Antibiotic Stewardship Research in the Outpatient Setting

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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

Outpatient Antibiotic Stewardship Research

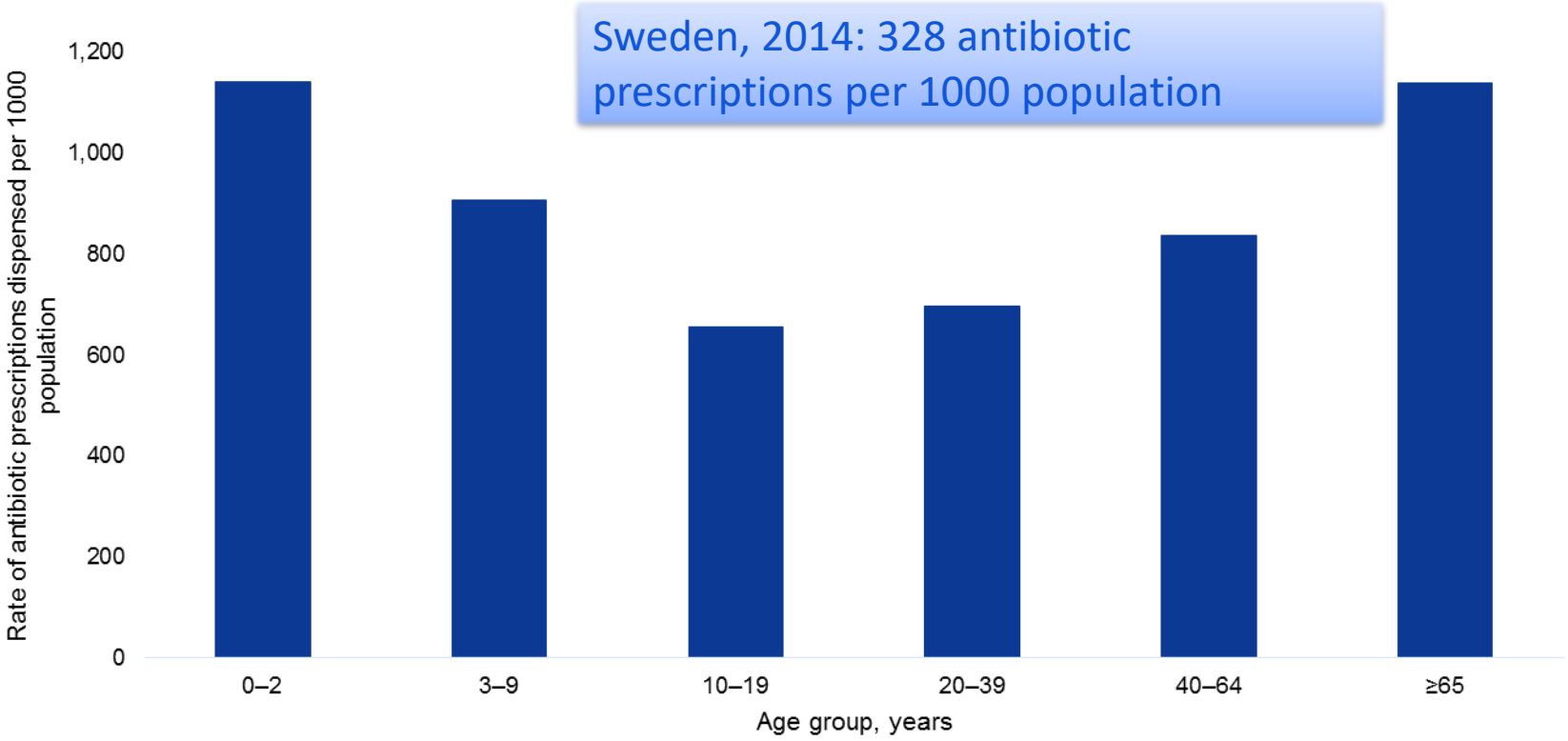
- Quantitative studies (observational or experimental)
  - Characterize antibiotic use
  - Assess implementation of antibiotic stewardship interventions
- Qualitative or formative research assessing knowledge, attitudes and behaviors related to antibiotic use or an intervention
  - In-depth interviews and focus groups
  - Not generalizable, but provide important insights
- Mixed methods (both qualitative and quantitative)

