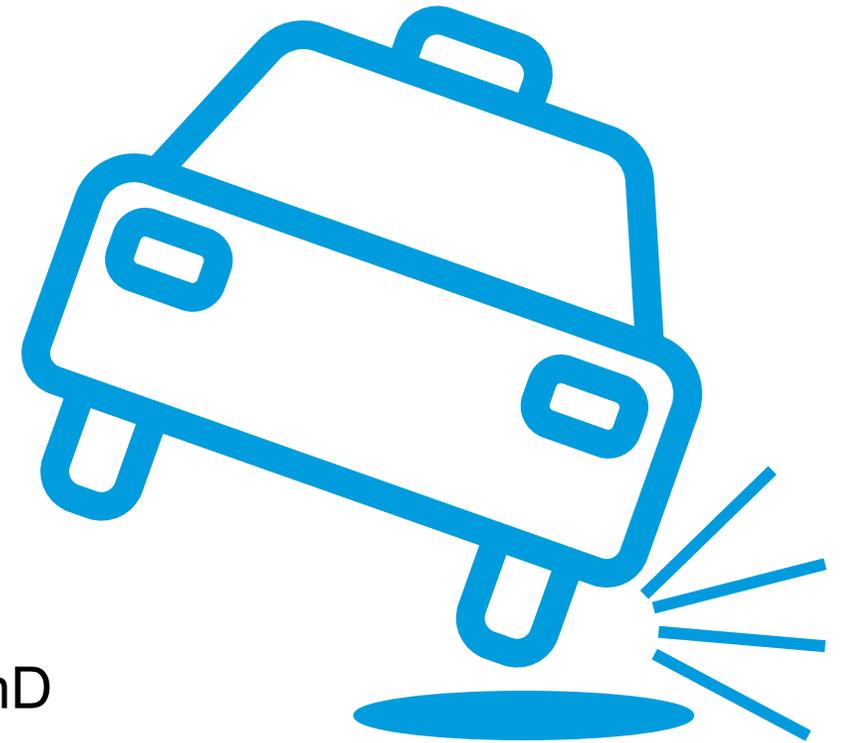# IMPLEMENTATION OF OUTPATIENT ANTIMICROBIAL STEWARDSHIP:

AVOIDING POTHOLES ON THE ROAD TO RESPONSIBLE ANTIBIOTIC PRESCRIBING

Ryan W. Stevens, PharmD and Kelsey Jensen, PharmD

2024 MN Antibiotic Stewardship Conference
April 30th, 2024

OBJECTIVES

Describe a target and an intervention to improve outpatient antimicrobial prescribing in respiratory tract infections

Discuss metrics which could be used to measure appropriateness of antimicrobial prescribing in urinary tract infections

Outline three potential challenges or pitfalls in the development of outpatient antimicrobial stewardship infrastructure

Disclosures: None

FIRST THINGS FIRST…

2022 Data:

- U.S. responsible for **236.4 million** antibiotic Rx **(709 Rx / 1000 persons)**
  - Midwest region: **49.5 million** antibiotic Rx **(719 Rx / 1000 persons)**
    - MN: **522 Rx / 1000 persons**

- -

If CDC estimates of 30% unnecessary are accurate…

- **70 million** unnecessary antibiotic Rx nationally

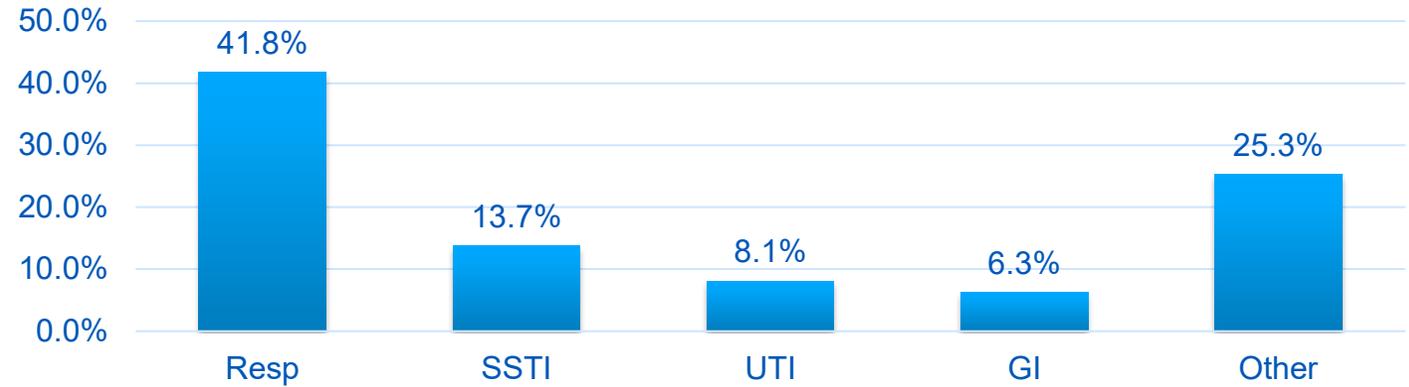- **14.85 million** unnecessary antibiotic Rx in the Midwest region

Centers for Disease Control and Prevention. Outpatient antibiotic prescriptions – United States, 2022.

