrum antibiotics] take the thinking out of it for me so that I am not trying to figure out what the organism is and [which] particular antibiotic treats the organism.”

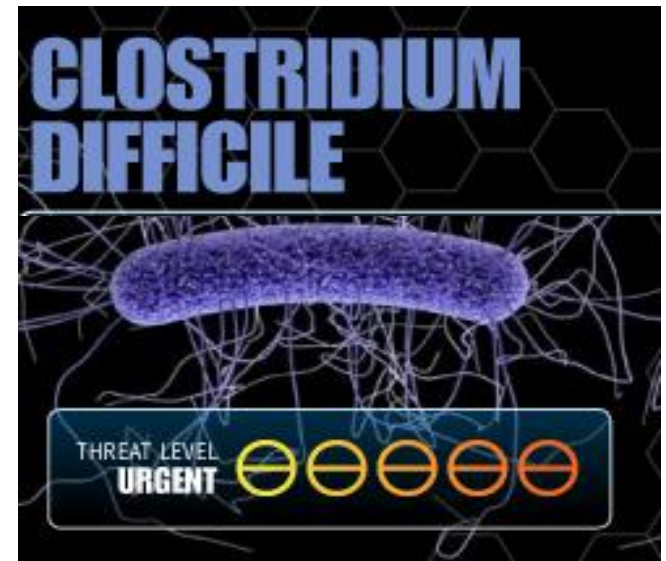
Sanchez et al. Emerg Infect Dis. 2014. **20**(12): 2041-2047.

# Why might providers prescribe antibiotics inappropriately?

- ~~Lack of knowledge of appropriate indications~~
  - Providers generally know the guidelines
- Fear of complications
  - Providers cite fear of infectious complications
  - *Also adverse events*

# What if something bad happens?

- Without an antibiotic
  - Complications to common respiratory infections are very rare
  - Over 4000 patients with colds need to be treated to prevent 1 case of pneumonia
- With an antibiotic
  - Side effects
    - Diarrhea in 5-25%
    - Yeast infections
    - Allergic reactions and anaphylaxis
  - 1 in 1000 antibiotics lead to ED visit for adverse events
  - *Clostridium difficile* infection



## It's a matter of patient safety

- Adverse drug events lead to an estimated 143,000 emergency department visits annually.
- In 2011 alone, an estimated 453,000 *C. difficile* infection cases occurred in the United States, over one-third of which were community-associated.
- As much as 35% of adult and 70% of pediatric *C. difficile* infections are community-associated.
- One study estimated that even a 10% reduction in outpatient antibiotic prescribing could reduce community-associated *C. difficile* by 17%.

Shehab N, et al. Clinical Infectious Diseases 2008 Sep 15;47(6):735-43.

Lessa FC, et al. The New England Journal of Medicine 2015 Feb 26;372(9):825-34.

Wendt JM, et al. Pediatrics 2014 Apr;133(4):651-8.

Dantes R, et al. Open Forum Infectious Diseases 2015. Sep;2(3):ofv113.

# Why might providers prescribe antibiotics inappropriately?

- ~~Lack of knowledge of appropriate indications~~
  - Providers generally know the guidelines
- Fear of complications
  - Providers cite fear of infectious complications
  - *Also adverse events*
- Patient pressure and satisfaction?
  - Providers universally cite patient requests for antibiotics
  - Providers worry about losing patients to other providers



# Clinician perception of patient expectations

- Overt requests for antibiotics are rare
- Clinicians think patients want antibiotics more often than patients really do
- When physicians think patients/parents want antibiotics, physicians are more likely to prescribe
  - 62% when physicians thought parent wanted antibiotics
  - 7% when physicians thought parent did **not** want antibiotics
- Clinicians are terrible at predicting which patients want antibiotics



# Why do we think patients want antibiotics?

- Physicians thought parents wanted antibiotics when
  - Parents suggested a candidate diagnosis
  - Parents questioned non-antibiotic treatment plan
- Parents who questioned the treatment plan were equally likely to expect or not expect antibiotics
- Two different conversations
  - One that the clinician understands
  - One that the patient is having



Stivers. *Journal Family Practice* 2003; 52(2):140-8.