Characterize Antibiotic Prescribing

Antibiotic Use Data for Action

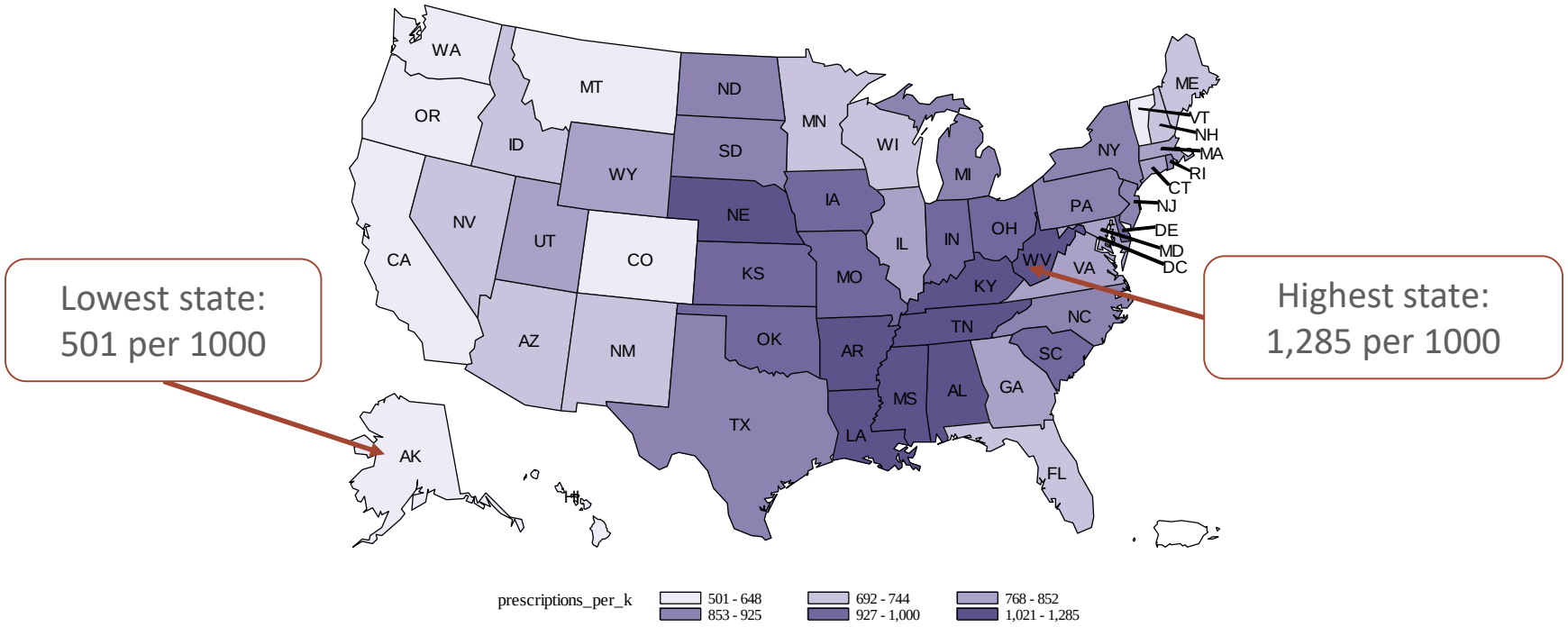
Community Antibiotic Prescriptions Dispensed per 1000 Persons in the United States, 2014

- 835 antibiotic prescriptions dispensed per 1000 population in outpatient settings (5 prescriptions for every 6 people)



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-reportsummary_2013.pdf

Community Antibiotic Prescribing Rates per 1000 Population — United States, 2014



Data: IMS Health Xponent

http://www.cdc.gov/getsmart/community/programs-measurement/measuring-antibiotic-prescribing.html

Hicks CID 2015: 60(9):1308-16; CDC. Outpatient antibiotic prescriptions — United States, 2013.