OUTPATIENT ASP TARGETS

**Retrospective review of 1.16 million urgent care encounters:**

- Overall antimicrobial prescribing rate: **34%**

- Clinical category prescribing rates:
  - Respiratory: **50%**
  - SSTI: **35%**
  - UTI: **76%**
  - GI: **13%**
  - Other: **2%**

Potential Target Order:

Resp > UTI > SSTI

Clin Infect Dis 2020;70(8):1781-1787.

% Total Encounters by Clinical Category

Resp 41.8%	SSTI 13.7%	UTI 8.1%	GI 6.3%	Other 25.3%

Encounters With/Without Abx and Rx Rate

Respiratory 50% — SSTI 35% — UTI 76% — GI 13% — Other 2%

Antibiotic Encounters — Non-Antibiotic Encounters — Prescribing Rate
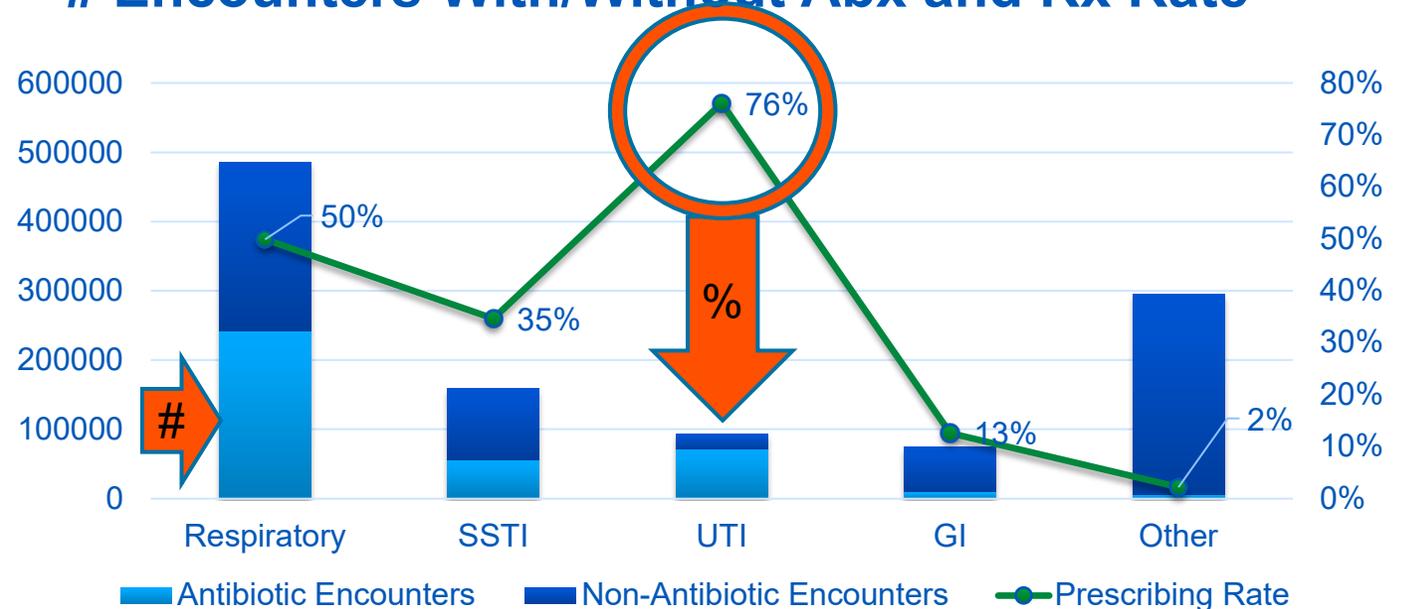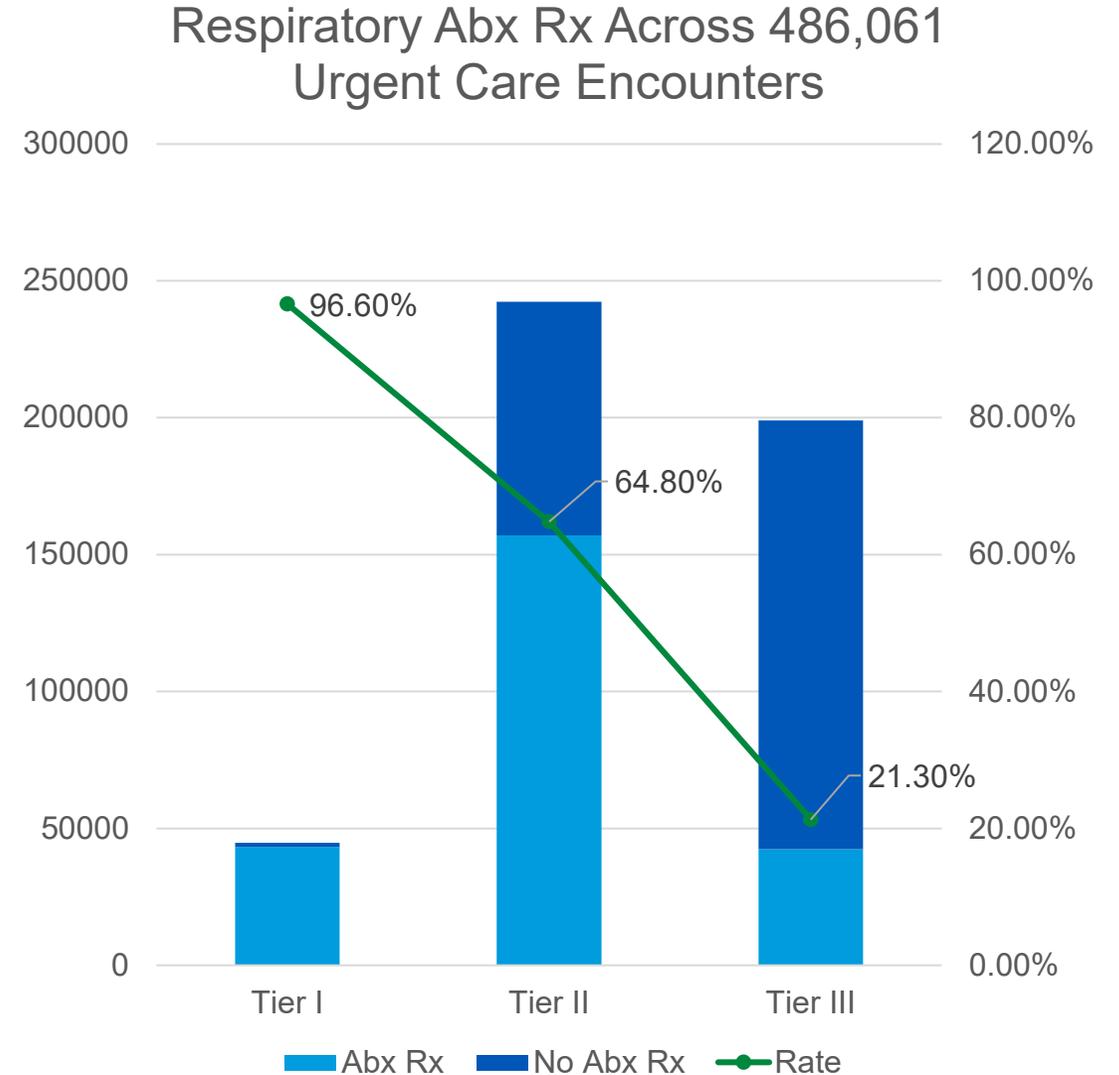
OUTPATIENT ASP RESPIRATORY TARGETS