Mangione-Smith. *Arch Pediatr Adolesc Med* 2006;160(9): 945-952.

# Patient satisfaction

- Parents are still satisfied if they don't get antibiotics
- Parents are dissatisfied if communication expectations are not met
- What do parents want?
  - Explanation of why antibiotics will not help
  - Positive recommendations
  - Contingency plan



Mangione-Smith *Pediatrics* 1999;103(4):711-8.

Mangione-Smith *Arch Pediatr Adolesc Med* 2001;155:800-6.

Mangione-Smith *Ann Family Med* 2015; 13(3) 221-7.

# Communication training as a public health intervention?

- Enhanced communications training reduces antibiotic prescribing for respiratory infections in all ages
- Effect appears to be sustainable over time



# Why might providers prescribe antibiotics inappropriately?

- ~~Lack of knowledge of appropriate indications~~
  - Providers generally know the guidelines
- Fear of complications
  - Providers cite fear of infectious complications
  - *Also adverse events*
- Patient pressure and satisfaction
  - Providers universally cite patient requests for antibiotics
  - *Effective communication can help*
- Habit?

Sanchez, EID; 2014; 20(12);2041-7

Jones. *Ann Int Med* 2015;163(2):73-80.

Gerber. *JPIDS* 2015;4(4): 297-304.

## Provider variability: Habit of prescribing antibiotics

- In a large study of 1 million VA outpatient visits for acute respiratory infections (ARIs, many of which did not require antibiotics)
  - Highest 10% of providers prescribed antibiotics in  $\geq 95\%$  of ARI visits
  - Lowest 10% prescribed antibiotics in  $\leq 40\%$  of ARI visits
- In a pediatric network, antibiotic prescribing variability among 25 practices
  - 18 to 36% of acute visits resulted in antibiotic prescriptions by practice
  - 15 to 57% of antibiotics were broad-spectrum by practice

**Child with same complaint in high use practice: 2x as likely to get antibiotics and 4x as likely to get broad-spectrum antibiotics**

Identify effective interventions to improve outpatient antibiotic prescribing

**How can we change clinician antibiotic prescribing practices?**

# CDC's Core Elements for Antibiotic Stewardship Programs in Hospitals and Nursing homes

- Leadership commitment
- Accountability
- Drug expertise
- Action
- Tracking
- Reporting
- Education



*Outpatient Core Elements  
expected late 2016*



# What works in the outpatient setting?

- Inappropriate prescribing generally involves two scenarios:



## Knowledge deficit

- Clinician is unaware of expected prescribing behaviors or evidence supporting them



## Behavioral barrier

- Clinician is familiar with expected prescribing behaviors, but decides not to follow them for various reasons

# What works in the outpatient setting?



- **Educational methods** — decisions are based on knowledge
  - Academic detailing (one-on-one education)
  - Guidelines



- **Behavioral methods** — decisions are influenced by psychosocial factors
  - Communications training
  - Public commitments



- **Both educational and behavioral methods**
  - Clinical decision support
  - Audit and feedback with peer comparisons



## Academic detailing

- Systematic provision of clinical education to reinforce or change behavior
- Core tenants involve:
  - Assessing baseline knowledge;
  - Focusing on specific clinicians or clinician leaders;
  - Using active education strategies;
  - Highlighting and repeating essential messages; and
  - Using positive reinforcement to reward desired behaviors.
- Shown to limit unnecessary medical costs and reduce inappropriate prescribing
- Most effective when used in combination with a behavioral intervention (e.g., audit and feedback with peer comparison)