JAMA The Journal of the American Medical Association

Research

Original Investigation

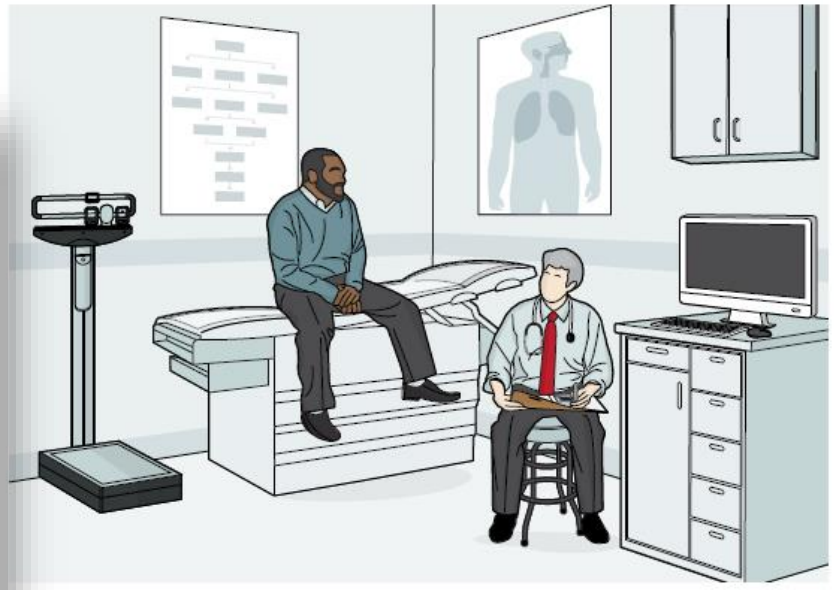
Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011