- **Tier I**: Always prescribe
  - E.g., pneumonia

- **Tier II**: Sometimes prescribe
  - E.g., pharyngitis, sinusitis, suppurative otitis media

- **Tier III**: Never prescribe
  - E.g., viral URI, asthma/allergy, rhinitis, bronchitis/bronchiolitis

Respiratory Abx Rx Across 486,061 Urgent Care Encounters

96.60%

64.80%

21.30%

Abx Rx   No Abx Rx   Rate

Tier I   Tier II   Tier III

Clin Infect Dis 2020;70(8):1781-1787.

TIER III URI ASP AT MAYO CLINIC

- **Title:** Evaluation of a multisite programmatic bundle to reduce unnecessary antibiotic prescribing for respiratory infections: a retrospective cohort study

- **Goal:**
  1. Evaluate impacts of a multifaceted outpatient ASP bundle on tier III URI prescribing and repeat healthcare contact
  2. Identify features of ongoing inappropriate prescribing and repeat healthcare contact after bundle implementation

- **Methods:** Quasi-experimental, pre/post, retrospective cohort study

- **Population:**
  - Both adult/pediatric patients from full Mayo Clinic Enterprise
  - Seen by primary care, urgent care, or emergency medicine
  - Tier III URI encounter (by ICD-10)
    - *Note: COVID excluded*
  - WITHOUT tier I or tier II URI diagnosis associated with the encounter
  - January 1st, 2019 – December 31st, 2022
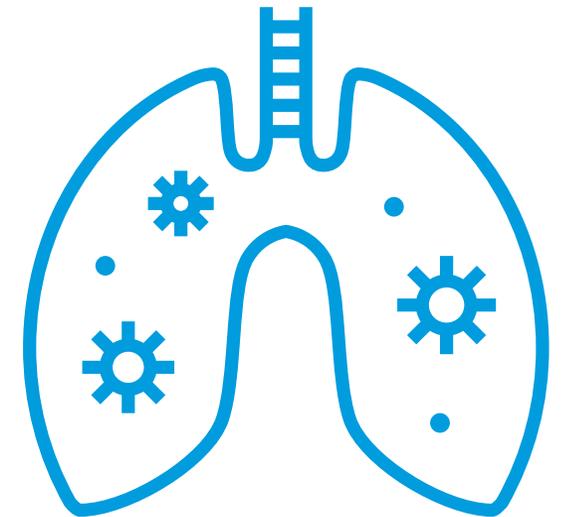
TIER III URI ASP AT MAYO CLINIC

- **Intervention:**
  - Enterprise outpatient ASP implementation on July 1st, 2020

