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KDHE-KHC Syndromic Antibiotic Stewardship Series

Session #1 – April 5 – Focused Initiatives for the Prevention and Treatment of UTI

Session #2 – May 3 – Focused Initiatives for Wounds, Skin, and Soft Tissue

Session #3 – June 7 – Focused Initiatives for Upper & Lower Respiratory Infections

Session #4 – July 12 – Focused Initiatives Directed Toward Sepsis

Session #5 – August 2 – Focused Initiatives Directed Toward Shorter Courses and Reducing Prophylactic Antimicrobial Use

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Continuing Educational Credit Instructions

Steps to Obtain CNE or CPE:

1. Fill out the CNE or CPE Sign-In Form
2. Participate in the polls. **Each participant must be logged in separately.**
3. Email ***fully*** completed form to: jdaughhetee@khconline.org

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Presenters

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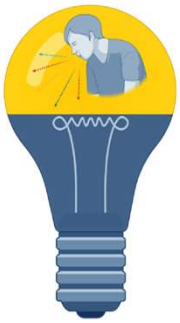

Objectives

- Discuss the epidemiology and background of upper and lower respiratory infections
- Design facility specific treatment guidelines for bronchitis, community acquired pneumonia
- Identify and implement evidence-based antibiotic stewardship initiatives towards upper and lower respiratory infections including community acquired pneumonia
- Differentiate effective communication strategies to reduce antimicrobial use for acute respiratory infections

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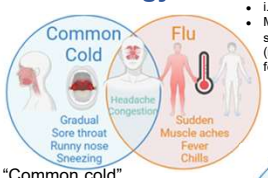
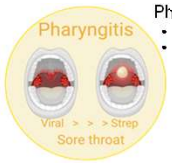
Terminology

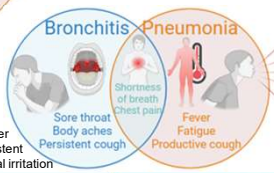


"Common cold"
- i.e., viral upper respiratory infection (URI)
- Mostly sinus/throat symptoms

Influenza
- i.e., flu
- Mostly systemic symptoms (muscle aches, fevers, chills)



Pharyngitis
- i.e., sore throat
- Pharyngeal inflammation, generally not systemic symptoms



Bronchitis
- e.g., cough
- Viruses
- Mostly upper airways, persistent cough, tracheal irritation

Pneumonia
- Viruses + Bacteria
- Lower airways, shortness of breath, systemic symptoms

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Polling Question

True or False

Antibiotics are the most commonly prescribed **medicines** in both inpatient and outpatient settings?

A. True

B. False

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Polling Question

What the most common conditions associated with antibiotic prescriptions in the U.S.?

A. Skin infections

B. Diarrheal conditions

C. Acute respiratory infections

D. Dental infections

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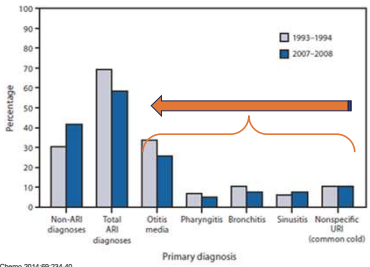
Epidemiology

- 50-60% of all antibiotic prescriptions written are for acute upper respiratory infections (ARIs)
- Prescribing is highest for children and adults >65

Average annual percentage of physician office visits by persons aged ≤14 years where an antibiotic was prescribed, by primary diagnosis - National Ambulatory Medical Care Survey, United States, 1993-1994 and 2007-2008



Source: Hicks L, et al. MMWR 2011; 60(34):1153-56. Shapiro D., et al. J Antimicrob Chemo 2014;69:234-40.

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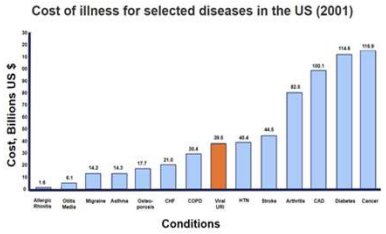
Epidemiology

Economic burden of the common cold is greater hypertension, heart failure, chronic obstructive pulmonary disease

- $40 billion annually (2001 USD)
- $2 billion worth of OTC cough and cold meds (1997 USD)



Source: Fendrick A., et al. Arch Intern Med. 2003;163 (4):487-94. Turner R., Ann Allergy Asthma & Imm 1997;78(6): 531-40.

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Epidemiology

500 million episodes of common colds annually associated with:

- 22.0% office visits (95% CI 20.2%-23.8%)
- 1.2% ED visits (95% CI 0.7% - 1.6%)
- 8.2% Antibiotic Rx (95% CI 7.4%-9.0%)

Virus	Estimated annual proportion of cases
Rhinovirus	30-50%
Coronavirus	10-15%
Influenza viruses	5-15%
Respiratory syncytial virus	5%
Parainfluenza virus	5%
Adenovirus	<5%
Enterovirus	<5%
Metapneumovirus	Unknown
Unknown	20-30%

Source: Fendrick A., et al. Arch Intern Med. 2003;163 (4):487-94. Heikkinen G et al. Lancet 2003;361(9351): 51-59.

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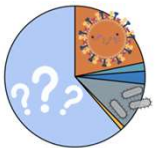
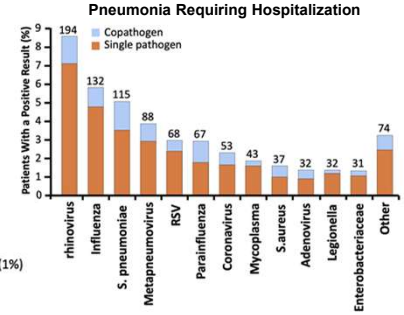
Epidemiology



Leading causes of Community Acquired Pneumonia Requiring Hospitalization



Source: Jain S., et al. NEJM 2015;373:415.

