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# Interventions to Improve Antibiotic Prescribing

# Disclosures

I have the following financial relationships with the manufacturer(s) and/or provider(s) of commercial services discussed in this activity:

- ◊ Contracted research with:
  - ◊ Pfizer (pediatric nirmatrelvir-ritonavir, maternal RSV vaccine)
  - ◊ Merck (monoclonal antibody for RSV prevention)

I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.

# CDC Core Elements of Outpatient Stewardship

[https://www.cdc.gov/antibiotic-use/community/pdfs/16\\_268900-A\\_CoreElementsOutpatient\\_508.pdf](https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_508.pdf)



## **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 prescribing practices themselves.



## **Education and expertise**

Provide educational resources to clinicians and patients on antibiotic prescribing, and ensure access to needed expertise on optimizing antibiotic prescribing.

# Evidence- Based Strategies

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Patient Education

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Clinician Education

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Peer Comparison

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Clinical decision support

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Written justification

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Public Pre-commitment

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Communication training

## General Principles

Successful strategies will not be the same as in the hospital.

Education is necessary but not sufficient.

Change is possible, but *sustained* change is very difficult.

# Can we use our hospital strategies?

Hospital Strategy	Can it work in ambulatory setting?
Restriction of targeted antimicrobials	Not for stewardship, though certainly for cost control!
Prospective audit and feedback on active antimicrobial orders	Nope
Clinical algorithms/pathways	Yes
EHR-based clinical decision support	Yes

# Ambulatory Opportunities Compared to Hospital

- ◇ Can tie antibiotic prescribing directly to specific clinician
  - ◇ (This is impossible in the hospital, though we can use specialty or unit)
- ◇ A few diagnoses account for *most* outpatient antibiotic prescriptions
  - ◇ More impact by targeting specific conditions
- ◇ Large numbers of cases
  - ◇ Easier to study impact of interventions

# Example

You recently joined a primary-care practice. When you see patients with symptoms of nasal congestion, cough, and low-grade fever, they often ask if you'll be prescribing antibiotics. They sometimes mention that one of the other providers always gives them an antibiotic for these symptoms.

Where might you start with addressing overprescribing of antibiotics for sinusitis and acute bronchitis?

# Patient Education

## ◇ Why do it?

- ◇ Patient desires/preferences are VERY important in the ambulatory setting
- ◇ Conflict between patient expectations and provider desire to provide optimal care
- ◇ Aligning patient/family with provider understanding of risks and benefits should lead to better patient satisfaction and stronger relationships

## ◇ Challenges:

- ◇ The target group is basically everyone
- ◇ Hard to compete for attention these days
- ◇ Some patients see medical providers as one source of medical information among many

# Patient Education Modes

- ◇ Untargeted
  - ◇ Posters on the walls, etc.
  - ◇ Very few studies; impact probably not large
  - ◇ Might also help remind providers!
  - ◇ May help support other interventions
- ◇ Targeted education (during the visit)
  - ◇ Can be enormously impactful
  - ◇ But perceived as time-consuming

<https://www.cdc.gov/antibiotic-use/media/pdfs/VirusOrBacteria-Original-P.pdf>

<https://www.cdc.gov/antibiotic-use/hcp/educational-resources/stewardship/index.html>

## Viruses or Bacteria What's got you sick?

Antibiotics are often prescribed when they are not needed for respiratory infections. Antibiotics are only needed for treating certain infections caused by bacteria. Viral illnesses cannot be treated with antibiotics. When an antibiotic is not prescribed, ask your healthcare professional for tips on how to relieve symptoms.

Common Respiratory Infections	Common Cause			Are Antibiotics Needed?*
	Virus	Virus or Bacteria	Bacteria	
Common cold/runny nose	✓			No
Sore throat (except strep)	✓			No
COVID-19	✓			No
Flu	✓			No
Bronchitis/chest cold (In otherwise healthy children and adults)		✓		No**
Middle ear infection		✓		Maybe
Sinus infection		✓		Maybe
Strep throat			✓	Yes
Whooping cough			✓	Yes

\*Antiviral drugs are available for some viral infections, such as COVID-19 or flu.

\*\*Studies show that in otherwise healthy children and adults, antibiotics for bronchitis won't help patients feel better.