  - Stepwise rollout of multifaceted URI ASP bundle…
    1. Standardized/templated staff educational materials
    2. Patient education via symptom management in URI
    3. Ambulatory URI antimicrobial order panel
    4. Patient facing antimicrobial stewardship commitment poster
    5. Provider education via peer comparison reporting
    6. Provider facing URI antimicrobial prescribing dashboard

  - Regional representatives determined rollout of Enterprise-developed tools

TIER III URI ASP AT MAYO CLINIC

- **Control:**

Pre-implementation (1/1/19 – 6/30/20) n = 96,125	Washout/Implementation (7/1/2020 – 6/30/21)	Post-implementation (7/1/2021 – 12/31/2022) n = 69,533

- **Outcomes:**
  - **Antimicrobial prescribing rate (Full enterprise):**
    - Pre-intervention = **21.7%** vs. post-intervention = **11.2% (p<0.001)**
    - Subgroups:
      - Statistically significant reduction in all regions, department specialties, provider types (non-trainees), patient age groups, and diagnostic category (excluding "other" category)
  - **Repeat healthcare contact (Full enterprise):**
    - Pre-intervention = **6.7%** vs. post-intervention = **7.3% (p = 0.116)**
    - Antibiotic Rx = **6.9%** vs. No antibiotic Rx = **9.7% (p<0.001)**
    - No antibiotic Pre = **9.9%** vs. No antibiotic Post = **9.4% (p = 0.004)**

TIER III URI ASP AT MAYO CLINIC

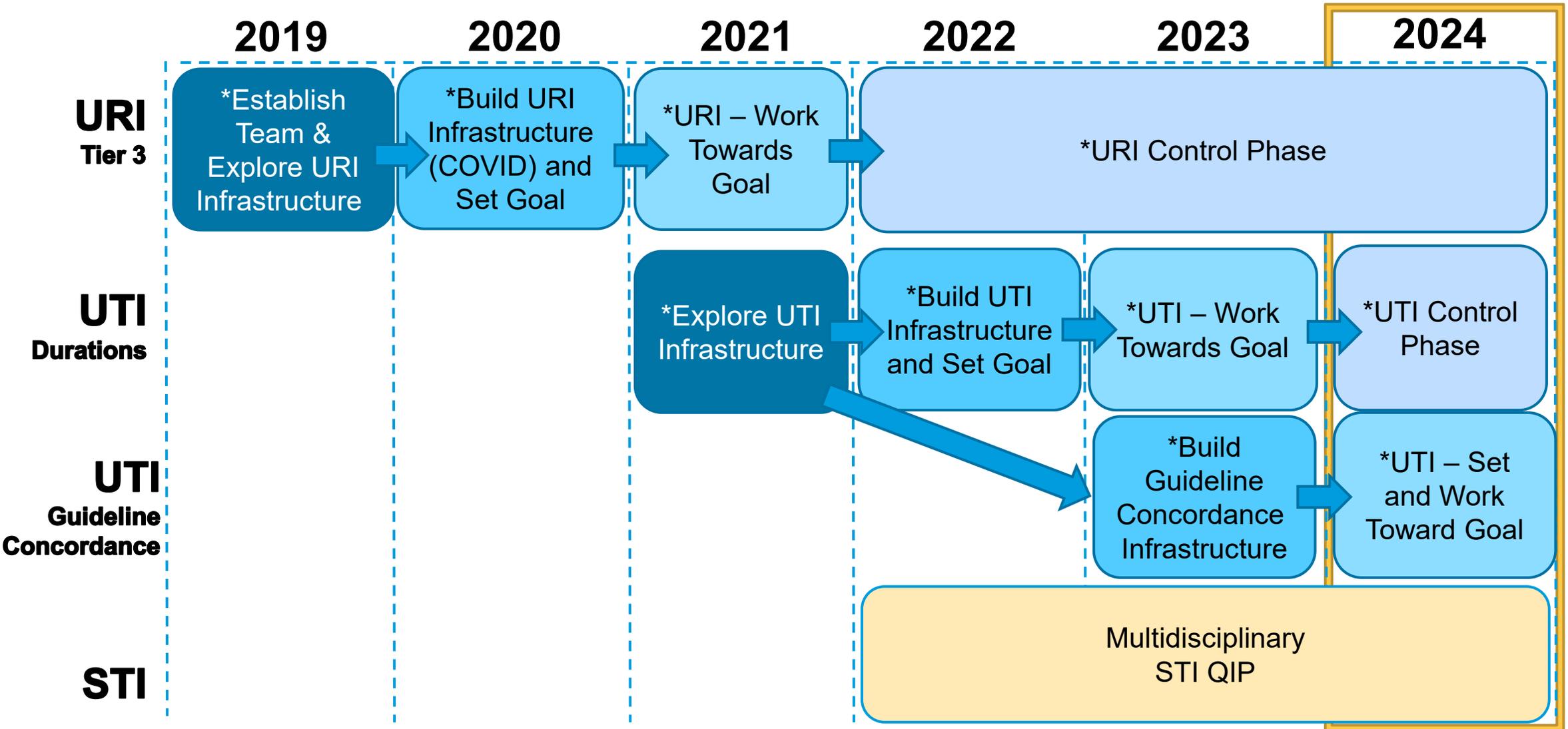## Top 3* predictors of ongoing inappropriate antibiotic Rx:

1. Increasing age
   - Most significant for age >65

2. Primary diagnosis
   - Most significant with serous otitis media/ear disorders

3. Increasing Charlson Comorbidity Index
   - Most significant with CCI ≥5

Top 5* predictors of post-implementation repeat healthcare contact:

1. Age range 0-2 years

2. Emergency medicine index visit

3. Telehealth visit

4. Primary diagnosis of "other"

5. Increasing Charlson Comorbidity Index

*Gradient boosting machine models used to estimate relative influence of variables to identify smaller models that retained predictive ability.