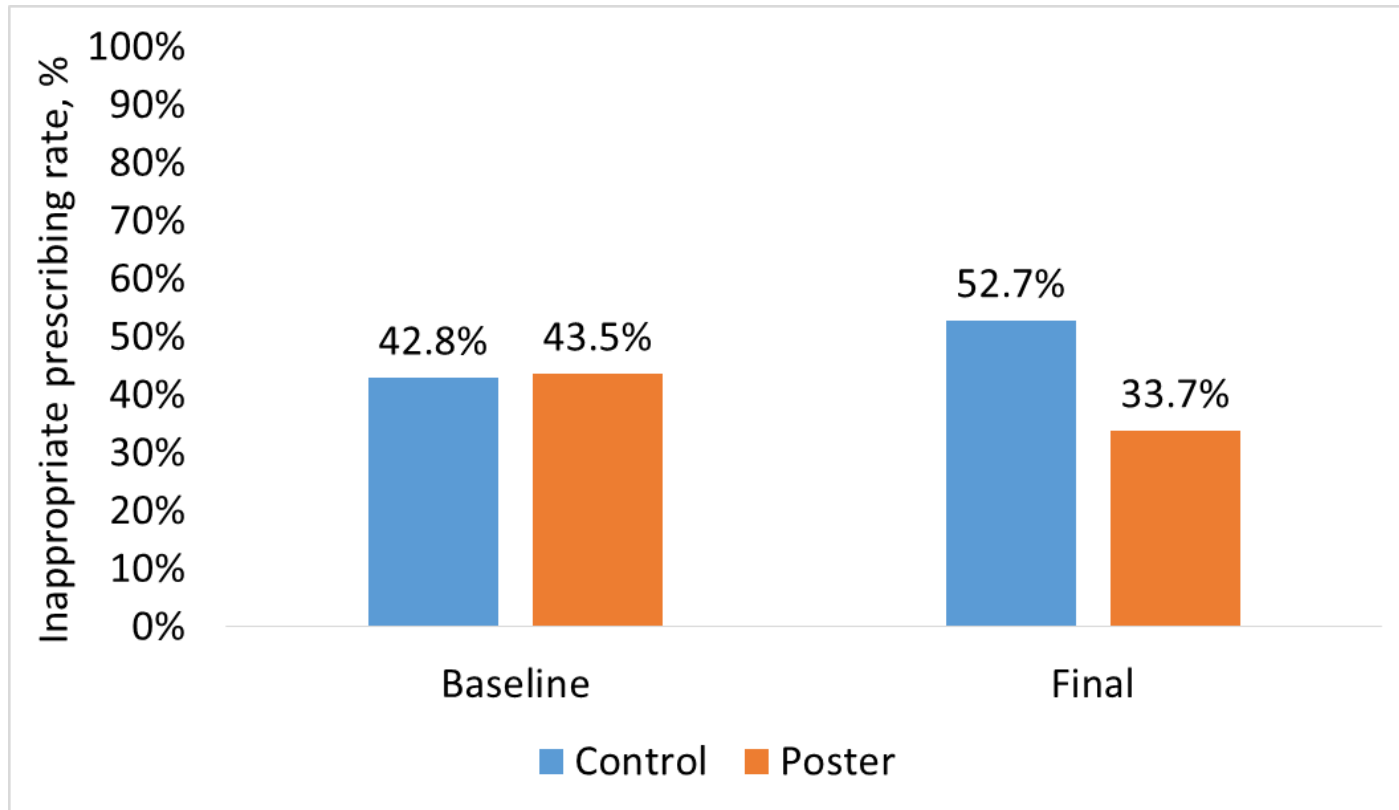


## Public commitment posters

- Simple intervention: poster-placed in exam rooms with provider picture and commitment to use antibiotics appropriately
- Randomized-controlled trial
- Principle of behavioral science: desire to be consistent with previous commitments

*“As your doctors, we promise to treat your illness in the best way possible. We are also dedicated to avoid prescribing antibiotics when they are likely do to more harm than good.”*