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

A report from THE PEW CHARITABLE TRUSTS | May 2016

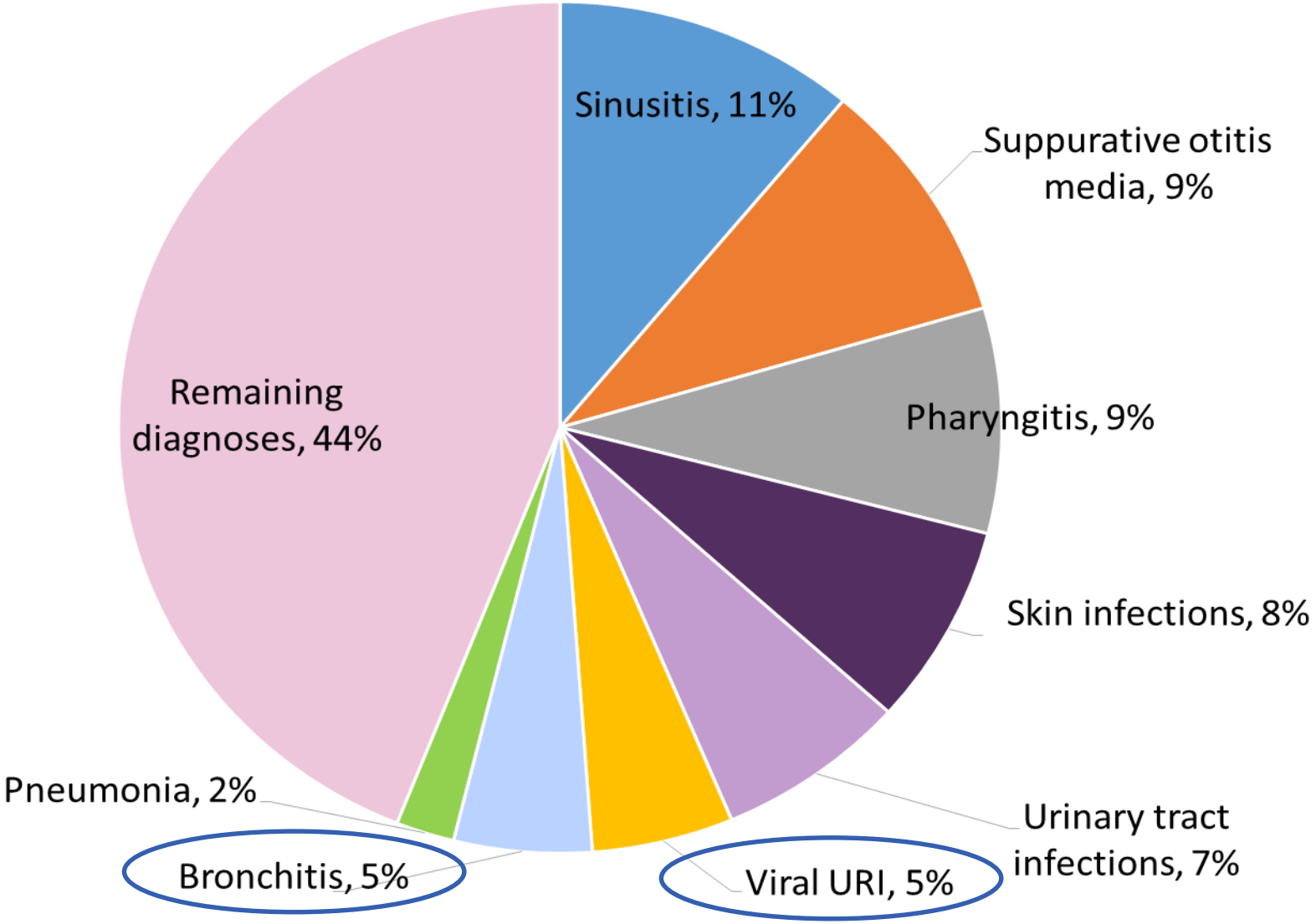


Antibiotic Use in Outpatient Settings

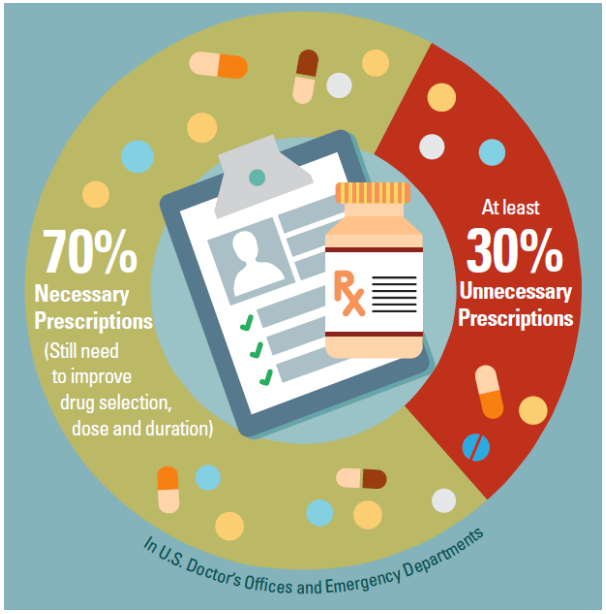
Health experts create national targets to reduce unnecessary antibiotic prescriptions