Open Forum Infect Dis 2023;10(12):ofad585.

WHERE ARE WE NOW?

A timeline chart showing progress across years 2019–2024 for four workstreams.

	2019	2020	2021	2022	2023	2024
URI Tier 3	*Establish Team & Explore URI Infrastructure	*Build URI Infrastructure (COVID) and Set Goal	*URI – Work Towards Goal	*URI Control Phase		
UTI Durations			*Explore UTI Infrastructure	*Build UTI Infrastructure and Set Goal	*UTI – Work Towards Goal	*UTI Control Phase
UTI Guideline Concordance					*Build Guideline Concordance Infrastructure	*UTI – Set and Work Toward Goal
STI				Multidisciplinary STI QIP		

URI VS. UTI – WHAT IS DIFFERENT?

	Urinary Tract Infections (UTI)	Upper Respiratory Infection (URI)
Antibiotics indicated?	Always – Most diagnoses Never – ASB	Always – Tier 1 Sometimes – Tier 2 Never – Tier 3
Culture obtainment	Sometimes	Rarely
ICD-10 coding and agent selection	Fewer codes, lack of diagnostic specificity	Large number of codes, increased diagnostic specificity
Patient population (antibiotic use)	More often middle-aged females	More often <18 or > 65 years of age
Encounter volume	Lower	High

Clin Infect Dis 2020;70(8):1781-1787.

UTI (DURATION) ASP AT MAYO CLINIC

- **Goal:** Decrease the rate of antibiotic prescriptions with a duration of > 7 days for urinary tract infections (excluding pyelonephritis)

- **Timeline:** 2023 (Q3-4)

- **Population**
  - **Department specialties**
    - FAM, CIM, Express, CPAM, ED, and OBGYN/Women's Health
    - Captures >80% of both total UTI and uncomplicated cystitis encounters
    - Includes age 12 and older
  - **Diagnosis groupers**
    - Cystitis
    - UTI NOS
    - Catheter-associated
    - Asymptomatic bacteriuria

UTI (DURATION) ASP AT MAYO CLINIC

- **Interventions** (stepwise rollout)**:**
  - **Education**
    - Standardized/templated staff educational materials
    - Utilized internal publications to promote awareness of efforts/tools
  - **Policy and Procedure**
    - Ambulatory UTI antimicrobial order panel
    - Modify existing SmartSets to align with order panel
    - Modification of default durations on departmental preference lists
  - **Data/Tracking/Reports**
    - Provider education via peer comparison reporting
    - Develop a UTI diagnosis calculator to improve diagnostic specificity

  Regional representatives determined rollout of Enterprise-developed tools

UTI (DURATION) ASP AT MAYO CLINIC

• **Results**

Go-Live of ambulatory order panel and UTI diagnosis calculator

Default durations removed from department specific EPIC preference list

Q3=11.8%

Q4=9.7%

Enterprise Rate 2022: 15%
Enterprise Goal Q3-4 2023 : ≤12%
Enterprise Rate Q3-4 2023: 10.7%