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Polling Question

Which of the following respiratory-related guidelines has your facility developed? (select all that apply)

A. Acute bronchitis
B. COPD exacerbation
C. Acute upper respiratory infection
D. Community acquired pneumonia
E. Hospital acquired pneumonia
F. Ventilator associated pneumonia
G. Others

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Guidelines - Pediatrics

Example Guidelines

Condition	Condition	Treatment	Duration
Otitis media with effusion (OME) i.e., serous otitis	 Middle ear fluid without signs of bacterial infection (no redness, purulence)	No antibiotics indicated • PRN **antihistamines** (if allergies contributing) • **Intermittent autoinsufflation** by pinching nose while exhaling through nose forcing air back through Eustachian tube (for aural fullness)	If becomes chronic (3+ months) • Audiology evaluation recommended for hearing evaluation • ENT evaluation for myringotomy with tube

Source: AAP 2013 Guidelines childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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Guidelines - Pediatrics

Example Guidelines

Condition	Condition	Treatment	Alt. Treatment	Duration
Acute Otitis Media (AOM) i.e., purulent otitis	<2 yrs OR ruptured tympanic membrane OR recurrent AOM	Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose) • If received amoxicillin<30d prior or concomitant conjunctivitis use: Amoxicillin/clavulanate 40-50 mg/kg/dose (amox component) PO BID (max 2000 mg/dose)	**Penicillin Allergic Alternative (low-moderate allergy)** • Cefuroxime 250 mg PO BID (only in tablet form, not crushed) • Cefdinir 7 mg/kg/dose PO BID (max 300 mg/dose) • Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose) • Ceftriaxone 50 mg/kg IM/IV qday x1-3 days (max 1000 mg/dose) **Penicillin-allergic Alt. (severe allergy)** • Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)	10 days
	≥2 years with intact tympanic membrane			5-7 days

Source: AAP Lieberthal A., et al. Pediatrics; 2013;131(3): e964-99. childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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Guidelines - Pediatrics

Example Guidelines

Condition	Treatment	Alt. Treatment	Duration

Group A strep pharyngitis	• Amoxicillin 40-50 mg/kg/dose PO qDay (max 1000 mg/day)
	• Penicillin G benzathine IM
	  ○ <27 kg: 600,000 Units x 1 dose
	  ○ ≥27 kg: 1.2 million Units x 1 dose
	• Penicillin VK
	  ○ <27 kg: 250 mg PO BID - TID x 10 days
	  ○ ≥27 kg: 500 mg PO BID - TID x 10 days
		Penicillin Allergic Alternative (low-moderate allergy)
		• Cephalexin 20-25 mg/kg/dose PO BID (max 500 mg/dose)
		Penicillin-allergic Alternative (severe allergy)
		• Clindamycin 7 mg/kg/dose PO TID (max 300 mg/dose)
			10 days

		• Azithromycin 12 mg/kg/dose PO qDay (max 500 mg/dose) • Azithromycin is not recommended unless patient has severe allergy to above, as resistance is common and treatment failure may occur	5 days

Note: streptococcal pharyngitis is uncommon in children <3 years of age and children of any age with viral symptoms

Source: Shulman S. et al CID 2012; 55(10: 1279-82 childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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Guidelines - Pediatrics

Example Guidelines

Condition	Treatment	Alt. Treatment	Duration
Community Acquired Pneumonia	Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)	**Penicillin Allergic Alternative (low-moderate allergy)** • Cefuroxime 250-500 mg PO BID (only in tablet form, non-crushable) • Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose) **Penicillin-allergic Alternative (severe allergy)** • Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose) • Levofloxacin 8-10 mg/kg/dose PO BID (ages 6 mos-5 yrs) OR qDay (≥5 yrs) (max 750 mg/day)	5-7 days

Note: if concern of atypical pneumonia (eg., adolescents with bilateral disease) add azithromycin
- Azithromycin 10 mg/kg/dose PO aDay on day #1 (max 500 mg/dose), then 5 mg/kg/dose PO qDay on days #2-5 (max 250 mg/dose)

Source: Bradley J et al. CID 2001; 53(7): e25-76. childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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Guidelines - Pediatrics

Example Guidelines

Condition	Criterion	Treatment	Alt. Treatment	Duration
Acute bacterial rhinosinusitis (ABRS)	Mild-moderate disease AND ≥2 yrs AND does not attend daycare AND has not received antibiotics past 30 days	Amoxicillin 45-50 mg/kg PO BID (max 2000 mg/dose)	**Penicillin Allergic Alternative (low-moderate allergy)** • Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose) • Cefuroxime 250 mg PO BID (non-crushable) **Penicillin Allergic Alternative (severe allergy)** • Levofloxacin 10 mg/kg/dose PO BID (ages 6 mos-5 yrs) OR qDay (≥5 yrs) (max 500 mg/day)	10 days (continue for at least 7 days after symptom resolution)
	Severe disease with ANY of the following • <2 yrs • attends daycare • receipt of antibiotics past 30 days	Amoxicillin-clavulanate 40-50 mg/kg/dose (amoxicillin-component) PO BID (max 2000 mg/dose)		

Note: In communities with low rates of penicillin non-susceptible *S.pneumoniae*, standard dose amoxicillin may be considered (rather than 45-50 mg/kg dosage)

