CAPE CHARM
Collaboration to Harmonize Antimicrobial Registry Measures

Practical Approaches to Outpatient Stewardship

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Disclosures

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- Research grants: Beckton Dickinson, Genentech
- Paid consultant: Qorvo, Beckton Dickinson, Primary.Health, Roche Labs, Quidel
- Independent contractor: LabSimply

Objectives

At the end of this program the attendee will be able to:

- **Identify Common Data Sources and Metrics for Outpatient Stewardship.**
- **Implement Data-Driven Antimicrobial Stewardship Strategies in Outpatient Settings.**
- **Understand the Importance of Data in Outpatient Antimicrobial Stewardship.**

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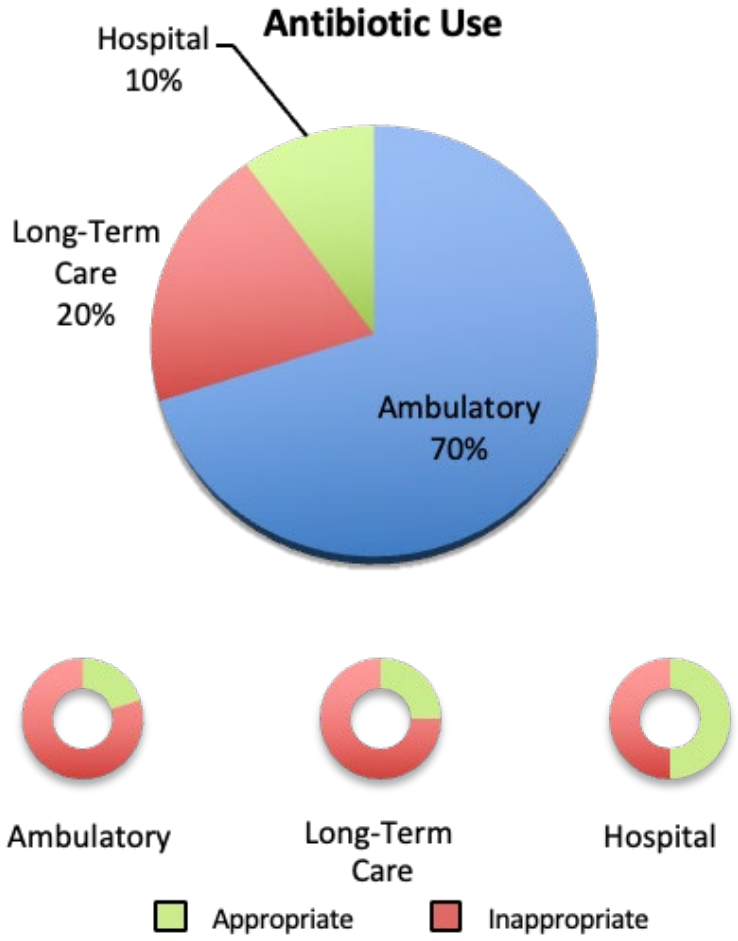
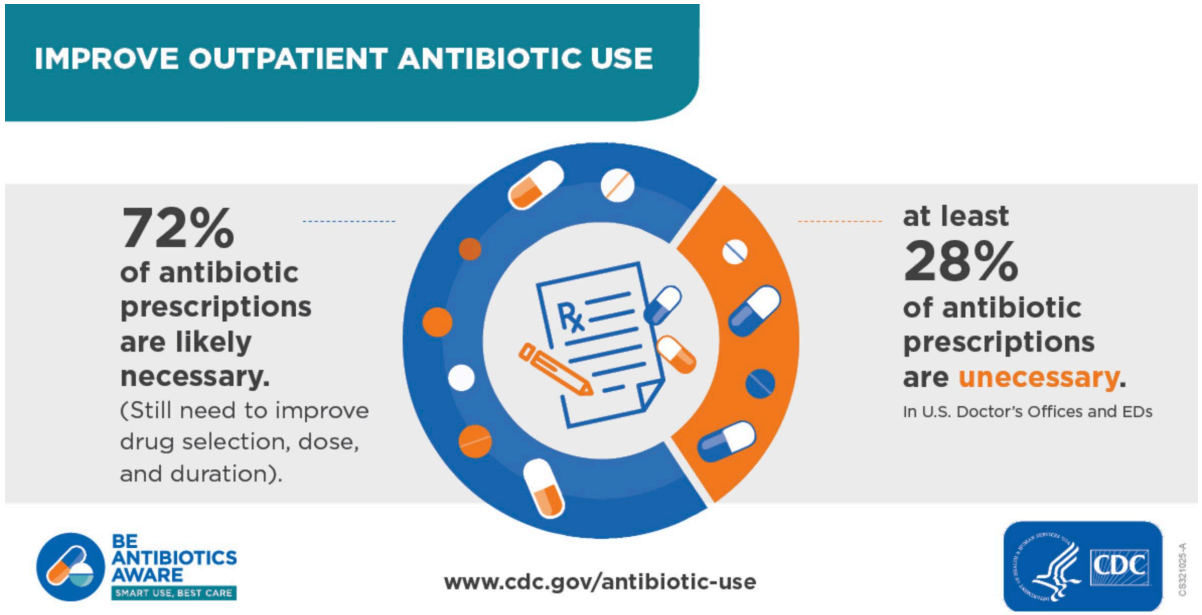
Outpatient Antibiotic Use