p<0.01
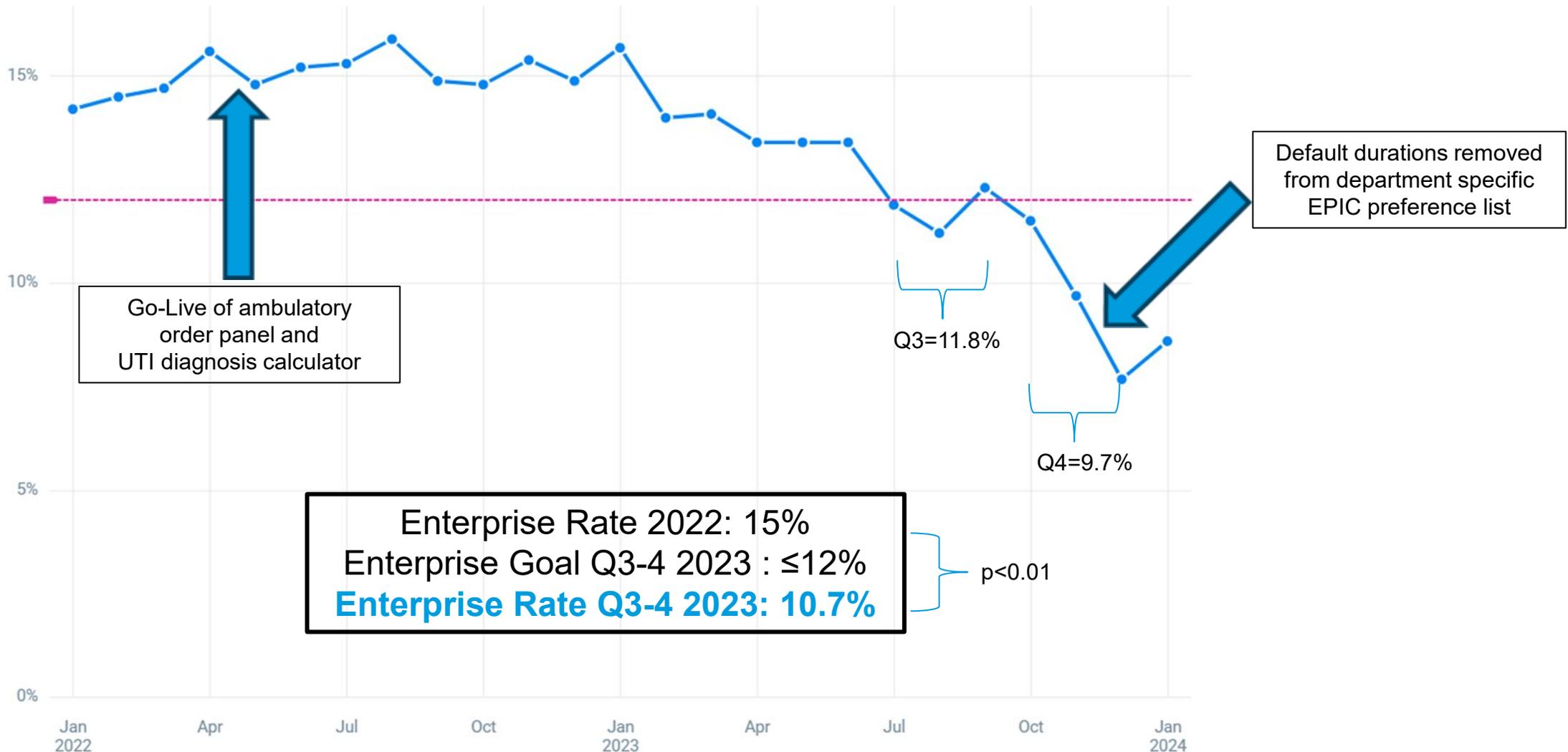
POTHOLE: LACK OF DIAGNOSTIC SPECIFICITY

THE FACTS

1. Antimicrobials compose a unique class of medications where a single drug could be used for a host of indications.

2. Requiring indications for use is common in **inpatient** ASPs.

3. Requiring **outpatient** indications = less common… why?
   - Interface with external pharmacies
   - Less internal control over prescribing
   - High volume = lots of "clicks"
   - Logistics (Custom curated list? ICD-10 association? Provider entered?)

4. Encounter level codes = prescribing inference

Encounter-level ICD-10 selection

Antibiotic Prescription
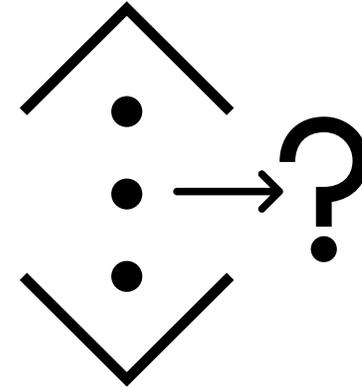
- Non-visit care?
- Rx not related to primary dx?
- Lack of specificity?
- Lack of accuracy?

CDC Core Elements of Hospital Antibiotic Stewardship Programs, CDC; 2019.

POTHOLE: LACK OF DIAGNOSTIC SPECIFICITY

Improvement Opportunities:

1. Optimize coding inference:
   - Improve accuracy of code selection
   - Improve specificity of code selection (i.e., eliminate "NOS" utilization)
   - Optimize inclusion/exclusion of secondary codes in data modeling
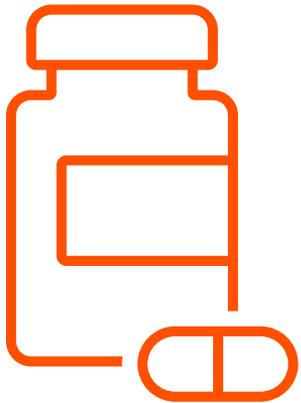
2. Require indications/diagnosis association on ambulatory antimicrobial orders
   - Pair with encounter-level data?
   - Employ independent of encounter-level data?

POTHOLE: LACK OF DIAGNOSTIC SPECIFICITY

The Problem:

Abundance of "NOS" code utilization limiting "appropriateness assessment" by UTI syndrome

The Fix:

Development and implementation of a diagnosis calculator

The Enhancement:

Replacement of NOS code with the calculator on all diagnosis preference lists

© 2023 Epic Systems Corporation.