Source: AAP 2013 Guidelines. childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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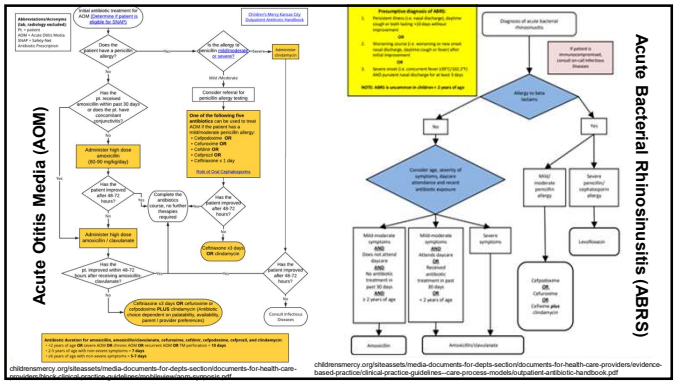

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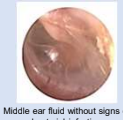
Guidelines - Adults

Example Guidelines

Condition	Condition	Treatment	Duration
Otitis media with effusion (OME) i.e., serous otitis	 Middle ear fluid without signs of bacterial infection (no redness, purulence)	No antibiotics indicated PRN **antihistamines** (if allergies contributing), **decongestants, nasal corticosteroids;** intermittent **autoinsufflation** by pinching nose while exhaling through nose forcing air back through Eustachian tube (for aural fullness), **nasal saline**	If becomes chronic (over 3 months) audiology and ENT evaluation recommended

Source: AAP 2013 Guidelines childrensmercy.org/siteassets/media-documents-for-depts-section/documents-for-health-care-providers/evidence-based-practice/clinical-practice-guidelines--care-process-models/outpatient-antibiotic-handbook.pdf

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Guidelines - Adults

Example Guidelines

Condition	Common Pathogens	Treatment			Duration
Acute Otitis Media i.e., purulent otitis	*S.pneumonia* *H.influenzae* Less frequently: *M.catarrhalis* *S.pyogenes* *S.aureus* *M. pneumoniae* Compared to kids, less frequently viral, treatment recommended	Milder disease, lower weight, low rates of *S.pneumoniae* resistance (<10%)	Amox/clav 875 mg PO BID	**Penicillin Allergic Alternative (low-moderate allergy)** • Cefpodoxime 200 mg PO BID • Cefuroxime 500 mg PO BID • Cefdinir 300 mg BID or 600 mg qDay • Ceftriaxone 1-2 g IV or 1 g IM qDay (3 days) **Penicillin-allergic Alt. (severe allergy)** • Doxycycline 100 mg PO BID • Levofloxacin 500 mg PO qDay (5-10 days)	10 days
		If regions of *S.pneumoniae* resistance high (>10% PCN-non susceptible) ≥65, immunocompromised, recent antibiotics	Amoxicillin/clav 1000 mg PO BID		

Source: Rosenfeld R., et al. Otolaryngology-Head & Neck Surgery; 2016;154(S1): S1-41.

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Guidelines - Adults

Example Guidelines			
Condition	**Treatment**	**Alt. Treatment**	**Duration**
Group A pharyngitis	• Penicillin VK 500 mg PO BID - TID • Amoxicillin 500 mg BID or 1 gram once qDay	**Penicillin Allergic Alternative (low-moderate allergy)** • Cephalexin 500 mg PO BID • Cefpodoxime 100 mg PO BID • Cefdinir 300 mg PO BID OR 600 mg PO qDay **Penicillin-allergic Alternative (severe allergy)** • Clindamycin 300 mg orally PO TID	10 days
	Penicillin G benzathine (Bicillin-LA) IM 1.2 million Units x1	• Azithromycin 12 mg/kg/dose PO qDay (max 500 mg/dose) • Azithromycin is not recommended unless patient has severe allergy to any of the other antibiotics, as resistance is common and treatment failure may occur	←

Source: Shulman S. et al CID 2012; 55(10: 1279-82.

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Guidelines - Adults

Example Guidelines					
Condition	**Common Pathogens**	**Treatment**			**Duration**
Community Acquired Pneumonia	*S.pneumonia* *H.influenzae* *M.catarrhalis*	No comorbidities	Amox/clav 875 mg PO BID OR Doxycycline	**Penicillin allergic** Cefuroxime mg 500 BID	5 days
	S.pneumonia *H.influenzae* *M.catarrhalis* *S.aureus* *M.pneumoniae* *C.pneumoniae* *Legionella spp* Gram negative rods	Comorbidities (heart, lung, liver, renal disease, diabetes, alcoholism, malignancy, asplenia)	Amox/clav 875 mg BID AND Doxycycline 100 mg BID or Azithro 500 mg x1 -> 250 mg q24	**Penicillin allergic** Cefuroxime mg 500 BID AND doxy or azithro **Penicillin & cephalosporin allergic** Levofloxacin 750 mg q24	

Source: Metlay J., et al. Am J Resp and Crit Care. 2019; 200(7): e45-67

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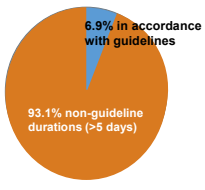
Clinical Practice Guidelines

Community Acquired Pneumonia Durations (Adults)		
Outcome Mild, Mod and Severe CAP	**3 days**	**8 days**
Clinical cure at 10 days	93%	88%
Clinical cure at 28 days	90%	88%
Adverse events	11%	21%

Retrospective review of inpatient CAP treatment duration



Sources: Stevens D, et al CID; 2014; 59:e10. Moussaoui R, et al BMJ 2006;332:1355. Jenkins T., et al Infect Control Hosp Epidemiol 2014;35(10).