To learn more about antibiotic prescribing and use, visit [www.cdc.gov/antibiotic-use](https://www.cdc.gov/antibiotic-use).



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# Question

Have patient attitudes about antibiotics evolved over the past 10-15 years?

If so, do we have any ideas what might have led to that change?

# Clinician Education

- ◇ Also necessary but probably not sufficient
- ◇ When initiating an intervention, clinician education is necessary:
  - ◇ Signs that differentiate pneumonia and acute bronchitis
  - ◇ First-line antibiotics for acute otitis media, and best alternatives for patients with reported penicillin allergy
  - ◇ Impact of antibiotic overprescribing at the patient and population levels
- ◇ Alone, the impact is likely to be small and temporary
- ◇ Educational sessions have been used as the control arm of clinical trials

# Effect of an Outpatient Antimicrobial Stewardship Intervention on Broad-Spectrum Antibiotic Prescribing by Primary Care Pediatricians

A Randomized Trial

Gerber et al., *JAMA*, 2013

- ◆ Cluster randomized trial of 18 pediatric practices in an academic network
- ◆ Intervention: education session plus quarterly emailed feedback on guideline-concordant antibiotic prescribing with comparison to peers (“you are in the Xth percentile”)
- ◆ Outcomes: broad-spectrum antibiotics for sinusitis, pneumonia, and streptococcal pharyngitis

## Slide 13

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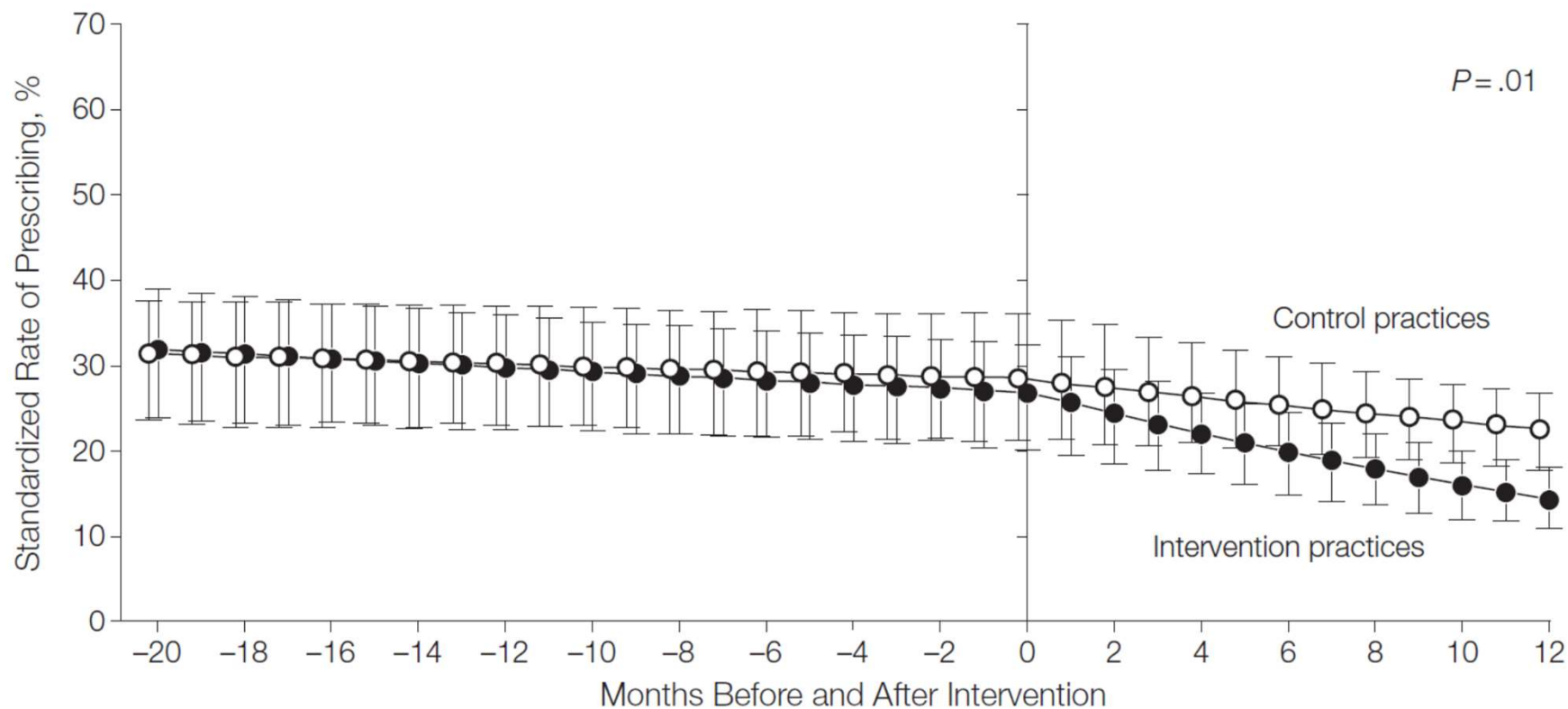
**JW1** I think we discussed this study in the previous session. The intervention included both education (session 2) and feedback (this session, if I get where you're going with this) so it seems appropriate.