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

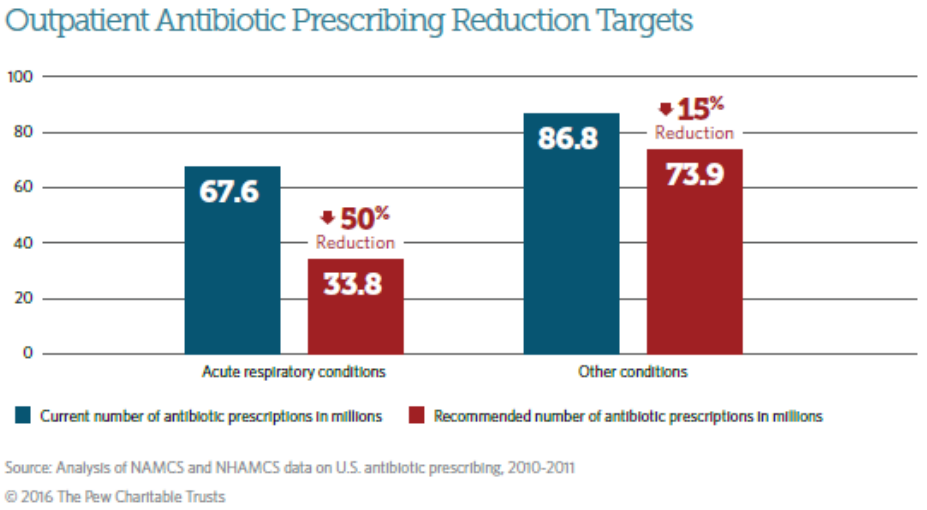
Diagnoses Leading to Antibiotics — United States, 2010–11



Setting National Targets: Outpatient Antibiotic Prescribing



47 million unnecessary antibiotic prescriptions per year



By 2020, significant outcomes of Goal 1 will include: **(CARB National Action Plan)**

- 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.

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

Understand barriers to appropriate prescribing

Understand what interventions resonate with providers and patients

Why are providers prescribing antibiotics inappropriately?

Why might providers prescribe antibiotics inappropriately?

- Lack of knowledge of appropriate indications?
- Fear of complications?
- Patient pressure and satisfaction?

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
- Patient pressure and satisfaction
  - Providers universally cite patient requests for antibiotics
  - Providers worry about losing patients to other providers

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

Physician Perception of Patient Expectations

- Overt requests for antibiotics are rare
- When physicians think patients/parents want antibiotics, they are more likely to prescribe
  - 62% when they thought parent wanted antibiotics
  - 7% when they thought parent did **not** want antibiotics

- Physicians are terrible at predicting which patients want antibiotics

Knapf *Family Practice* 2004;21(5):500-6. Mangione-Smith *Pediatrics* 1999;103(4):711-8

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 + 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.

Identify effective interventions to improve outpatient antibiotic prescribing

Studies Assessing the Impact of Interventions

What works in the outpatient setting?

- Communications training
- Clinical decision support
- Accountable justification
- Audit and feedback with comparisons to peers
- Public commitments
- Academic detailing (one-on-one education)
- Delayed antibiotic prescribing

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

Cals *Ann Family Med* 2013;11(2)157-64.
Little *Lancet* 2013:382(9899)1175-82.

Clinical Decision Support

- Effective intervention
  - Acute bronchitis: 12–14% reduction in antibiotic prescribing
  - Pharyngitis: reduced antibiotic use
  - Pneumonia: improved antibiotic selection

- Important considerations
  - Print and electronic tools are likely equally effective
  - Tools need to be **used** to be effective
    - In one study, tool was used in 6% of eligible visits
  - Alert fatigue is a problem

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.

Original Investigation

Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices

A Randomized Clinical Trial

Daniella Meeker, PhD; Jeffrey A. Linder, MD, MPH; Craig R. Fox, PhD; Mark W. Friedberg, MD, MPP; Stephen D. Persell, MD, MPH; Noah J. Goldstein, PhD; Tara K. Knight, PhD; Joel W. Hay, PhD; Jason N. Doctor, PhD

IMPORTANCE Interventions based on behavioral science might reduce inappropriate antibiotic prescribing.