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Choosing Initiatives

Any intervention may be effective in isolation, a combination of interventions targeting both SYSTEMS + PERSONS is most effective

Designing successful intervention bundle involves 6 crucial steps:

1. Assess need and define underlying problem
2. Identify which key barriers are modifiable, have greatest impact for change
3. Implement 1 change at a time
4. Use complementary approaches
5. Test intervention in pilot population
6. Assess outcomes at regular intervals

Source: Advani S & Vaughn V. Curr Inf Dis Reports. 2021;23(10):16

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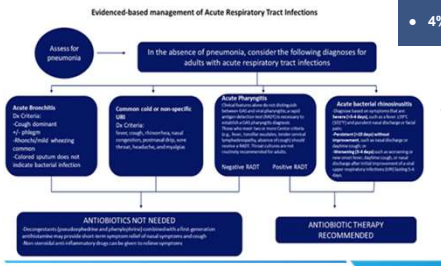
Clinical Practice Guidelines

Antibiotic Use

- **10% decreased abx URI** (33.3% to 22.9%)
- **14% decrease nasopharyngitis** (14.3% to 0%)
- **4% acute bronchitis** (40% to 36.1%)



- URI management protocol
- Educational emails detailing project
- Laminated protocols distributed during educational meetings

Source: Aplin-Snider C., et al. J Prim Care Comm Health 2020;11:215013272096811.

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Clinical Practice Guidelines

Barriers

- Compliance
- Workflow or time constraints

Solution

- Integrate into daily technology

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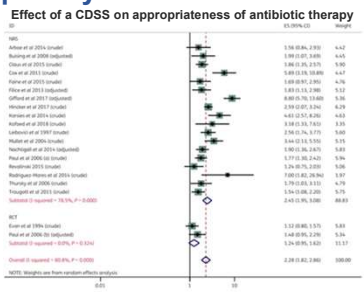
Clinical Decision Support Systems

Meta-analysis majority of studies demonstrated a pooled 2-fold improvement in antibiotic use (OR 2.28, 95% CI 1.82-2.86)



Source: Laka M, et al. J Antimicrob Chemother. 2020;75(5):1099-1111

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Polling Question

Which of the following is an example of a clinical decision support?

A. **EMR-embedded URI diagnosis and treatment algorithm**
B. Delayed prescribing of an antibiotic for acute bronchitis
C. Audit and feedback of antibiotic use for flu
D. Education regarding etiologies of acute respiratory infections

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Clinical Decision Support Systems

- 105 primary care and 21 urgent care
- Acute sinusitis
- Decision support triggered at time of acute sinusitis diagnosis
  - Guidelines, no abx if <10 days
  - Option to justify use of abx in the case of specific symptom or exam
  - Could be exited or bypassed by prescribers but required response or cancellation to proceed

Antibiotic Use

- **22% decreased abx** (OR 0.78, 95% CI 0.71-0.87)
- **14% increase guideline-concordant abx**
- **Sustained over time**
- **Education - large initial effect, not sustained**

Source: Sharp A & Hu Y.I. Am J Managed Care. 2017; 23(11):e360-65

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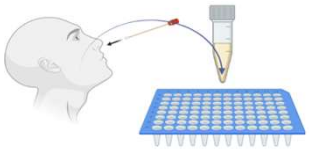
Diagnostics

- Rapid diagnostics have the potential to
  - Reduce unnecessary antibiotics
  - Improve antiviral prescribing
  - Limit additional imaging
  - Shorten hospital or ED lengths of stay
  - Optimize infection-control practices
- May be associated with
  - Higher costs
  - Over-diagnosis



Source: Hansen K., et al. CID 2020; 2744-51.

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Respiratory Diagnostic Stewardship

Question 1: To Test or Not to Test

- Severity of illness
- Duration of symptoms
- Availability of other studies
- Turnaround time of results
- Test results change management

- American Society for Clinical Pathology recommends **against** broad respiratory viral PCR panels and instead use specific rapid molecular tests that impact management (e.g. flu, RSV)

Question 2: If I Test, Which is Best

- CDC and IDSA both favor molecular (PCR) testing for flu instead of antigen testing
- Multiplex viral and bacteria PCRs for immunocompromised and critically ill
  - Consider prolonged shedding
  - Specimen source (e.g., lower respiratory tract RSV vs nasal swab)

Method	Test Time
Rapid molecular (flu RNA or NAAT)	15-30 min
RT-PCR (singleplex and multiplex)	1-8 hours
Rapid influenza (antigen)	<15 min
Immunofluorescence direct (DFA) or indirect fluorescent antibody (IFA)	1-4 hours

Source: Hansen K., et al. CID 2020; 2744-51. Am Soc Clin Path Choosing Wisely, https://www.choosingwisely.org/societies/american-society-for-clinical-pathology/

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Respiratory Diagnostic Stewardship

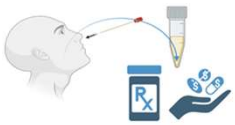
Question 3: What is the Significance of Bacterial DNA

- Potential detection of dead, colonization, or metabolically impaired organisms of unclear clinical significance
- Semi-quantitative PCRs may be helpful
- Concern that over-detection may paradoxically increase abx

Antibiotic Use

Cochrane review - 3 trials of rapid viral diagnostics

- **Little or no effect on antibiotic prescribing** (RR 0.86, 95% CI 0.61 - 1.22)
- **No difference on repeat visit** (RR 0.86, 95% CI 0.59 - 1.25)



Source: Hansen K., et al. CID 2020; 2744-51. Tonkin-Crine S., et al. Cochrane Syst Rev 2017;9(9):cd012252.