Johnson, James William, 2023-06-26T18:50:25.130

**WZ11 0** Exactly, we brushed on it before but I wanted to do a deeper review of stewardship strategies

Willis, Zachary Inskeep, 2023-06-26T20:08:48.796

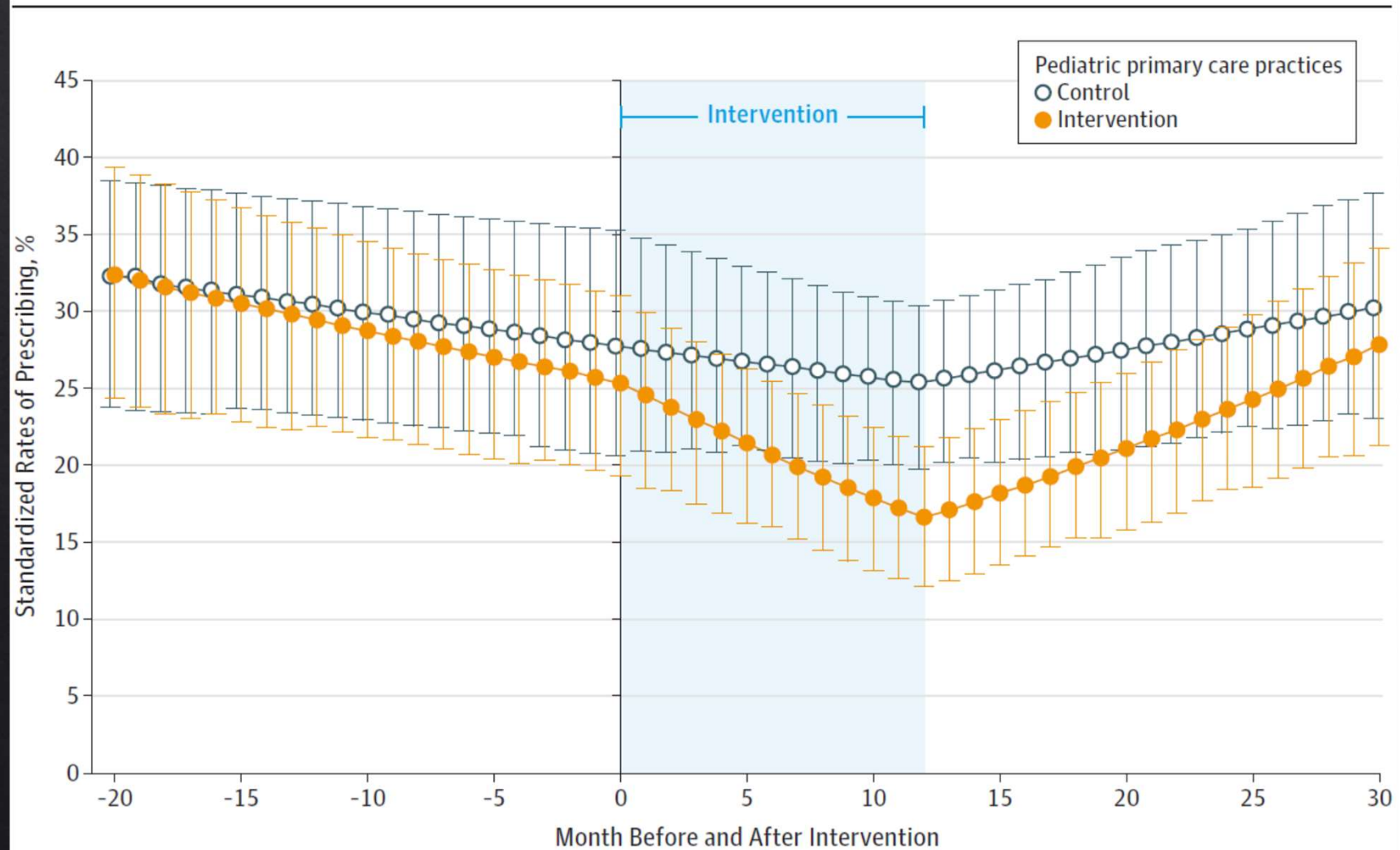
**Figure 2.** Standardized Rates of Broad-Spectrum Antibiotic Prescribing at Acute Care Office Visits Over Time



