

Defining Exposures and Outcomes: Outpatient Considerations

SHEA Antibiotic Stewardship Research Workshop

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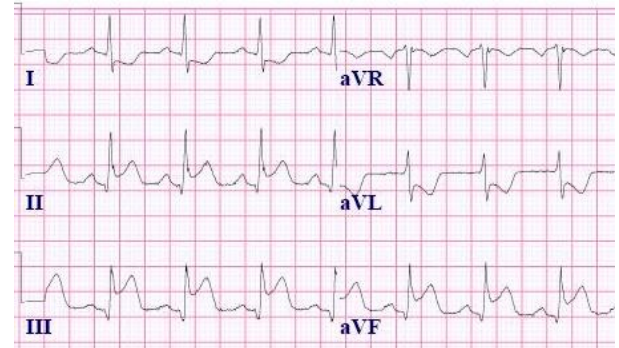
Disclosures

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- **Honoraria:** SHEA (supported by Merck)

Exposure



Outcome



Outline

- Defining your goal and specific aim(s)
- Exposures
- Outcomes
 - Antibiotic use
 - Others
- Unintended consequences

Outpatient Antibiotic Prescribing Research

- Antibiotics = Antimicrobials
- “Appropriateness” = Stewardship
- ID (76% of you) vs primary care vs specialty

Core Elements of Outpatient Antibiotic Stewardship

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¹*Division of Healthcare Quality Promotion, CDC*

1. Commitment
2. Action for policy and practice
- 3. *Tracking and reporting***
4. Education and expertise

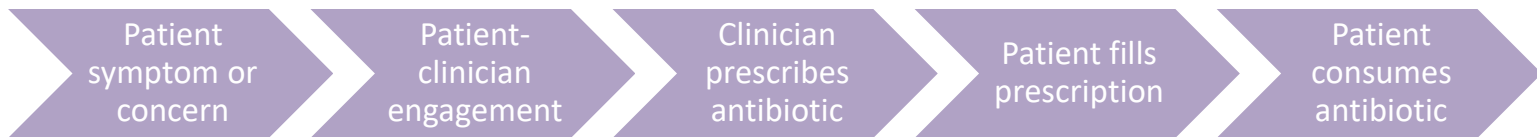
Specific Aims and Goals

- What are you hoping to accomplish?
- What is your target?
 - What is your goal?
 - How?
- Example specific aim:
 - “To implement and evaluate a commitment poster intervention to decrease inappropriate antibiotic prescribing for acute respiratory infections”

Exposures

- Intervention(s)
- Time

Outpatient Measures of Antibiotic Use

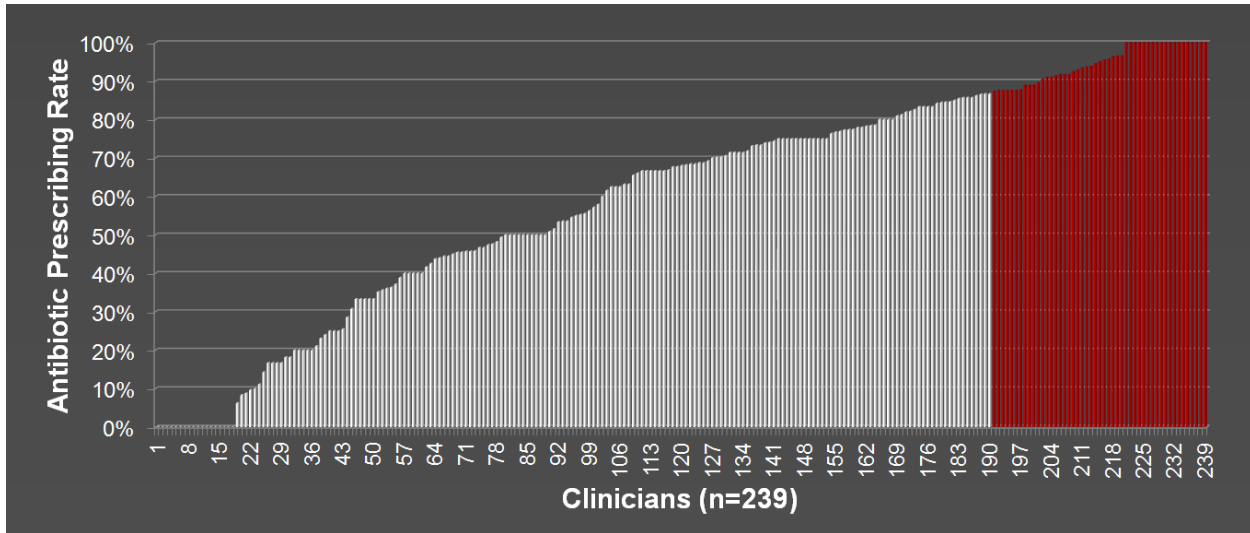


- **Prescription:** EHR, patient report
- **Fill:** claims, pharmacy, patient report
- **Consumption:** patient report, pill counts, monitoring, testing

