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### The State of Ambulatory Antibiotic Stewardship Research

SHEA Antibiotic Stewardship Research Workshop

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### **Objectives**

1. To not even try to summarize the literature regarding ambulatory antibiotic stewardship

- 2. To go over a few articles that
  - I was involved with
  - Are recent, I think are cool, and/or confirm my prior beliefs
- 3. Give you an introductory sense of ambulatory stewardship

## **Outpatient Antibiotic Prescribing Research**

#### • Per year in the US

- 35 million hospitalizations
- 136 million ED visits
- 1.1 billion outpatient visits
- 59% of antibiotic expenditures are outpatient

## **Antibiotic Prescribing**

**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; Larises S. May, MD, MCPH, David MC, MD, MPH; Ruth Lynfield, MD; David J. Margolis, MD, PhD;

- 506 antibiotic prescriptions per 1000 people
  - 30% unnecessary
  - 50% of ARI prescribing unnecessary
- US: 833 per 1000 people
- Sweden: 388 per 1000 people

# Interventions

- Public awareness campaigns
- Patient education
- Clinician education and academic detailing
- Diagnostic testing and diagnostic stewardship
- Alternatives
- Delayed antibiotic prescriptions
- Feedback

#### **Original Investigation**

#### **RESEARCH LETTER**

#### Effects of Behavioral Interventions on Inappropriate Antibiotic Prescribing in Primary Care 12 Months After Stopping Interventions

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

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## **CDS and HIT often Disappoint**

- Electronic health records with clinical decision support
  - Touted as a solution to problems of medical safety, cost, and quality
- Many EHR/CDS implementations
  - Do not achieve expected improvements
  - Implicitly assume clinicians follow a standard economic/behavioral model



- To evaluate 3 behavioral interventions to reduce inappropriate antibiotic prescribing for acute respiratory infections
  - 3 health systems using 3 different EHRs





- 1. Suggested Alternatives
- 2. Accountable Justification
- 3. Peer Comparison

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		Oxymetazoline HCL (0.05 % SPRAY) 2 SPRAY (0.05 % SPRAY) NAS BID or PRN but no more frequently than every 6 hours. Do not use more than 3 days. Dispense: 1 Bottle(s) Refills: 0									n		
		Pseudoephedrine (30 MG TABLET ) 60 MG (30 MG TABLET Take 2) PO Q6H PRN as needed for nasal congestion. Dispense: 50 Tablet(s) Refills: 0											
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	Diphenhydramine ORAL (25 MG TABLET ) 25 MG (25 MG TABLET Take 1) PO Q6H PRN not to exceed 6 doses in 24 hours. Dispense: 24 Tablet(s) Refills: 0												
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If you still want to prescribe an antibiotic, please check the box													

### **Intervention 2: Accountable Justification**

estPractice Advisory - Zztest	Bearistudyfive									
▽ Text Alerts (1 Advisory)										
* Antibiotics are not generally indicated for acute bronchitis										
▽ Justifications (1 Advisory)										
<ul> <li>You have prescribed antibiotics for a likely viral diagnosis. Please click the Enter Justification button below and write your justification for prescribing antibiotics in the comment box. This justification will be entered into the patient's record.</li> <li>If you do not enter a justification into the comment box, the phrase "No justification for prescribing antibiotics was given " will appear in the patient's record.</li> </ul>										
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	Patient has asthma.									
Click this box and enter ARI justificati										
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### **Intervention 3: 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.

### Interventions: Summary



#### **Methods: Practices and Randomization**

#### **47 Primary Care Practices**

3 Health Systems, 3 EHRs Los Angeles: 25 Boston: 22

### Methods: Enrollment

- Invited: 355 clinicians
- *Enrolled:* 248 (70%)
  - Consent
  - Education
  - Practice-specific orientation to intervention
  - Honorarium

### **Methods: Primary Outcome**

- Antibiotic prescribing for non-antibiotic-appropriate diagnoses
  - Non-specific upper respiratory infections
  - Acute bronchitis
  - Influenza
- *Excluded:* chronic lung disease, concomitant infection, immunosuppression
- Data Sources: EHR and billing data