Gerber, et al., *JAMA* 2013  
Figure used with permission.

After 12 months, the study intervention ended. They continued data collection...

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



Gerber, et al.,  
*JAMA* 2014  
Figure used  
with  
permission.

## Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices A Randomized Clinical Trial

Meeker et al, JAMA 2016

- ◇ RCT of 248 clinicians in 47 practices
- ◇ Outcome: antibiotic prescribing rate for patients with diagnosis codes consistent with viral infection (URTI, acute bronchitis, influenza)
- ◇ Three interventions tested
  - ◇ A practice could have none, 1 of 3, 2 of 3, or all 3 interventions
- ◇ >31,000 visits studied
- ◇ 18 months pre- and post-intervention

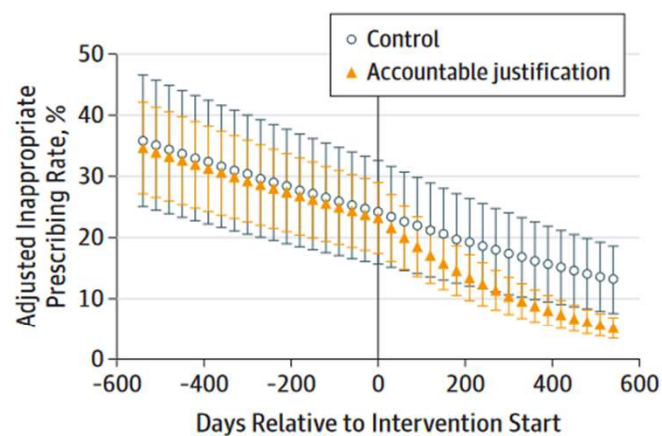
## Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices A Randomized Clinical Trial

3 strategies:

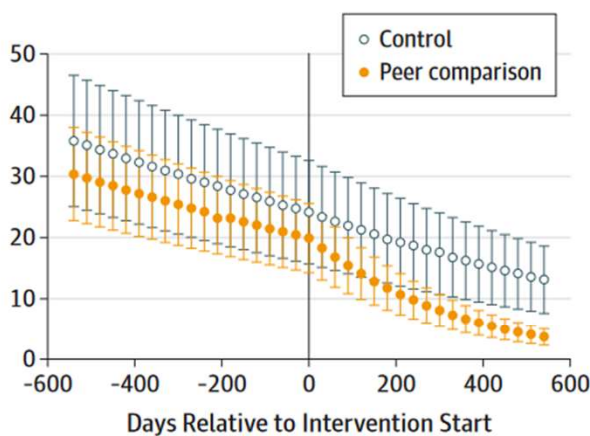
1. Clinical decision support
  - ◇ E.g., URI diagnosis + Abx prescribed → Pop-up
2. Accountable justification
  - ◇ Required free-text explanation for use of Abx in each case
3. Peer comparison
  - ◇ Clinicians received monthly emailed feedback with personal rate of inappropriate prescribing
  - ◇ Top 10% were told they were top performers; all others were told they were “not a top performer.”