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Respiratory Diagnostic Stewardship

Pre-Analytic	Analytic	Post-Analytic
Ordering: Focus on testing only high pretesting probability **Collecting**: Sample collection & transport to optimize yield, reduce contamination	**Lab Processing**: use adjunctive tests distinguish colonization from infection	**Reporting**: resulted in format that guides appropriate practice
Testing: only dependent upon signs/symptoms; avoid blanket or repeated sputum culturing/tracheal aspirates, multiplex tests (test only if high/moderate probability of 2+ targets on test)	**Nudges**: what's not present (e.g., no MRSA/Pseudomonas")	**Micro-nudges/comments** (e.g., "oral flora reflecting contamination")
Decision Support: documentation/checklists of symptoms		**Cascading Antibiotic Choices** (display only preferred antibiotics)

Source: Morgan D., et al. JAMA.2017;3187):607-608. Hansen K., et al. CID 2020;

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MRSA PCR Screening + COVID-19

- High volume of IV vancomycin in critically-ill COVID-19 admissions (>20%)
- High risk of renal failure at baseline
- Low prevalence MRSA upfront, only 5.7% by day 28
- Excellent diagnostic performance, MRSA PCR = 100% NPV

Prevalence of MRSA in Respiratory Cultures at Different Time Points of Hospital Stay				
Days from Admission	**Day 3**	**Day 7**	**Day 14**	**Day 28**
Total patients with respiratory cultures obtained	158	285	405	472
Patients with MRSA in respiratory cultures	1	7	18	27
Prevalence	0.6%	2.4%	4.4%	**5.7%**

Source: Punjabi C. et al. ICHE 2021;42(9):1156-58.

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Gram Stain Directed Treatment

Gram Stain-Guided Antibiotics Choice for VAP (GRACE-VAP) Trial

Gram-stain vs guideline-directed
- 12 hospitals, intubated patients started on empiric regimen
- Gram stain with staph or strep-resembling bacteria, anti-MRSA antibiotic added

Antibiotic Use
- **Reduced anti-MRSA abx** (38.3%, 95% CI 29.4-48.9%, p<0.001)

Outcomes
- **Improved clinical response** (76.7% vs 71.8%, p<0.001)
- **Reduced 28-day mortality** (13.6% vs 17.5%, p=0.39)
- **No difference in ICU-free days, ventilator-free days, adverse events**

Source: Yoshimura J., et al. JAMA Open Netw 2022;5(4): e226136.

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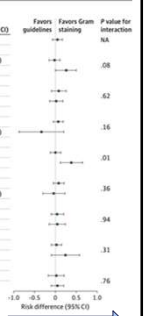
Gram Stain Directed Treatment

Gram stain-guided antibiotics improved clinical response for all sub-populations

Figure 2. Clinical Response Rate in Prespecified Subgroups

Subgroup	Clinical response, No./total No. (%) Gram stain–guided group	Guideline-based group	Risk difference (95% CI)
All patients	79/103 (76.7)	74/103 (71.8)	0.05 (-0.07 to 0.17)
Previous antibiotic therapy			
No	58/73 (79.5)	62/76 (81.6)	-0.02 (-0.15 to 0.11)
Yes	21/30 (70.0)	12/27 (44.4)	0.26 (0.01 to 0.50)
Length of ICU stay before randomization			
≥5 d	40/53 (75.5)	33/49 (67.3)	0.08 (-0.09 to 0.26)
<5 d	39/50 (78.0)	41/54 (75.9)	0.02 (-0.14 to 0.18)
COPD			
No	77/97 (79.4)	70/97 (72.2)	0.07 (-0.05 to 0.19)
Yes	2/6 (33.3)	4/6 (66.7)	-0.33 (-0.87 to 0.20)
TBI			
No	68/92 (73.9)	66/90 (73.3)	0.01 (-0.12 to 0.13)
Yes	11/11 (100)	8/13 (61.5)	0.38 (0.12 to 0.65)
Postcardiopulmonary arrest syndrome			
No	64/77 (83.1)	58/77 (75.3)	0.08 (-0.05 to 0.21)
Yes	15/26 (57.7)	16/26 (61.5)	-0.04 (-0.30 to 0.23)
Sepsis			
No	50/67 (74.6)	49/70 (70.0)	0.05 (-0.10 to 0.20)
Yes	29/36 (80.6)	25/33 (75.8)	0.05 (-0.15 to 0.24)
Acute kidney injury			
No	65/83 (78.3)	68/90 (75.6)	0.03 (-0.10 to 0.15)
Yes	14/20 (70.0)	6/13 (46.2)	0.24 (-0.10 to 0.58)
APACHE II			
≥20	29/42 (69.0)	34/51 (66.7)	0.02 (-0.17 to 0.21)
<20	50/61 (82.0)	40/52 (76.9)	0.05 (-0.10 to 0.20)



Source: Yoshimura J., et al. JAMA Open Netw 2022;5(4): e226136.

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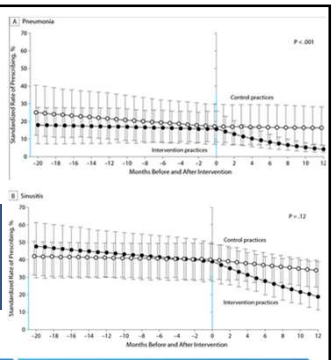
Audit & Feedback

- Education vs education + audit-feedback
- 25 primary care pediatric clinics
- Every 4-month audit/feedback
  - Reports showed rates of individual Rx, practice Rx, network Rx for viral infections, sinusitis, pharyngitis and pneumonia

Antibiotic Use

- **50% reduction antibiotics in combined group** (vs 20% education alone, p=0.01)
- **75% reduction in broad-spectrum abx for CAP** (vs 5% education alone, p>0.001)



Source: Gerber J., et al. JAMA 2013; 309(22):2345-52.