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Supplemental content at jama.com

Behavioral Clinical Decision Support: Accountable Justification

- Cluster randomized trial—47 primary care practices (248 clinicians)
- Three specific interventions via Electronic Health Recor (0,1,2,3)
  - Suggested alternatives
  - Accountable Justification
  - Peer Comparison
- Prescribing rates for visits with inappropriate antibiotics for acute respiratory infections
- 18 months pre-intervention to 18 months afterward
- Decrease in all the arms including the control
- Accountable Justification and Peer Comparison resulted in statistically significant decreases
- Idea: Clinicians want to preserve their reputation

Meeker, Linder, et al. *JAMA* 2016;315(6): 562-570.

Peer Comparison

"You are a Top Performer"

You are in the top 10% of clinicians. You wrote 0 prescriptions out of 21 acute respiratory infection cases that did not warrant antibiotics.

"You are not a Top Performer"

Your inappropriate antibiotic prescribing rate is 15%. Top performers' rate is 0%. You wrote 3 prescriptions out of 20 acute respiratory infection cases that did not warrant antibiotics.

Slide content courtesy of Dr. Jeff Linder

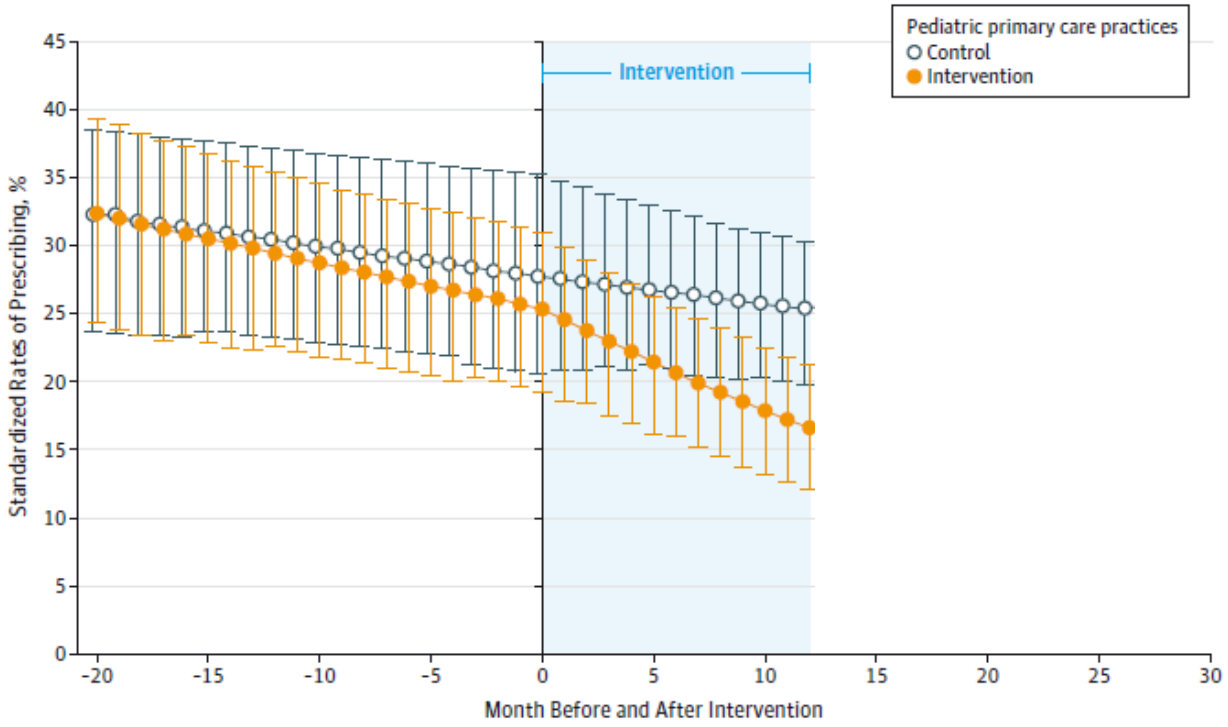
Intervention Persistence

	Pre-intervention	Intervention	Post-intervention
	% antibiotic prescribing		
Suggested alternatives	22	6	9
Accountable justifications	23	5	8
Peer comparison	20	4	5

Slide content courtesy of Dr. Jeff Linder, presented at IDWeek 2016

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.