# Public commitment posters: inappropriate prescribing for acute respiratory infections



Adjusted absolute reduction: -20% compared to controls,  $p=0.02$



## Communications training

- Promotes evidence-based strategies to address patient concerns regarding:
  - Prognosis
  - Benefits and harms of antibiotic treatment
  - Management of self-limiting conditions
  - Management of patient expectations
- E.g., provision of a contingency plan in case symptoms worsen
- Shown to be uniquely sustainable following intervention cessation

# What works in the outpatient setting?



- **Educational methods** — decisions are based on knowledge
  - Academic detailing (one-on-one education)
  - Guidelines



- **Behavioral methods** — decisions are influenced by psychosocial factors
  - Communications training
  - Public commitments



- **Both educational and behavioral methods**
  - Clinical decision support
  - Audit and feedback with peer comparisons



## Educational clinical decision support

- Provide clinical information at specific times during workflow to facilitate desired behaviors
- Shown to reduce inappropriate prescribing
  - Acute bronchitis: 12–14% reduction in antibiotic prescribing
  - Pharyngitis: reduced antibiotic use
  - Pneumonia: improved antibiotic selection
- Important considerations
  - Message should be clear and concise, and not interruptive
  - Print and electronic tools are likely equally effective
  - Tools need to be **used** to be effective
  - Alert fatigue is a problem
  - Can be resource intensive

McGinn *JAMA Intern Med* 2013 Sep 23;173(17):1584-91. Gonzales *JAMA Intern Med* 2013 Feb 25;173(4):267-73.

Linder *Inform Prim Care*. 2009;17(4):231-40.