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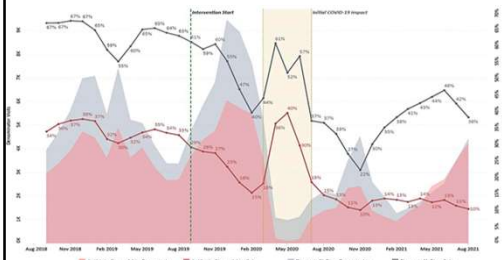
Audit & Feedback: Harness Local Champions

Antibiotic Use

- **22% reduction antibiotics** (34% 2019 to 12% 2021)
- **6% increase in patient satisfaction** (83%->89%)



- 17 urgent care clinics
- Clinician and patient education
- Reports with individual, regional Rx
- Shared leadership through regional and quality committee meetings
- Regional medical directors reviewed report with individual prescribers annually, discussed barriers and opportunities

Source: Patel D., et al. ICHE 2022; 1-10

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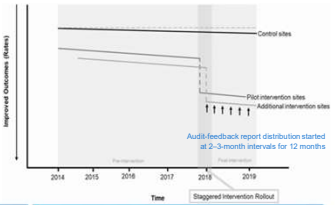
Audit & Feedback: Harness Peers

- ED + outpatient (VA)
- Site champions recruited to promote and participate
  - Peer-to-peer communication/strategies with vignettes, reinforcement techniques
  - Reports every 2-3 months "throughout ARI season"
  - In-person or emailed aggregate antibiotic, abx by total ARI diagnosed, proportions of acute sinusitis, cases treated appropriately and ARI mgmt compared to top 20% in their groups

Antibiotic Use

- **- 22% abx for bronchitis** (+ 5.9% for control, p>0.001)
- **-7.7% abx for sinusitis** (-1.7% control, p=0.02)
- **1.7 fold increase in appropriate antibiotics** (53.8%->69.1%, OR 1.67, 95% CI 1.31-2.14)



Source: Madaras-Kelly CID 2021; 73(5):e1126-e1134

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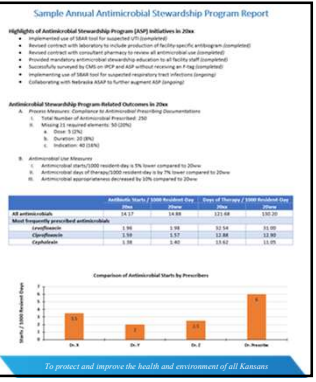
Audit & Feedback

- Auditing easier with mandatory antibiotic indications in the EMR
- Auditing targets
  - Conditions (e.g. CAP, viral URI)
  - Antibiotics
  - Guideline adherence
  - Duration of therapy
  - Pharmacist-led audit/feedback (inpatient)
  - Frequency

Sample Report LTCF providers asap.nebraskamed.com/wp-content/uploads/sites/3/2018/08/Annual-ASP-Activity-Report-for-LTCF-Prescribers-081418.docx


Sample Annual Antimicrobial Stewardship Program Report

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Nudging

Commitment Posters

- Accountability when faced with pressure during visit
- 20% reduction in inappropriate abx (5 clinics, 2 RCTs)

Source: Meeker D et al. JAMA 2014;174(3):425-31; Kullel W., Open Forum Infect Dis 2018;5(suppl 1:S527)

English customizable poster: khconline.org/files/POSTER-UseAntibioticsWisely11x17.pdf
Spanish poster: khconline.org/files/POSTER-UseAntibioticsWisely24x36_SPANISH.pdf

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Polling Question

True or false: Social determinants factors such as physician-physician relationships, nurse-patient communication, are critical factors influencing inappropriate antibiotics use

A. True

B. False

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Behavioral Approaches

Communication Training

- Low-cost, high-impact
- Decision aids, infographics
- Shared decision making
- Address patient's expectations

DART = Dialogue Around Respiratory Illness Treatment
Four communication strategies to manage expectations:

1. Review physical exam findings
2. Deliver a clear diagnosis
3. Use a 2-part negative/positive treatment recommendations
4. Provide a contingency plan

DIALOGUE AROUND RESPIRATORY ILLNESS TREATMENT
DART
uwimtr.org/dart/

Sources: Mangione-Smith et al. Ann Fam Med. 2015;13(3). Drekonga et al. ICHE 2015;36(2):142-52 Coxeter et al, Cochrane Database Syst Rev 2015

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Communication Training

Negative treatment recommendations that "rule out" the need for antibiotics

- *"this infection is viral so antibiotics won't help"*
- May increase questions of the treatment plan
- Shift to provider-patient negotiation
- Extends visit length
- Forces providers to re-explain why abx aren't needed

Positive treatment recommendations for symptom relief

- *"drink hot tea with a teaspoon of honey to help with the sore throat"*
- *"use an extra pillow at night to reduce the drainage and resulting cough"*

When **combined**, negative treatment recommendations when followed by a positive one resulted in:

- Lowest association with unwarranted prescribing
- Strongest association with satisfaction with the quality of care

Source: Mangione-Smith et al. Ann Fam Med. 2015;13(3). Mangione-Smith R., et al. Patient Educ and Counseling. 2022; 105(7): 2611-16.

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Communication Training

Type of Communication	Sustained Effects
Communication training (10 peds clinics, 2 yrs) • **85% reduction antibiotics Rx when negative followed positive recs** (RR 0.15 CI 0.06-0.4, p<0.01) • 52% reduction of abx if positive only (RR 0.48, 95% CI 0.24-0.95, p=0.04) • No difference if negative only (RR 0.18, 95% CI 0.02 - 1.43, p=0.11)	Communication training (228 adult + peds clinics, 1 year, randomized with c-reactive protein) • **Decreased compared to no-intervention, but abx Rx with c-reactive protein at 1 year** • **29% decreased abx Rx, maintained at 1 year** (RR 0.71, 95% CI 0.45-0.99)

Sources: Mangione-Smith et al. Ann Fam Med. 2015;13(3). Little P., et al. Ann Fam Med 2019;17(2):125-32.