- Of the antibiotics used in humans, 60%-80% of antibiotics are used in the ambulatory care setting.
  - Approximately 30% of antibiotics prescribed in the outpatient setting are unnecessary.
  - Total inappropriate antibiotic use, inclusive of unnecessary use and inappropriate selection, dosing and duration, may approach 50% of all outpatient antibiotic use.



Hersh AL, et al. Clin Infect Dis. 2021;72(1):133-137.
Fleming-Durta K, et. al, JAMA. 2016:1864-73.

Outpatient Antibiotic Use in the United States

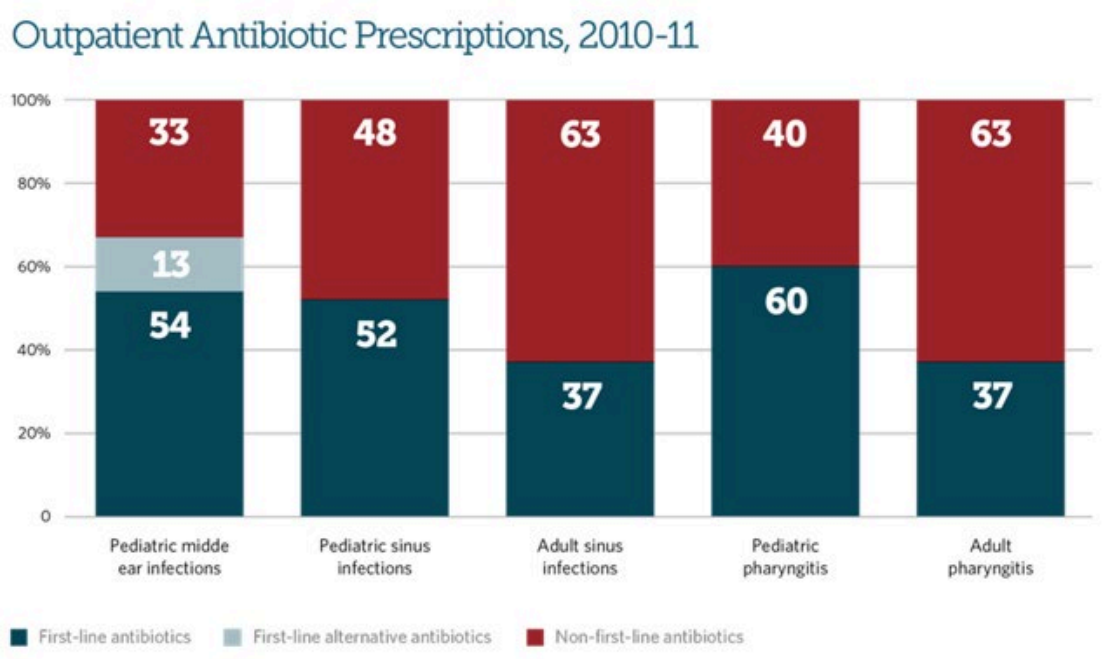


- 13% of all physician office visits result in the prescribing of an antibiotic.
  - Translates into 154 million antibiotic prescriptions.
  - In 2020, there were 613 oral antibiotic prescriptions per 1,000 persons.
- 1 in 3 antibiotics is unnecessary.
  - 30% (47 million) of antibiotic prescriptions are unnecessary.