## **Behavioral clinical decision support: accountable justification**

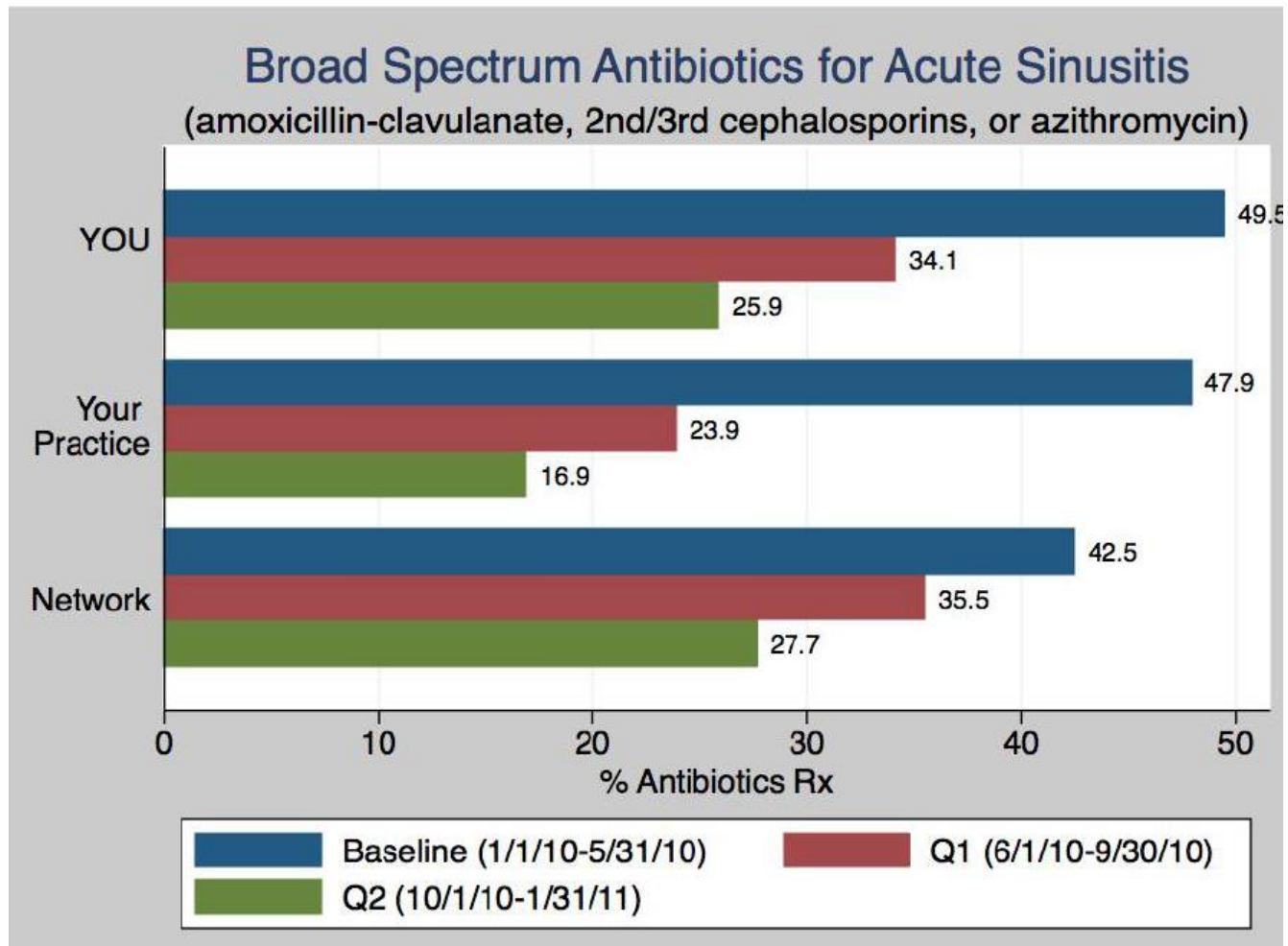
- “Antibiotic justification note” in medical record
  - Triggered by diagnosis for which antibiotics are not indicated and an antibiotic prescription is ordered
  - Free text field requesting justification for non-recommended therapy
  - If no text entered: “No justification given” appeared in medical record
  - Note disappeared if antibiotic prescription deleted
- Clinicians want to preserve their reputation
- Reduced inappropriate antibiotic prescribing from 23.2% to 5.2% pre and post-intervention (-7.0% difference in differences,  $p < 0.001$ )



## Audit and Feedback

- System of quality improvement which promotes individualized adherence to recommended prescribing behaviors
- Most effective methods involve comparison of individual clinician prescribing rates to both co-workers' prescribing and guidelines
- Often used in combination with clinician education (e.g., academic detailing)