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

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IMPORTANCE "Nudges" that influence decision making through subtle cognitive mechanisms have been shown to be highly effective in a wide range of applications, but there have been few experiments to improve clinical practice.

OBJECTIVE To investigate the use of a behavioral "nudge" based on the principle of public commitment in encouraging the judicious use of antibiotics for acute respiratory infections (ARIs).

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."

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

Meeker. *JAMA Intern Med*. 2014;174(3):425-31.

Safe Antibiotic Use:
A Letter From Your Medical Group

Dear Patient,

We want to give you some important information about antibiotics.

Antibiotics, like penicillin, fight infections due to bacteria that can cause some serious illnesses. But these medicines can cause side effects like skin rashes, diarrhea, or yeast infections. If your symptoms are from a virus and not from bacteria, you won't get better with an antibiotic, and you could still get these bad side effects.

Antibiotics also make bacteria more resistant to them. This can make future infections harder to treat. This means that antibiotics might not work when you really need them. Because of this, it is important that you only use an antibiotic when it is necessary to treat your illness.

How can you help? Carefully follow your doctor's instructions. He or she will tell you if you should or should not take antibiotics.

When you have a cough, sore throat, or other illness, your doctor will help you select the best possible treatments. If an antibiotic would do more harm than good, your doctor will explain this to you, and may offer other treatments that are better for you.

Your health is very important to us. 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 to do more harm than good.

If you have any questions, please feel free to ask your doctor, nurse, or pharmacist.

Sincerely,


QueensCare

El Uso Seguro de Antibióticos:
Una Carta de su Grupo Médico

Estimado Paciente:

Queremos compartir información importante con usted sobre los antibióticos.

Los antibióticos como la penicilina ayudan a combatir infecciones debido a bacterias que pueden causar serias enfermedades. Pero estas medicinas también tienen efectos secundarios como erupciones de la piel, diarrea, o infecciones por hongos de levadura. Si sus síntomas son debidos a un virus y no por una bacteria, no se mejorará con un antibiótico, y usted aún puede obtener estos efectos secundarios no deseables.

Los antibióticos también pueden hacer la bacteria más resistente a ellas. Esto hará que infecciones en el futuro sean más difíciles de tratar. Eso significa que los antibióticos no trabajarán cuando ustedes en realidad necesitan que funcionen. Por esto, es importante que usted sólo use un antibiótico cuando sea necesario para su enfermedad.

¿Cómo puede usted ayudar? Siga las indicaciones de su doctor. El o ella le dirá si debe o no tomar antibióticos.

Cuando usted tenga una tos, garganta irritada, u otra enfermedad, su doctor le ayudará a escoger el mejor tratamiento posible. Si un antibiótico haría más daño que bien, su doctor le explicará esto y tal vez le ofrecerá otros tratamientos que sean mejor para usted.

Su salud es importante para nosotros. Como sus doctores, nosotros prometemos tratar su enfermedad en la mejor manera posible. También nos comprometemos a evitar recetar antibióticos cuando sean probables de hacer más daño que bien.

Si tiene cualquier pregunta, pregúntele a su doctor, enfermera, o farmacéutico.

Atentamente,


Slide courtesy of Dr. Jeff Linder

What We Know

- The U.S. uses lots of outpatient antibiotics compared to other countries
- There is a lot of geographic variability within the U.S.
- There is a lot of unnecessary use, especially for respiratory conditions, in doctors' offices and emergency departments
- Reasons for inappropriate prescribing
  - Fear of complications
  - Perceived patient expectations
- 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

Where are the gaps?