Fairlie T, et al. Arch Intern Med. 2012;172:1513-4.
Smith SS, et al. Otolaryngol Head Neck Surg. 2013;148:852-9.
Barnett MI, et al. JAMA Intern Med. 2014;174:138-40.
Antibiotic resistance threats in the United States, 2013, Center for Disease Control and Prevention
Public Health Agency of Sweden and National Veterinary Institute2018 update Antibiotic Use in the United States

Outpatient Antibiotic Use in the United States

- For some common conditions, only half of patients receive the recommended first-line antibiotic.



https://www.pewtrusts.org/en/research-and-analysis/articles/2018/07/13/5-facts-about-outpatient-antibiotic-prescribing-in-the-us

Outpatient Antibiotic Use in the United States

Diagnosis	Visits with Antibiotics Prescribed by Age group (% Appropriate)		
	0-19 years	20-64 years	≥65 years
Sinusitis	84.7% (90%)	70.9% (49%)	53.8% (84%)
Pharyngitis	56.2% (67%)	72.4% (24%)	---
Viral URI	21.2% (0%)	43.0% (0%)	39.4% (0%)
Bronchitis/bronchiolitis	55.2% (0%)	72.4% (0%)	60.9% (0%)

- Among all patients, 50% of the antibiotic prescriptions for respiratory conditions were not warranted. For all conditions, 30% of antibiotic prescriptions were not warranted.

Fleming-Dutra et al. JAMA. 2016;315:1864-73.

Outpatient Antibiotic Use in the United States

Diagnosis	Antibiotic Use (%)	Percent Non-concordant antibiotic (95% CI)	Percent Non-concordant dosing regimen (95% CI)
UTI	6.7%	55% (54%, 56%)	90% (89%, 91%)
Cellulitis	1.6%	42% (40.3%, 43.6%)	83% (82%, 85%)
Streptococcal pharyngitis	1.5%	25% (23%, 26%)	38% (36%, 40.5%)
Sinusitis	7.3%	76% (75%, 77%)	12.5% (11%, 13.5%)
Overall		61% (60%, 61%)	53% (52%, 53.5%)

- **Examined 1,442,704 clinic visits, 239,090 visits resulted in a prescription for an antibiotic.**

Sohn M. JAPhA. 2020;60:930-6.

Inappropriate Antibiotic Use is a Problem

- Overuse of antibiotics is associated with:
  - Emergence of resistance
    - Outpatient antibiotic use affects inpatient antibiotic use.
    - Infection related mortality with antibiotic resistant bacteria will exceed cancer-related mortality by 2050.
  - Increased healthcare costs
    - Cost the US health system more than $20 billion annually.
  - Increased adverse drug reactions
    - Responsible for one out of every five drug-related emergency department visits for all patients.
    - 56% for children <5 years and 32% for children 6-19 years
- Impacts health care systems at every level.

Shehab N, et al. JAMA 2016;318:2115-25.

Outpatient Antibiotic Use Drivers

- Patient expectations
  - May not be a big as previously thought.
- Prescriber lack of familiarity/adherence with treatment guidelines
- Lack of and use of diagnostic tools and microbiology data at the point of care
- Provider shortage
  - Pressure to see more patients
- Poor patient follow-up
  - Dismiss and done
- Free antibiotic programs
  - Remove a barrier to antibiotic access
  - Create a pressure to use agent suboptimal spectra of activity
- Fear
  - Missing something
  - Litigation

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The Joint Commission

- **Effective January 1, 2020, The Joint Commission requirements (Standard MM.09.01.03) for antimicrobial stewardship in ambulatory care went into effect.**
  - **EP 1: The organization identifies an individual(s) responsible for developing, implementing, and monitoring activities to promote appropriate antimicrobial medication prescribing practices.**
  - **EP 2: The organization sets at least one annual antimicrobial stewardship goal.**
  - **EP 3: The organization uses evidence-based practice guidelines related to its annual antimicrobial stewardship goal(s).**

The Joint Commission

- **Continued**
  - **EP 4: The organization provides all clinical staff and licensed independent practitioners with educational resources related to its antimicrobial stewardship goal(s) and strategies that promote appropriate antimicrobial medication prescribing practices.**
  - **EP 5: The organization collects, analyzes, and reports data pertaining to the antimicrobial stewardship goal(s) to organizational leadership and prescribers.**
    - ***Note: Data may include antimicrobial medication prescribing patterns, antimicrobial resistance patterns, or an evaluation of the antimicrobial stewardship activities implemented***

Outpatient Antimicrobial Stewardship

- **The Society of Infectious Diseases Pharmacists published 2 papers on outpatient antimicrobial stewardship.**
  - **Outlines a process for developing a program**
  - **Identifies key stake holders and members**
  - **Identifies a means to quantify antibiotic use and assess appropriateness.**
  - **Outlines various activities and interventions**

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Dobson EL, et al. Outpatient Antibiotic Stewardship: Interventions and Opportunities. *JAPhA*.2017;57:464-73.
Klepser ME, et al. A Call to Action for Outpatient Antibiotic Stewardship. *JAPhA*. 2017;57:457-63.