## Audit-and-feedback with peer comparisons

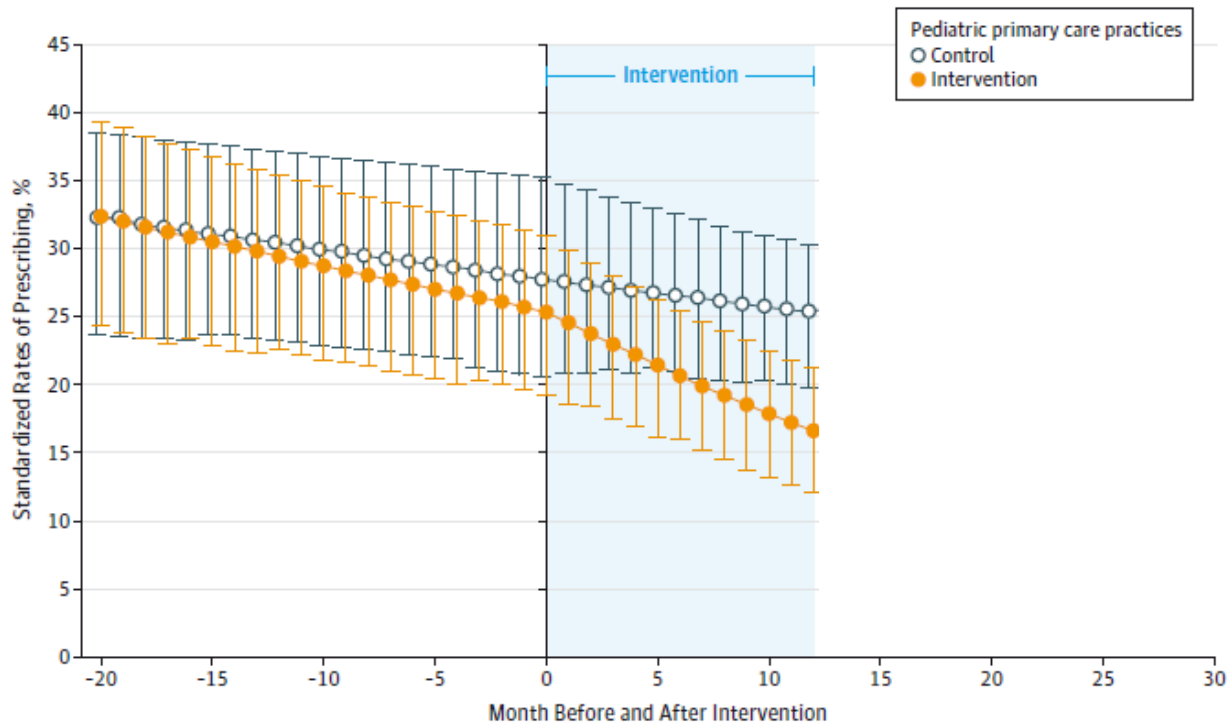


Gerber. *JAMA* 2013; **309**(22): 2345-2352.

Slide courtesy of Jeff Gerber

# Audit and feedback: Effect in pediatric practices

Figure. Standardized Rates of Broad-Spectrum Antibiotic Prescribing Before, During, and After Audit and Feedback



Gerber. *JAMA* 2013; **309**(22): 2345-2352.

Gerber. *JAMA* 2014 Dec 17;312(23): 2569-70.



## Peer Comparison to Top Performers

- One randomized controlled trial sent monthly emails to intervention group comparing clinician prescribing to their top-performing peers
- For clinicians in the top 10% of performers:
  - “You are a Top Performer”
- For those not in the top 10%
  - “You are not a Top Performer”
- Mean antibiotic prescribing decreased from 19.9% to 3.7% (-16.3%)
  - Statistically significant versus controls



## Peer Comparison: Further evidence

- National Health Service randomized trial of letters to general practitioner (GP) practices (1581 practices included)
  - Your practice is prescribing antibiotics at a rate higher than 80% of your local GP practices
  - Included actions to improve prescribing
  - From England's Chief Medical Officer
- 3.3% relative reduction in antibiotic prescribing relative to controls
  - Estimated ~73,000 antibiotic prescriptions saved
- Concluded it was cost effective
  - Materials to send letters v. cost of antibiotic prescriptions

# CDC's Core Elements for Antibiotic Stewardship Programs in Hospitals and Nursing homes

- Leadership commitment
- Accountability
- Drug expertise
- Action
- Tracking
- Reporting
- Education