Figure 2. Adjusted Rates of Antibiotic Prescribing at Primary Care Office Visits for Antibiotic-Inappropriate Acute Respiratory Tract Infections Over Time

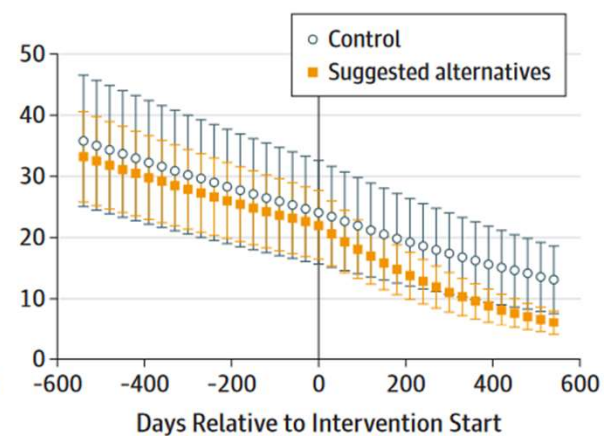
**A** Accountable justification



**B** Peer comparison



**C** Suggested alternatives



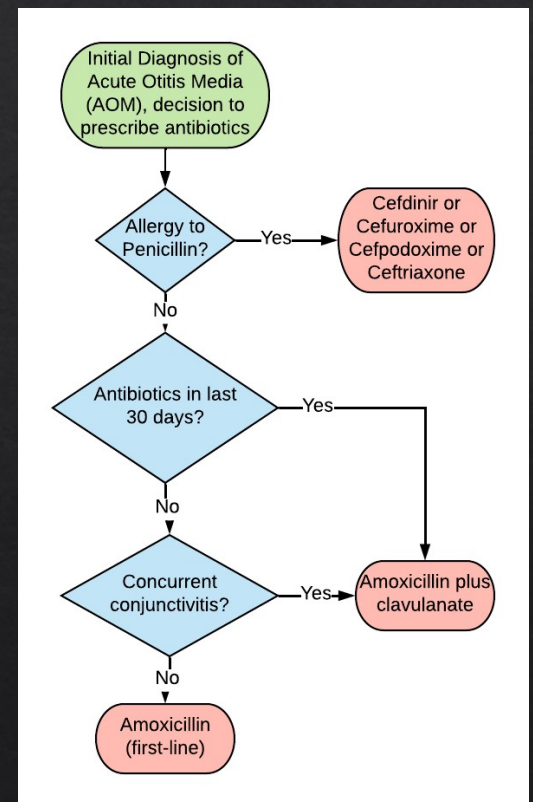
# Clinical Decision Support

## ◇ Complex version (EHR):

- ◇ Antibiotic order linked to viral diagnosis → flag
- ◇ Wise use of default dosing and durations in antibiotic orders
- ◇ Slightly harder: make an antibiotic order panel that starts by clicking on the patient's diagnosis

## ◇ Simpler versions:

- ◇ Make internal guidelines for common infections
- ◇ Cards taped to monitors or behind workstations
- ◇ For EHRs:



## PEDIATRIC ANTIBIOTIC PRESCRIBING GUIDELINES

Adapted by experts in antibiotic prescribing, including primary care providers, academic infectious disease physicians, clinical pharmacists, and health care systems antibiotic stewardship leaders from across North Carolina from 2018 guidelines produced by the New York State Department of Health

### PEDIATRIC OUTPATIENT TREATMENT RECOMMENDATIONS 2024: SUMMARY OF GUIDELINES<sup>1</sup>

Diagnosis	Management
Non-specific upper respiratory tract infection (URTI) <sup>1,2</sup> URIs usually last around 10 days Most cases are viral	Antibiotics are not helpful and should not be used. Focus on symptomatic relief. OTC cough and cold medications are not recommended for use in children < 6 yo. See references for more details, additional treatment options, and other important information.
Acute rhinosinusitis <sup>1,2</sup> Presentations consistent with acute bacterial sinusitis are: • Symptoms of acute rhinosinusitis lasting ≥10 days without improvement • Severe symptoms lasting ≥3 days: • Purulent nasal discharge	If diagnosis is based on persistent and non-severe symptoms, consider additional watchful waiting for up to 3 days.  First line treatment: If non-severe and no risk factor for resistance: • amoxicillin 80-90 mg/kg/day (PC) in 2 divided doses (max 4 g / day) × 7 days

## ADULT ANTIBIOTIC PRESCRIBING GUIDELINES

Adapted by experts in antibiotic prescribing, including primary care providers, academic infectious disease physicians, clinical pharmacists, and health care systems antibiotic stewardship leaders from across North Carolina from 2018 guidelines produced by the New York State Department of Health.