- Where are the opportunities to improve antibiotic use in dental offices, retail clinics, urgent care centers, ambulatory surgery, and dialysis centers?
- How do we improve antibiotic stewardship at the transitions of care (outpatient parenteral antibiotic therapy)?
- How do we train providers to communicate about antibiotics to patients and parents?
- What are the best approaches to scale up and sustain interventions that have been shown to be effective?

Thank you!
Questions?

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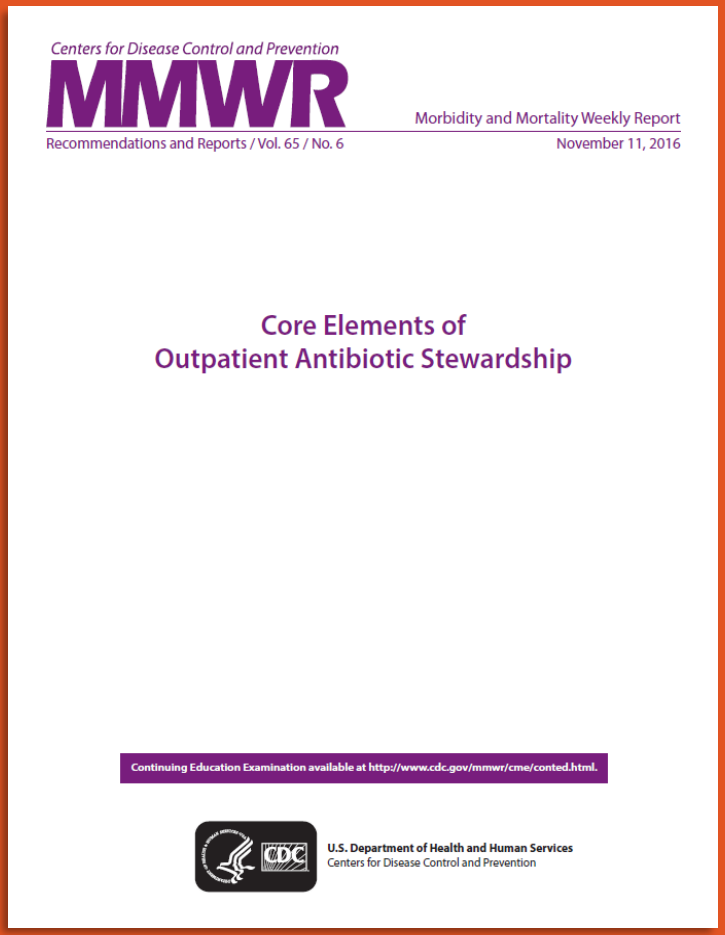
For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

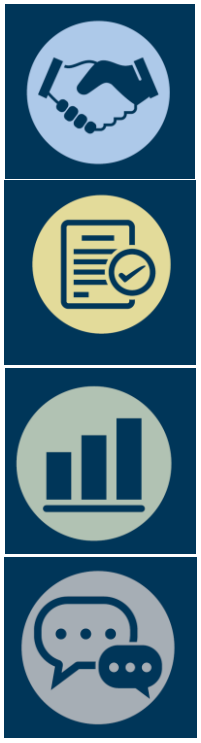
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

EXTRA SLIDES



Sanchez GV, Fleming-Dutra KE, Roberts RM, Hicks LA. Core Elements of Outpatient Antibiotic Stewardship. MMWR Recomm Rep 2016;65(No. RR-6):1-12. https://www.cdc.gov/mmwr/volumes/65/rr/rr6506a1.htm?s_cid=rr6506a1_e

The Core Elements of Outpatient Antibiotic Stewardship



- **Commitment:** demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety
- **Action for policy and practice:** implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed
- **Tracking and Reporting:** monitor antibiotic prescribing practices and offer regular feedback to clinicians or have clinicians assess their own antibiotic use
- **Education and Expertise:** Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on antibiotic prescribing

https://www.cdc.gov/getsmart/community/improving-prescribing/core-elements/core-outpatient-stewardship.html

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

Hallsworth et al. *The Lancet* 2016; 387(10029): 1743-1752.