POTHOLE: LACK OF DIAGNOSTIC SPECIFICITY

Diagnosis Code Selection in Encounters with Antibiotic Rx
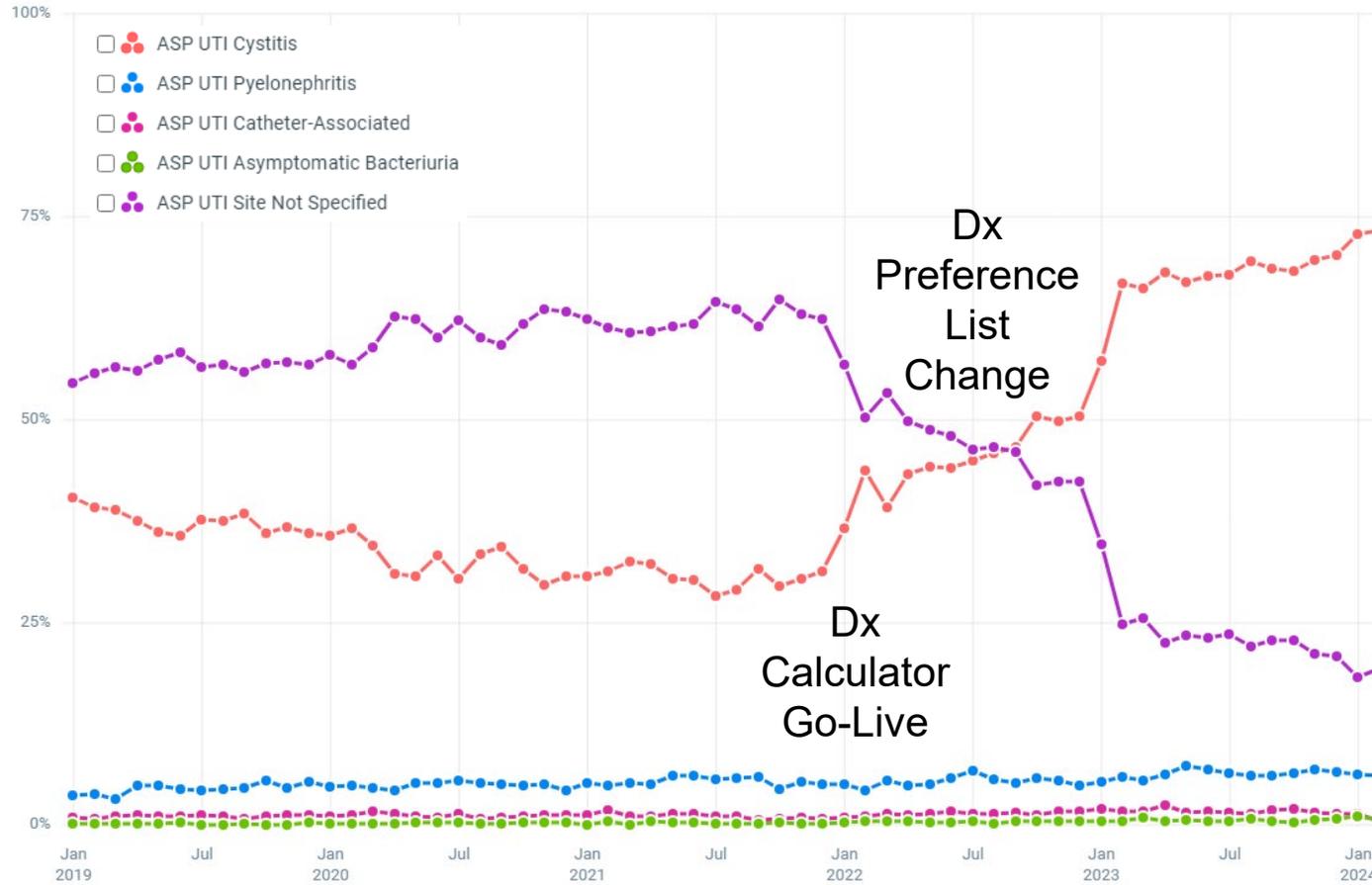
Summary:

1. Think outside the box

2. Consider how to optimize upstream data model elements

3. Probably… move towards ambulatory antimicrobial order indications…

POTHOLE: SYSTEM ISSUES DRIVING PRESCRIBING PRACTICES

- **Preference List Default Durations**

The Problem:

Inappropriately long antimicrobial default antimicrobial durations drive the end user to do the wrong thing.

The Fix:

Remove defaulted durations to promote active provider decision-making regarding antibiotic duration.

The Enhancement:

Add and/or update radio duration buttons for most common medication-specific antimicrobial durations.

POTHOLE: SYSTEM ISSUES DRIVING PRESCRIBING PRACTICES

- **Single vs. Multiple CDS Tools**

The Problem:

Multitude of tools (i.e., EZ panels, Smart Sets, departmental guidance documents) limits version control and different resources may have slightly different/conflicting guidance.

The Fix:

Determine utilization of various tools and converge on prescribing guidance.

The Enhancement:

Promote use of a single tool/workflow, as applicable.

POTHOLE: SYSTEM ISSUES DRIVING PRESCRIBING PRACTICES

- **"Watch and Wait" Prescriptions**

The Problem:

Based on our data model, if a prescription for a tier 3 diagnosis is generated during the visit, the encounter is included in the numerator regardless of if the RX is filled.

The Fix?:

Account for watchful waiting prescriptions when considering ASP goals and provider education around model limitations.

The Enhancement?:

Add functionality on individual antimicrobial orders allowing provider to denote "watch and wait" (however, more clicks!).