### ADULT OUTPATIENT TREATMENT RECOMMENDATIONS 2024: SUMMARY OF GUIDELINES<sup>1</sup>

Diagnosis	Management
Non-specific upper respiratory tract infection (URTI) <sup>1,2</sup> Most adults get 2-4 URIs annually	Antibiotic treatment is not recommended for non-specific URIs. • OTC analgesics can be given to relieve symptoms. • Decongestants combined with a first-generation antihistamine may provide short-term relief of nasal symptoms and cough.  Evidence does not support antihistamines (as monotherapy), intranasal corticosteroids, and/or nasal saline

# North Carolina Antibiotic Prescribing Guidelines

## ◇ Pediatric:

<https://www.dph.ncdhhs.gov/epidemiology/communicable-disease/pediatric-antibiotic-flyerwebpdf/open>

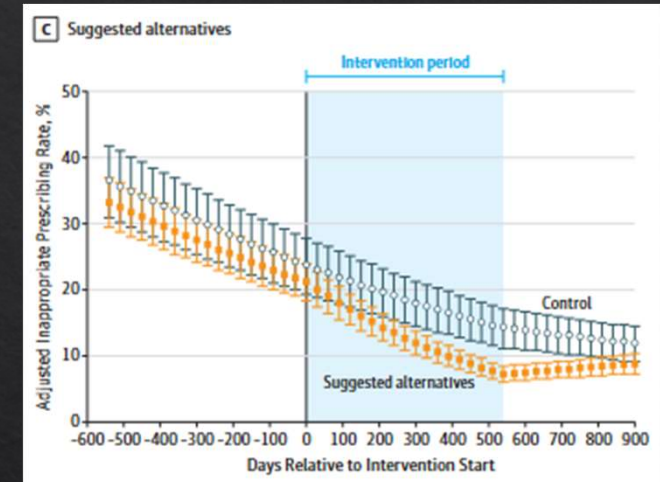
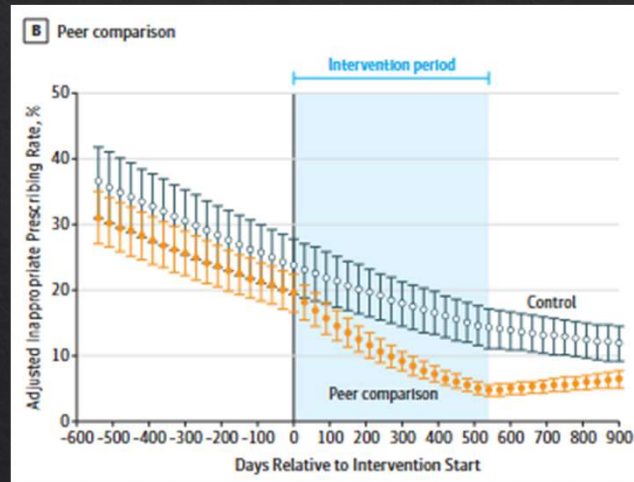
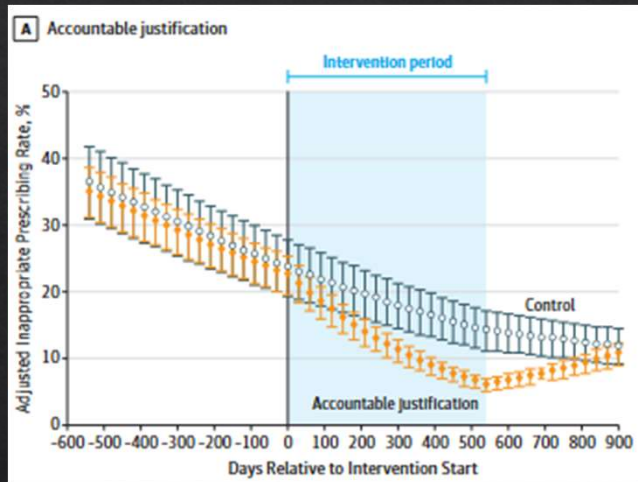
## ◇ Adult:

<https://www.dph.ncdhhs.gov/epidemiology/communicable-disease/adult-antibiotic-flyerwebpdf/open>

# Accountable Justification

- ◇ All antibiotic orders accompanied by *free text* justification
- ◇ In the trial, they could write anything
  - ◇ No one was reading it
- ◇ Still effective!
  