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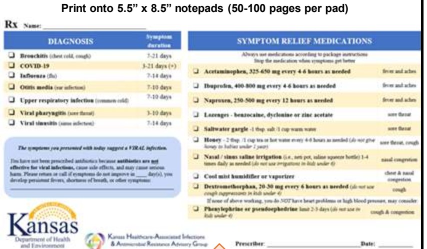
Communication Support: ARI Script Pads

- Providers reported biggest barrier was lack of tools to aid in promoting conversations with patients and education about ARIs
- 2/3 patients preferred to receive **verbal + printed** information about symptomatic URI management

Print onto 5.5" x 8.5" notepads (50-100 pages per pad)



Emailing symptomatic script pads with printing instructions (soon to be added to KDHE HAI/AR website)

Source: Lee C., et al. BMC Fam Pract 2020;21(42).

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Reporting Nudges

Leverage the laboratory to improve antibiotic use

Result text interpretation
- "commensal respiratory flora"
- "normal upper respiratory flora"

How to translate into a NUDGE?
Work with micro lab on selective reporting protocol using accepted ASM guidelines

Take it a step further, if already reporting interpretation, does more specificity help?
- **"commensal flora only" nudged to**
- **"commensal flora only, no *S. aureus*/MRSA or *P. aeruginosa*"**

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Reporting Nudges

"commensal flora only, no *S. aureus*/MRSA or *P. aeruginosa*"

Musgrove et al, 2018

- **Greater reduction de-escalation or discontinuation** (39% vs 73%, p>0.001)
- **5.5 fold increased odds de-escalation** (aOR 5.5, 95% CI 2.8 to 10.7)
- **Anti-MRSA & anti-pseudomonal antibiotics decreased 7 day median to 5 day**
- **No difference in all-cause mortality** (30% vs 18%, p=0.52), C.diff, or ICU LOS
- **Reduced AKI** (31%-> 14%, p=0.03)

McBride et al 2015

2 year inpatient period

- **Total abx decreased** 2.31-> 1.87 (p=0.009)
- **Broad-spectrum abx decreased** 1.94-> 1.44 (p=0.004)
- **Anti-MRSA agents decreased** 0.71-> 0.49 (p=0.008)
- **Anti-pseudomonal decreased** 1.24-> 0.94 (p=0.02)
- **IV antibiotic decreased** 1.51-> 1.16 (p=0.009)

Highlights importance of clear, persuasive communication of diagnostic testing in improving abx prescribing behaviors

Sources: Musgrove M., t al OFID 2018;5(7). Mcbride J., et al. ORID 2015;2(1).

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Reporting Nudges

People with tracheostomy cx drawn, even with clinical algorithm 73% of patients received unnecessary abx b/c of clinician's tendency to treat "positive" cultures

- Tracheal **culture over-reporting → 2.8 fold** higher rate of abx (95% CI 1.23-6.53, p>0.05)
- Conclusion: over-reporting influences prescribing behavior, excess abx in patients on ventilators

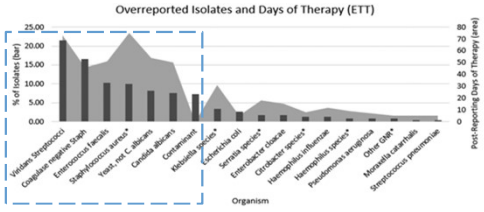
Culture over-reported organisms associated with 3-fold higher* DOT

- Strep viridans**
- **CoNS**
- **E.faecalis**
- S.aureus**
- **Candida spp**

* compared to report of "mixed upper respiratory flora"

** excess or post-report re-initiation

29% cultures from intubated were over-reported



Sources: Karsies T., et al. Pediatr Crit Care Med. 2021; 22: 859-69. Prinzi A et al. 2022 J Clin Micro; 60(11): e00930-22.

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Reporting Nudges

- Fully identifying and reporting organisms from poorly collected samples or nonsterile sites → unnecessary antibiotics
- Look at your facility sputum culture results, volume of pneumonia antibiotic use, indications and median days of therapy (DOT) to determine where discordant or overuse is occurring
- Involve micro lab to frame culture results message

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Delayed Prescribing

- Patient-led (immediate Rx at time of visit with instructions not to till until specified day or symptom)
- Post-visit (instructed will receive abx at specified day if symptoms unimproved)

Adult - ARIs

Immediate abx vs delayed vs no abx (23 clinics tracked 1 year)

- **Patient-led 58% reduced abx use**
- **Delayed Rx associated with 68% reduced abx use**
- **No difference in patient satisfaction**
- **No difference in duration of symptoms**
- **No difference in severity of symptoms**

Children - AOMs

Waited 1-2 days to fill (1 clinic tracked 1 years)

- **Reduced amoxicillin 32%** (95% CI 25%-39%)
- **30.5 less monthly amoxicillin Rx's** (75->47, 95% CI -14 to -31, p=0.006)

Children - ARIs

Immediate vs delayed vs no abx (39 clinics)

- **No difference in patient satisfaction**
- **No difference in duration of symptoms**
- **No difference in severity of symptoms (AOM, pharyngitis, sinusitis, bronchitis)**

Sources: Paza Abad M., et al. JAMA Int Med. 2016;176(1):21-9. Cates C., BMJ 1999;318(7185):715-16. Mas-Delmau G., Pediatrics 2021;147(3):e20201323.