Some Measures of Antibiotic Use

- Inappropriate
- Guideline concordant
- “Comprehensive management”
- “Imperfect antibiotic prescribing”
- Volume
- Prescriptions per unit time: especially for chronic conditions
- % prescribing by individuals/variability

Antibiotic Prescribing Variability



- Eliminate top 20% prescribers by rate: 64% → 50%
- Eliminate top 20% prescribers by volume: 64% → 40%

Stratifying antibiotic prescriptions

- Broader or narrower-spectrum
- Class
- Duration
- ***These can be outcomes as well***

Inappropriate Antibiotic Prescriptions

- ***Inclusion criteria***

- Patients: attribution

- Prescriber
- Time

- Visit characteristics: diagnosis, site of care

- ***Exclusion criteria***

- Patients: comorbidities

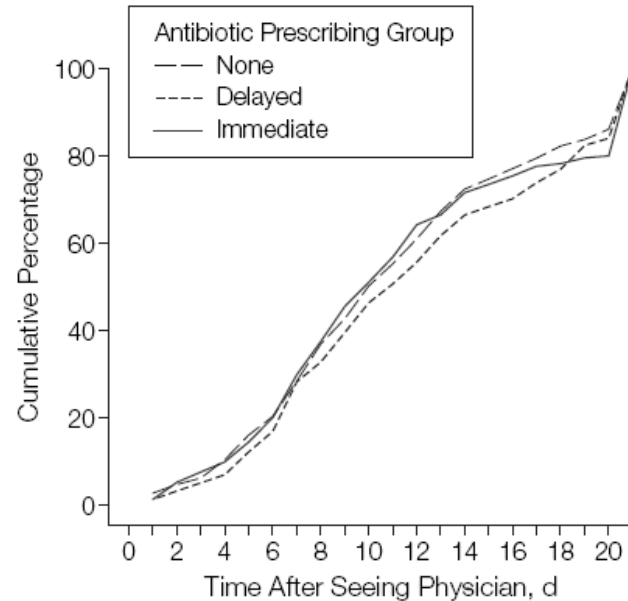
- Visit: concomitant infections

Delayed Antibiotic Prescriptions

- Acute cough/acute bronchitis
 - N = 562
 - Antibiotic use
 - No 16%
 - Delayed 20%
 - Immediate 96%

- **Symptom measures**

Figure 2. Duration of Cough After Physician Visit Until Patient Is Feeling Better



Delayed Antibiotic Prescribing

Original Investigation

Prescription Strategies in Acute Uncomplicated Respiratory Infections

A Randomized Clinical Trial

Mariam de la Poza Abad, MD; Gemma Mas Dalmau, MD; Mikel Moreno Bakedano, MD, PhD; Ana Isabel González González, MD; Yolanda Canellas Criado, MD; Silvia Hernández Anadón, MD, PhD; Rafael Rotaache del Campo, MD; Pere Torán Monserrat, MD; Antonio Negrete Palma, MD; Laura Muñoz Ortiz, MD; Eulàlia Borrell Thió, MD; Carl Llor, MD, PhD; Paul Little, MD; Pablo Alonso-Coello, MD, PhD; for the Delayed Antibiotic Prescription (DAP) Group

- ***398 patients randomized***
 - No antibiotics
 - Collection
 - Patient-led
 - Immediate

Delayed Antibiotic Prescribing

	Randomized Groups			
	No abx	Collection	Patient-led	Immediate
Severe symptoms, days	4.7	4.0	5.1	3.6
Health status on follow-up, 0 to 100	95	91	95	95
	%			
Antibiotic collected	NA	26	35	89
Antibiotic use	12	23	33	91
Need for unscheduled health care	6	4	6	4
Absenteeism	40	21	26	33
Belief that antibiotics had no or little effect	20	16	19	8
Will return for similar illness in the future	70	69	69	86
Satisfaction	← No difference →			

de la Poza Abad. JAMA Intern Med 2016

Outcomes: Adverse events


- Adverse drug events: perhaps as a measure of avoiding harm
- Drug-drug interactions
 - Potential drug-drug interactions

Outcomes: Others


- **Utilization:** primary care, specialty, ED, hospitalizations, other sites
- **Microbiology**
 - *Clostridium difficile* infection
 - Infections with antibiotic-resistant organisms
 - Community antibiotic resistance rates
- **Costs**

Covariates to Consider

- Site of care
- Prescriber
 - Trainee status
 - Clinician type
 - PCP or not



Diagnosis	Pre	Post
	%	
Non-specific upper respiratory infections	60	80
Acute bronchitis	60	80
Non-streptococcal pharyngitis	60	80



Diagnosis	Pre (n = 90)	Post (n= 30)
	N (%)	
Non-specific upper respiratory infections	18/30 (60)	8/10 (80)
Acute bronchitis	18/30 (60)	8/10 (80)
Non-streptococcal pharyngitis	18/30 (60)	8/10 (80)
Antibiotic Prescribing	54/90 (60)	24/30 (80)