- ◇ It does seem the effect could be temporary
  - ◇ Clinicians figure out when there are no consequences

# Follow-Up



- ◇ Interventions lasted 18 months
- ◇ After trial completion, practice began to revert

Linder et al., *JAMA*, 2017

# Pre-Commitment and Public Commitment

## 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

- ◆ Sites displayed a poster signed by all the clinicians stating commitment to use antibiotics responsibly
- ◆ Patient education + clinician nudge
  - ◆ Precommitment
  - ◆ Visual reminder
- ◆ Poster practices had a 10% reduction in antibiotic prescribing during study
- ◆ Effective, but short study (10 months)

*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.*

What do clinicians report is the biggest barrier to improved antibiotic prescribing?

Patients!

# Communication training

- ◆ DART Project (Dialogue Around Respiratory Illness Treatment)
  - ◆ Developed by University of Washington researchers
- ◆ Common clinician concern: *not* prescribing takes longer than prescribing
- ◆ Common patient concern: they took off work, traveled, paid a copay...
  - ◆ ...and got told they had to get better on their own



# Communication training

1. Review your physical exam findings

“Lungs sound nice and clear”

2. Deliver a clear diagnosis

“You have bronchitis”

3. Use a two-part negative/positive treatment recommendation

**Negative:** “This is caused by a virus that antibiotics won’t touch”

**Positive:** What things the patient *can* do to feel better

Start with negative and *then* do positive – shift the focus away from antibiotics

4. Provide a contingency plan

“I expect you to feel better in 2-3 days. If you have higher fever, or your breathing’s getting worse, give me a call and we’ll check again. We might need to get a chest X-ray or some labs then.”

## Antibiotic Prescribing for Acute Respiratory Tract Infections 12 Months After Communication and CRP Training: A Randomized Trial

- ◇ Cluster-randomized trial of 2 interventions:
  - ◇ Training on use of C-reactive protein (CRP) to differentiate bacterial and viral lower respiratory tract infections
  - ◇ Communication training
- ◇ Both were impactful at 3 months
  - ◇ Communication training was more durable: 28% reduction in antibiotic prescribing after 12 months
  - ◇ CRP training effect was not statistically significant at 12 months

# Who Else Talks to Patients?

◇ Front desk/scheduling staff, MAs, RNs...

“Let’s get you in and see if the doctor can give you something for that”

vs

“Let’s get you in and see if the doctor can help you figure this out”

# Sustaining Impact

- ◇ Interventions work!
- ◇ But impacts may be short-lived
  - ◇ Effect can fade over time (CRP study)
  - ◇ Effect may depend on continuous intervention. Short-lived interventions likely fade the fastest.
- ◇ Keys to sustainment:
  - ◇ Do not rely on one-time or short-lived interventions
  - ◇ Anticipate that even continuous interventions grow stale
  - ◇ Layer strategies on top of each other
  - ◇ Communications training and well-done Clinical Decision Support seem most likely to sustain

# How to Overuse Antibiotics



Unnecessary  
antibiotics

Prescribing  
when not  
indicated



Excessive  
Spectrum

Treatment not  
targeted



Excessive  
Duration

Longer courses  
than necessary

# Matching Strategy to Problem

Problem	Strategies
Overuse of antibiotics for viral infections	Communication Training Clinical Decision Support Peer Comparison
Overuse of non-first-line antibiotics	Clinical Decision Support Peer Comparison
Excessive Durations	Clinical Decision Support
General Improvement	Patient Education Clinician Education Antibiotic Justification