### Methods: Analysis

#### Piecewise hierarchical model

- Clinician and practice-level clustering
- 18-month baseline period
- 18-month intervention
- 12-month post-intervention period
- Modeled differences in the trajectory of antibiotic prescribing starting at month zero
- Evaluated interactions

#### **Persistence: Suggested Alternatives**



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#### **Persistence: Accountable Justification**



#### **Persistence: Peer Comparison**



### **Multicomponent Intervention**

Effect of a training and educational intervention for physicians and caregivers on antibiotic prescribing for upper respiratory tract infections in children at primary care facilities in rural China: a cluster-randomised controlled trial

Xiaolin Wei, Zhitong Zhang, John D Walley, Joseph P Hicks, Jun Zeng, Simin Deng, Yu Zhou, Jia Yin, James N Newell, Qiang Sun, Guanyang Zou, Yan Guo, Ross E G Upshur, Mei Lin



- Cluster RCT of 25 hospital-based primary care clinics
- Intervention
  - Clinician: guidelines, 2h education (communication skills), peer-review
  - Caregivers: education with handouts and waiting room video
- Primary Outcome: Abx for 2-14 yos with URIs in mos 4-6

### **Multicomponent Intervention**

			Baseline	Endline
<ul> <li>Diagnoses</li> </ul>		-	%	)
<ul> <li>Acute pharyngitis</li> <li>NSURI</li> </ul>	~38% ~35%	Intervention (12 clusters, n = 4700)	82	40
- Acute tonsillitis	~22%	<b>Control</b> (13 clusters, n = 5100)	75	70

#### **Multicomponent Intervention**

- Adjusted absolute risk difference, -29% (95% CI, -42 to -16)
- No change in diagnosis of pneumonia (~0.5%)
- Decrease among intervention clusters: range, -11% to -74%
- Among those receiving antibiotics, no change in:
  - Multiple ~20%
  - Broad spectrum ~65%
  - IV >40%
- No change in:
  - Antivirals ~30%
  - Glucocorticoids ~20%

### Harmonizing Antibiotic Prescribing

Qualitative Research

Focus on early-career GPs: qualitative evaluation of a multi-faceted educational intervention to improve antibiotic prescribing

Laura Deckx<sup>a</sup>, Sibyl Anthierens<sup>b</sup>, Parker J Magin<sup>c,d</sup>, Simon Morgan<sup>e</sup>, Lawrie McArthur<sup>f</sup>, Lucy Yardley<sup>g</sup>, Anthea Dallas<sup>h</sup>, Paul Little<sup>i</sup> and Mieke L van Driel<sup>a,\*</sup>

- Educational intervention for early-career Australian GPs
- Qualitative interviews of 14 GP trainees and supervisors

### Harmonizing Antibiotic Prescribing

'If we can actually get everyone in the practice on board with this and then the consistency of things would make it a lot easier on the people who are doing it [...] what I am very conscious of is that I know if I don't give antibiotics and then they go and see a different doctor later in the week, there is a high chance they will get the antibiotics, which may then reflect to the patients that I didn't - in their perception - do a good job or do the right thing, so I am conscious of that, but normally I'll try to get my own *patients back.*' (GP trainee 2)

### It Takes a Village



- Mixed methods study of 6 primary health care centers
- Quantitative: Prescribing rates, patient and clinician questionnaires
- Qualitative: observation and semi-structured interviews

### It Takes a Village



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![](_page_32_Picture_0.jpeg)

![](_page_32_Figure_1.jpeg)

Strandberg, BMC Fam Pract 2016

## **Policy Changes**

![](_page_33_Picture_1.jpeg)

- England: Extra funding if abx prescribing ↓4%, less broadspectrum prescribing
- **US:** The Joint Commission thinking about it

## Research Gaps

- Antibiotic prescribing rates
  - Target setting: all abx, multi-condition
  - Novel sites of care
- Diagnostic stewardship
- Implementation methods
- Engagement of the whole team

![](_page_35_Picture_0.jpeg)

#### **Questions? Conversation?**

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![](_page_36_Picture_0.jpeg)

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