Diagnosis	Pre (n = 180)	Post (n= 180)
	N (%)	
Non-specific upper respiratory infections	18/30 (60)	8/10 (80)
Acute bronchitis	18/30 (60)	8/10 (80)
Non-streptococcal pharyngitis	18/30 (60)	8/10 (80)
<i>Subtotal</i>	<i>54/90 (60)</i>	<i>24/30 (80)</i>

Gaming

- ***% prescribing does not tell the whole story***
- Diagnosis-specific antibiotic prescribing
- Diagnosis group-specific antibiotic prescribing
- All antibiotic prescribing

- Visit shifting, site-of-care shifting

Clustering

- Intervention
- Antibiotic prescriptions
- ***Level of potential clustering***
 - Patient: shows up more than once
 - Physician: moves between practices
 - Clinic
 - System

Impact of a 16-Community Trial to Promote Judicious Antibiotic Use in Massachusetts

Jonathan A. Finkelstein, MD, MPH^{a,b}, Susan S. Huang, MD, MPH^{a,c}, Ken Kleinman, ScD^a, Sheryl L. Rifas-Shiman, MPH^a, Christopher J. Stille, MD, MPH^d, James Daniel, MPH^e, Nancy Schiff, MPH^f, Ron Steingard, MD^g, Stephen B. Soumerai, ScD^a, Dennis Ross-Degnan, ScD^a, Donald Goldmann, MD^h, Richard Platt, MD^a

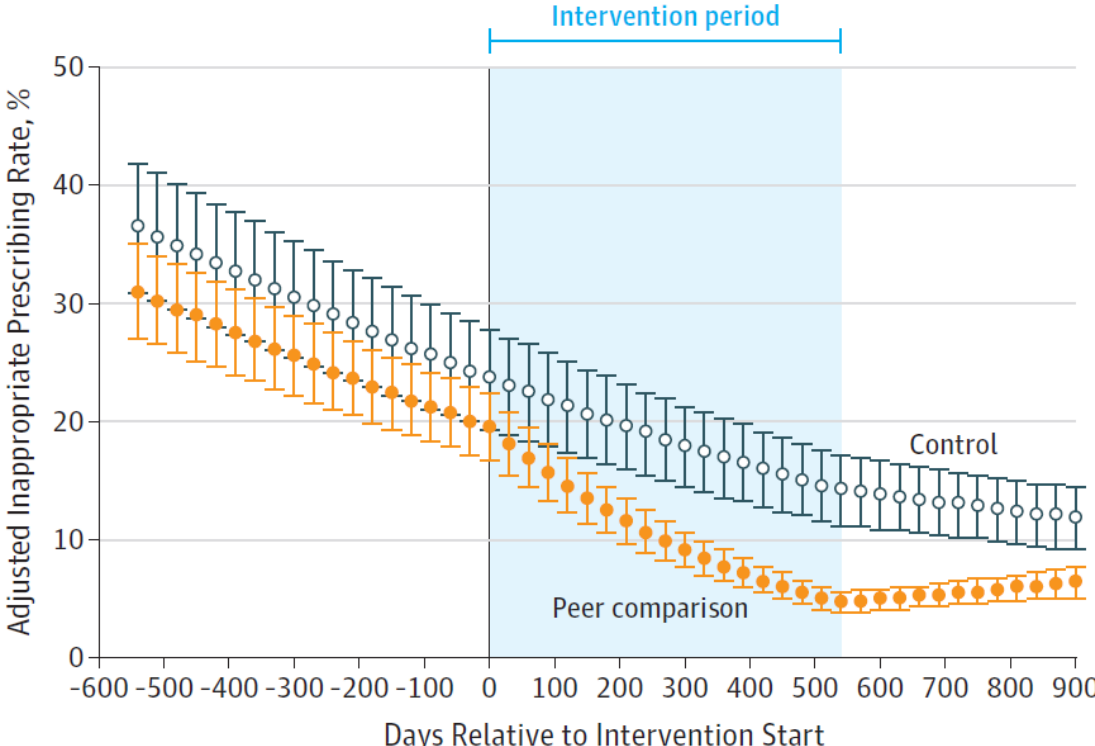
- **Practices:** guideline dissemination, small-group education, updates, feedback
- **Parents:** education by mail, PC, child care...
- **Outcome:** abx dispensed per person year, 3 to <72 mo, 4 participating insurers

Parameter	Control		Intervention		Intervention Impact ^c	P
	Unadjusted Rate, Baseline Year 1 ^a	Adjusted % Change ^b	Unadjusted Rate, Baseline Year 1 ^a	Adjusted % Change ^b		
Overall						
3 to <24 mo	2.8	-20.7	2.9	-21.2	-0.5	.69
24 to <48 mo	1.7	-10.3	1.7	-14.5	-4.2	<.01
48 to <72 mo	1.4	-2.5	1.4	-9.3	-6.7	<.0001

- More pronounced in Medicaid patients
- Decreased 2nd-line penicillins, macrolides

Finkelstein Pediatr 2008

Persistence: Peer Comparison



Take Home Points

- Defining your goal and specific aim(s)
- Exposures
- Outcomes
 - Antibiotic use
 - Others
- Unintended consequences
 - Gaming

Thank You

Questions? Conversation?

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References

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