*Outpatient Core Elements  
expected late 2016*

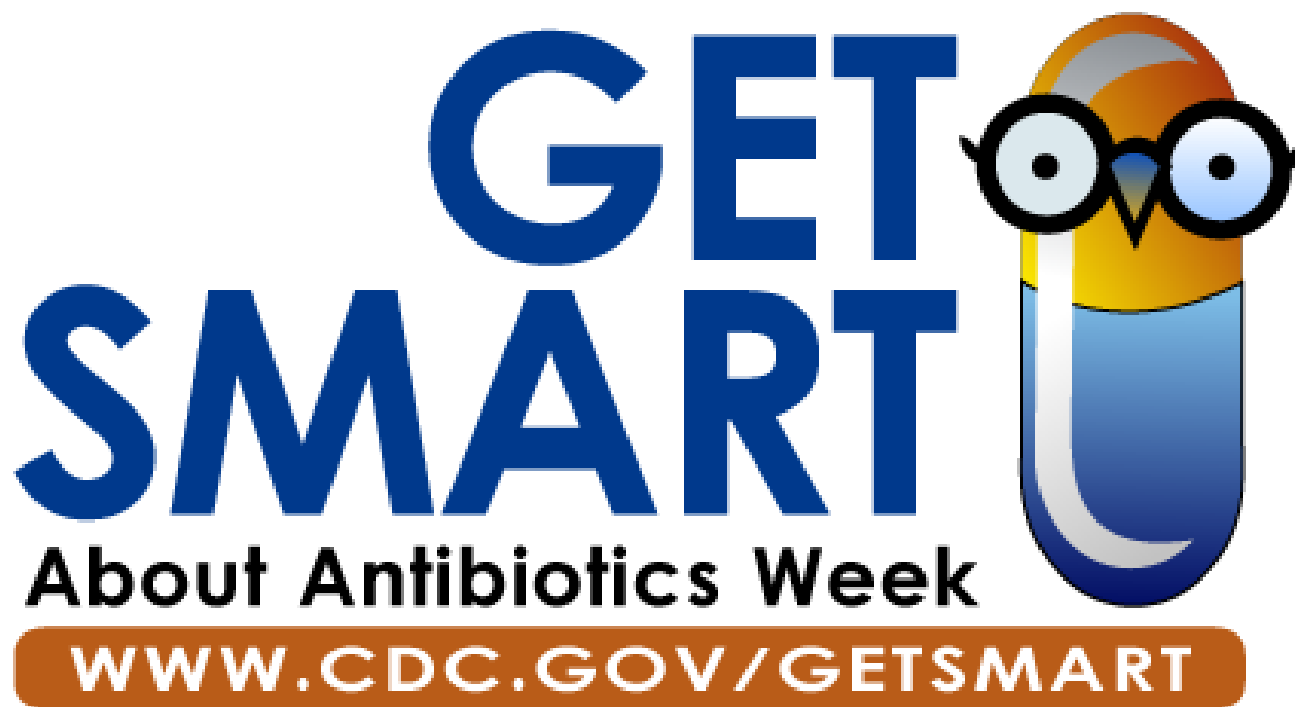
# The Get Smart Campaign

- CDC launched the National Campaign for Appropriate Antibiotic Use in the Community, 1995
- *Get Smart: Know When Antibiotics Work*, 2003
- Program works closely with variety of partners to reduce unnecessary antibiotic use in community
- Focus on increasing awareness among healthcare providers and general public
  - [www.cdc.gov/getsmart](http://www.cdc.gov/getsmart)





Get Smart Week: November 14-20, 2016



# Summary

- Outpatient prescribing in the United States can be improved
  - 30% of outpatient antibiotic prescriptions in the United States are unnecessary
  - National goal is to reduce inappropriate outpatient antibiotic prescribing by 50% by 2020
- Providers prescribe antibiotics inappropriately
  - Fear of complications
  - Perceived patient expectations
  - Provider prescribing pattern variability

# Summary

- Interventions can be effective in improving antibiotic use
  - Likely need to address more than just knowledge deficits
  - Incorporating principles of behavioral science can help change behavior
- Interventions that work include
  - Public poster-commitments to using antibiotics appropriately
  - Clinical decision support, accountable justification
  - Audit and feedback with peer comparisons
  - Communications training
  - And many more! ([www.cdc.gov/getsmart](http://www.cdc.gov/getsmart))
- Stay tuned for the *Core Elements of Outpatient Antibiotic Stewardship*



**Thank you!  
Questions?**

**[GetSmart@cdc.gov](mailto:GetSmart@cdc.gov)**

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