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Delayed Prescribing

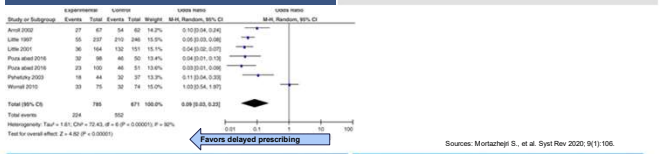
Meta-analysis of RCTs - delayed prescribing for reducing ARI antibiotics

Antibiotic Use

- **Greater odds of not requiring antibiotics for ARIs** (OR=0.09, CI 0.03 to 0.23)
- Subgroup analysis - **no difference when Rx were given at index visit or at a later time**

Secondary Outcomes

No difference in satisfaction (5 studies: 1 UK trial did have statistically significant lower satisfaction, 1 New Zealand trial had higher satisfaction)
No difference in re-consultation (2 studies: non-statistically significant repeat visits in delayed groups)



Sources: Mortazhejri S., et al. Syst Rev 2020; 9(1):106.

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Patient and Public Education

Meta-analysis of RCTs - patient and public educational campaigns for reducing ARI antibiotics

Educational Sessions + Booklets

Education vs none (caregivers, 10 daycares, n=177)

- **Fewer outpatient visits** (38.5 vs 61.9%, p=0.015)
- **Lower antibiotic use** (11.5% vs 29.5%, p=0.022)
- Less daycare absenteeism (21 vs 59 days, p=0.037)
- Less caregiver absenteeism (15 vs 44 days, p=0.046)

Point of Care Educational Materials

Interactive booklet ARI visit vs none (n=558)

- **21% less abx Rx at visit** (19.5% vs 40.8% RR 21.3%, CI 13.7-29.8%)
- **Less abx Rx 2 wks after visit** (OR 0.35, CI 0.18-0.66)
- **No difference in re-visits** (12.9% vs 16.2%, RR 3.3%, p=0.29)

Sources: Alexandrino A. et al. 2016 Fam Pract 2016;33(5):476-81. Francis N., et al. 2009; BMJ 339:b2885.

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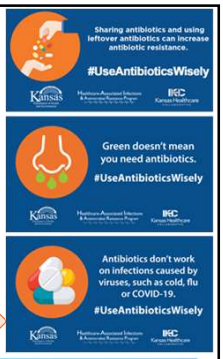
Patient and Public Education

- Easy to understand
- Focus on modifiable risk factors
- Design according to needs
  - Key driver for ARI visits: concern that illness lasted longer than expected
- Pharmacologic and nonpharmacologic treatments
- Passive education (eg providing materials but not reviewing) has little to no impact compared to active strategies

Download Social Media Toolkit: khconline.org/files/USAAW-2020-images.zip



Sources: Francis N., et al. Patient Educ & Counseling 2008;73(2):286-93.

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Peer Comparison
Choosing Metrics

- Antibiotic Use: ARI + Abx
- Antibiotics: NDC codes
- Identify ICD-10 codes: 24
- Time period: 2019-2022
- Rate: ARI+Abx / Total ARI claims
- Provider: NPI by address
- Provider: AU rates to quartiles

ICD-10 Code	Diagnosis
H65	Non-suppurative otitis media
J00	Acute nasopharyngitis, unspecified
J040	Acute laryngitis
J042	Acute laryngotracheitis
J043	Supraglottis
J050	Acute obstructive laryngitis (croup)
J06	Acute laryngopharyngitis
J09-J11	Influenza A
J12	Viral pneumonia
J203-209	Acute bronchitis due to coxsackie, parainfluenza, RSV, rhinovirus, echovirus, NOS
J21	Acute bronchiolitis
J22	Acute respiratory infection NOS
J30	Vasomotor & allergic rhinitis
J31	Chronic rhinitis
J40	Bronchitis NOS
J45	Asthma

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Reporting

ARI-AU Heatmap

- County/zip code-level rates mapped to identify areas for improvement
- Previous (2017-18) ARI-AU showed no relation b/w rural and urban counties

Peer Comparison

- Providers ARI-AU rate as percentage, split in quartiles
- Provider specialty vs entirety
- Vetted letters with KS physicians for message framing

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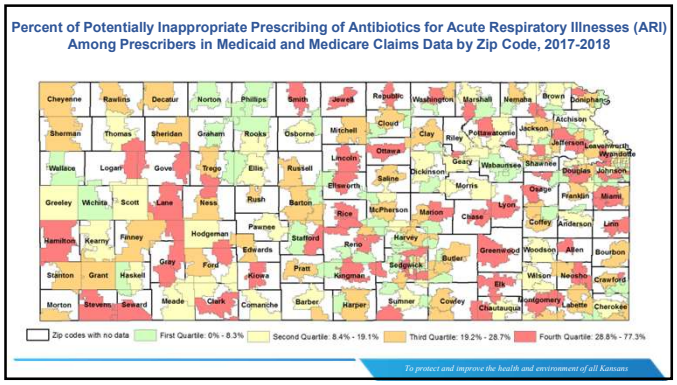

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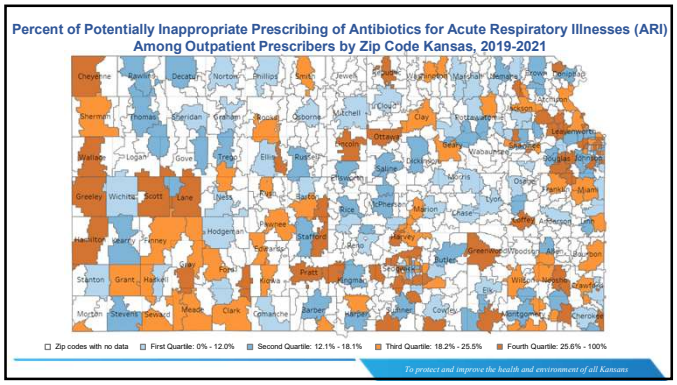

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Dissemination

- Highest prescriber's vs all – we decided all to avoid stigmatization within practices
- Initial "Icebreaker" letter with the map introducing the project (target send-out June-July)
- Peer comparisons November


Kansas

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Thank You!

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