# POTHOLE: BUILDING AND LEVERAGING THE TEAM

Outpatient ASP Team:

- Pharmacist(s)
- Physician(s)
- Administrator(s)
- Practice stakeholders:
    - Key specialities (e.g., primary care, urgent care, emergency medicine)
    - Provider types
    - Clinic locations
    - Low performers vs. high performers
- Microbiology
- Informatics
- Ad hoc: Coding specialist? Nursing?
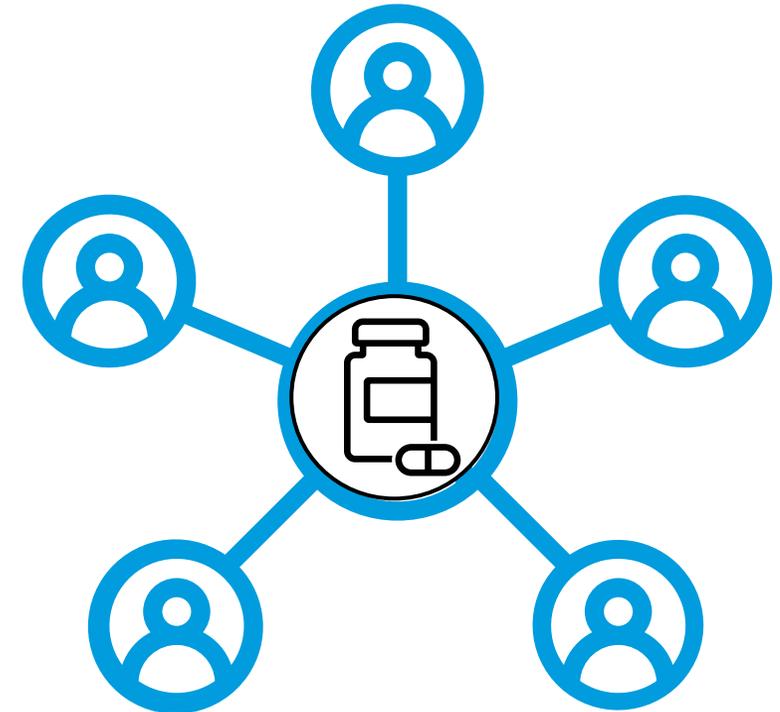
POTHOLE: ALLOCATION OF INFORMATICS RESOURCES

- Build of clinical decision support tools
  - Order panels
  - Best practice advisories (BPAs)
  - Refreshable reports
- Data modeling
  - Identification of yearly goals and/or educational targets
  - Accurate outcomes data
  - Identification of high vs. low performers (peer comparison data)
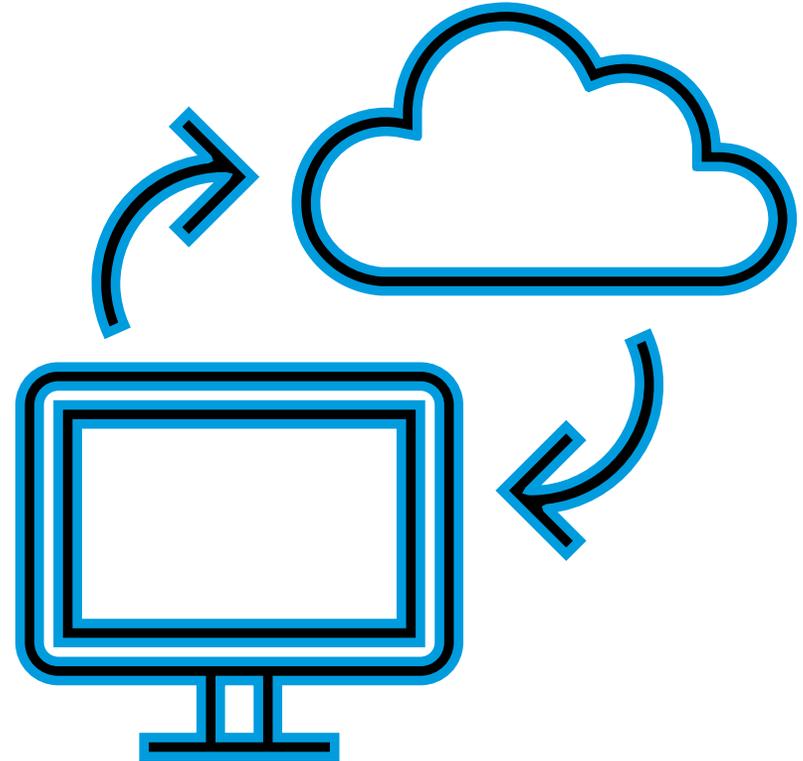
Informatics resources are essential to turn concept into reality!

J Am Coll Clin Pharm 2021;4(12):1583-93.

SUMMARY
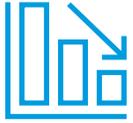
There are significant opportunities to improve antibiotic prescribing for both URIs and UTIs in the outpatient setting, however, ideal metrics between these syndromes differ.

There are many pitfalls that can be encountered when building ambulatory ASP metrics which can include lack of diagnostic specificity, default durations, and CDS tool version control.

Effective leveraging of the outpatient ASP team and available informatics resources is essential for programmatic success.

QUESTIONS & ANSWERS