Steps for Establishing an Outpatient Antimicrobial Stewardship Program

- Identify program scope
- Create Stewardship Team
- Assess baseline practice and antibiotic use
- Develop program priorities
- Develop initiatives
- Develop and monitor progress and outcomes

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Klepser ME et al. *JAPhA*. 2017;57:457-63.
Klepser ME, et. al. Community-based antimicrobial stewardship. In: Ambulatory Care Pharmacy Self-Assessment Program, American College of Clinical Pharmacy, 2016:53-70.

Identify the Scope of the Program

- Single institution vs. community wide
- Identify stakeholders
- Identify a point person within each organization
- Develop a data dissemination plan among partners

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Klepser ME et al. *JAPhA*. 2017;57:457-63.

Create an Antimicrobial Stewardship Team

- Identify core and translational members
  - View as an extension of inpatient stewardship activities. Leaders from the inpatient team can lead outpatient activities.
  - Identify roles
  - Secure document support for members to engage in antimicrobial stewardship activities

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Klepser ME et al. *JAPhA*. 2017;57:457-63.

Key Members of an Outpatient Antimicrobial Stewardship Team

Core Members

- Physician
  - Training in ID preferred, but not essential.
- Pharmacist
  - Training in ID preferred, but not essential.

Translational Members

- Clinic leader
- Microbiologist/Laboratorian
  - Track pathogens and susceptibility patterns
  - Develop recommendations for use of POCT
- Public Health
- Information Technology Specialist

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Assess Baseline Antibiotic Use, Resistance Patterns, and Outcomes

- Report usage data to the prescriber/patient level
- Compare usage patterns to available metrics
  - Among prescribers and clinics
- Summarize outpatient infection control measures and immunization rates
- Summarize antibiotic complication rates
  - Readmissions, CDI rates, adverse reactions, secondary infections

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Klepser ME et al. *JAPhA*. 2017;57:457-63.

Methods for Assessing Outpatient Antibiotic Use

Reporting Antibiotic Use

- Milligrams used
- Number of prescriptions
- Defined Daily Doses
  - Assumed average maintenance dose per day for its main indication in adults.

Standardizing Use

- Census population
- Clinic patients
- Clinic visits
- Unit of time

Be aware of methods to make sure you are comparing like data.

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Methods for Assessing Outpatient Antibiotic Use

Data Source	Level of Data	Strengths	Weaknesses
Practice Surveys (NAMCS, NHAMCS)*	Population	•Good for examining national/regional trends	•Not useful to direct stewardship •Costly to acquire •Time lag •Cumbersome to analyze
Claims Data	Population		
Purchase Data from pharmacy wholesalers	Population		
Electronic Medical Records Data	Patient/Prescriber	•Short time lag •Good for examining individual prescribing patterns •Patient level data	•Burden of extraction on the individual site.
Prescriptions filled	Patient	•Accurate assessment of use	•Difficult to obtain

Tracking Outpatient Antimicrobial Use: CHARM Process

- Extract data
  - Use clinic EMR data
  - Limited and masked data set
  - Identify episode of antibiotic use
    - Serves as the anchor for the collection of other relevant data
    - Link to a diagnosis (ICD-10 code)

Fields	
Masked Patient ID	Insurance Type
Facility/Clinic	Provider
Sex	Provider Type
Race/Ethnicity	Encounter Type
Date of Encounter	Antibiotic Allergies
Age	Renal Function
Body weight	Indication Code
Prescription	Indication Name
Antibiotic Name	Antibiotic Dose
Antibiotic Unit	Antibiotic Quantity