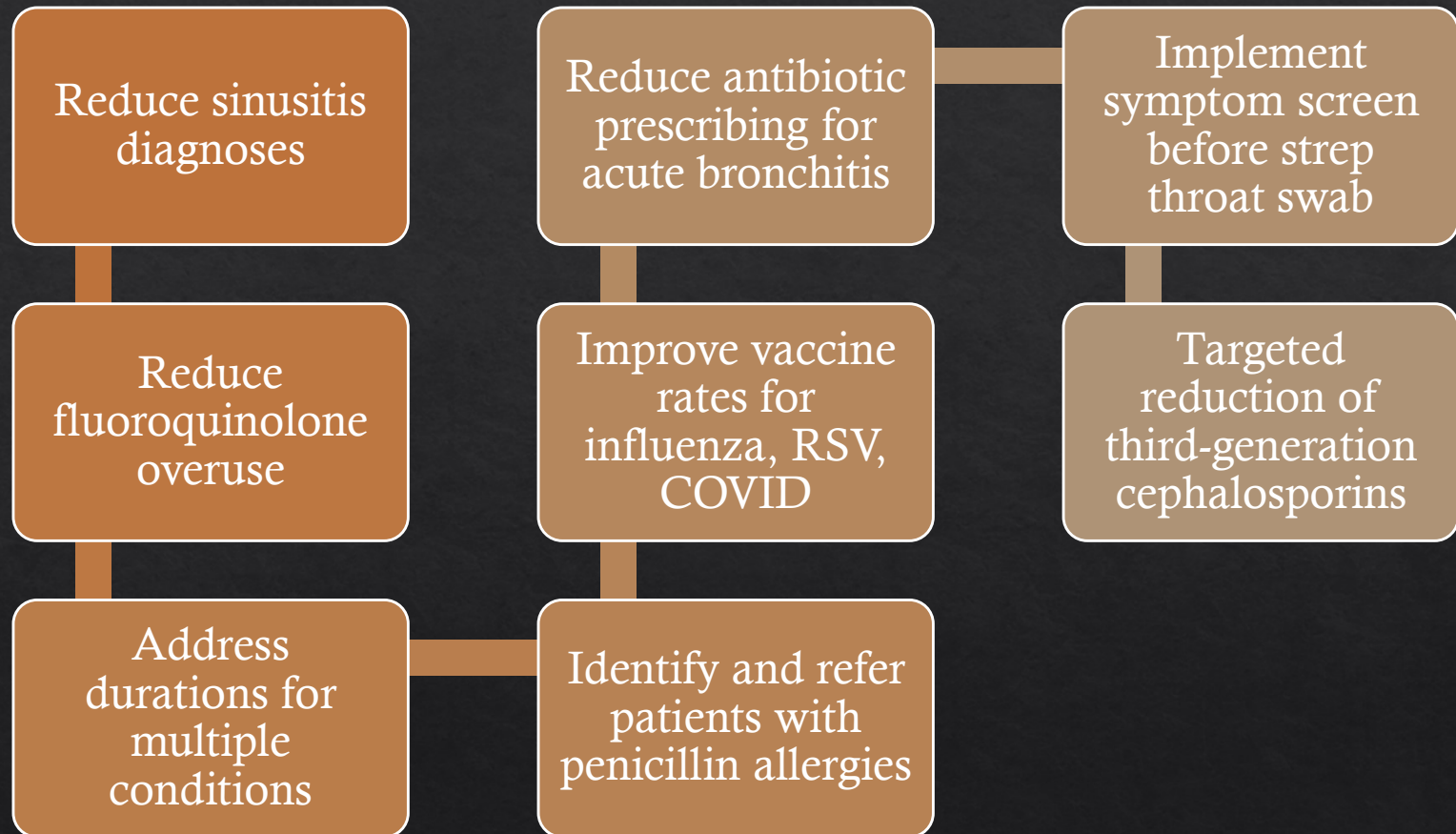
# Stewardship Intervention: Possible Steps



Gather data

Include benchmark comparison

“Our practice diagnoses sinusitis twice as often as the average practice in our system”



# Resources

- ◇ DART Project (Dialogue Around Respiratory Illness Treatment)
- ◇ North Carolina Antibiotic Prescribing Guidelines
  - ◇ Pediatric: <https://www.dph.ncdhhs.gov/epidemiology/communicable-disease/pediatric-antibiotic-flyerwebpdf/open>
  - ◇ Adult: <https://www.dph.ncdhhs.gov/epidemiology/communicable-disease/adult-antibiotic-flyerwebpdf/open>
- ◇ CDC recommendations
- ◇ CDC Antibiotic Stewardship Resource Bundles
- ◇ AHRQ Toolkit to Improve Antibiotic Use in Ambulatory Care