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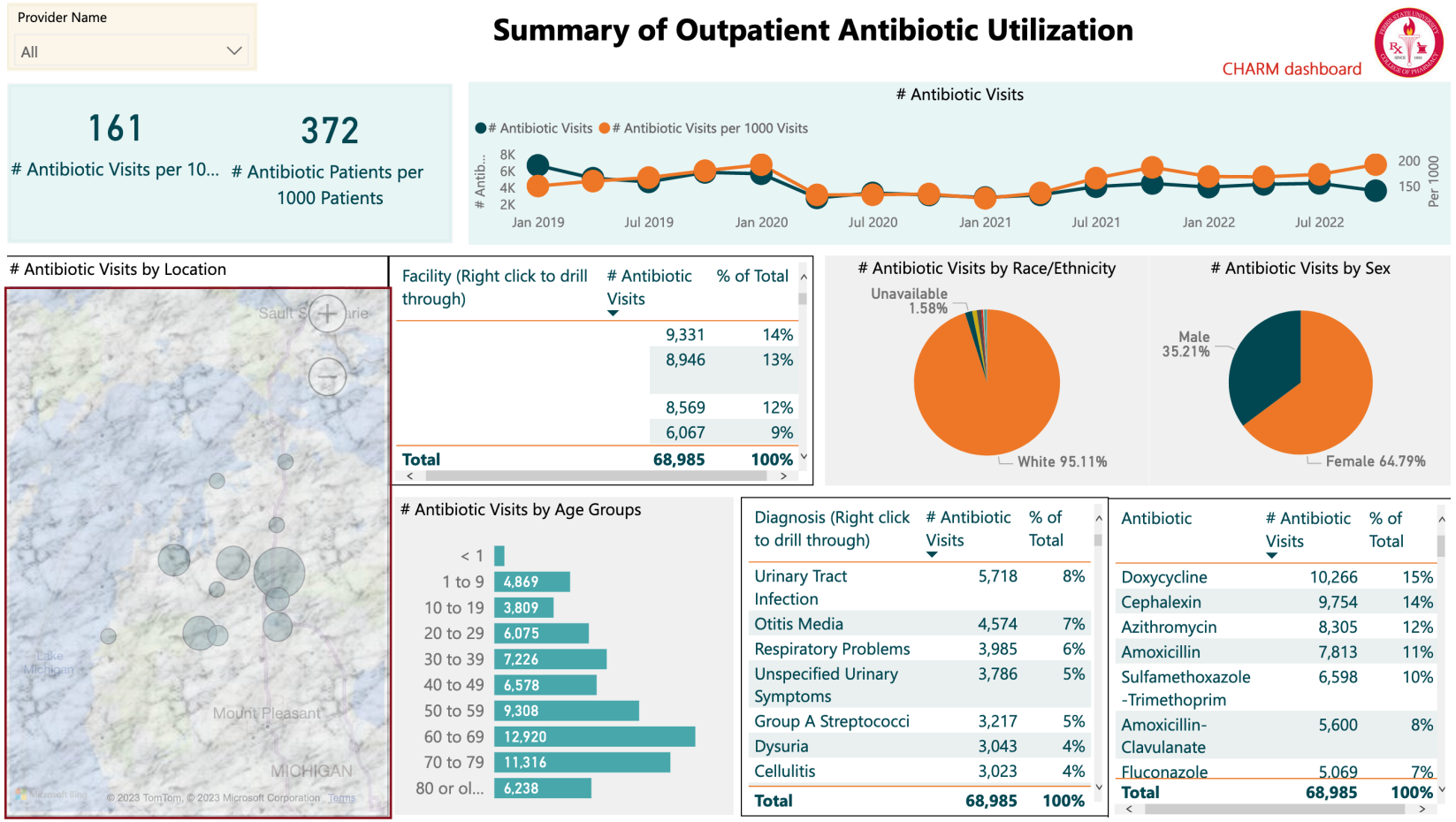
Tracking Outpatient Antimicrobial Use: CHARM Process

- Summarize and analyze data
  - Quantify antibiotic use
    - Antibiotic prescriptions per 1,000 clinic visits
    - Antibiotic prescriptions per 1,000 clinic patients
  - Determine if the antibiotic selected and indication are in concordance with published guidelines, FDA-approved indications, and/or site-specific treatment pathways for the associated indication.
  - Create diagnoses buckets

Tracking Outpatient Antimicrobial Use



Sohn M, et al. J Am Pharm Assoc. 2020;60:930-6

Tracking Outpatient Antimicrobial Use: CHARM Process

- **Summarize and analyze data**
  - **For agents that are concordant with respect to indication, determine dosing concordance**

Prescribed Therapeutic Regimen (PTR)

$$PTR = (Dose_{Prescribed}\, x\, Duration_{Prescribed}\, x\, Frequency_{Prescribed})$$

Recommended Therapeutic Regimen ($RTR_{Min/Max}$)

$$RTR = (Dose_{Recommended}\, x\, Duration_{Recommended}\, x\, Frequency_{Recommended})$$

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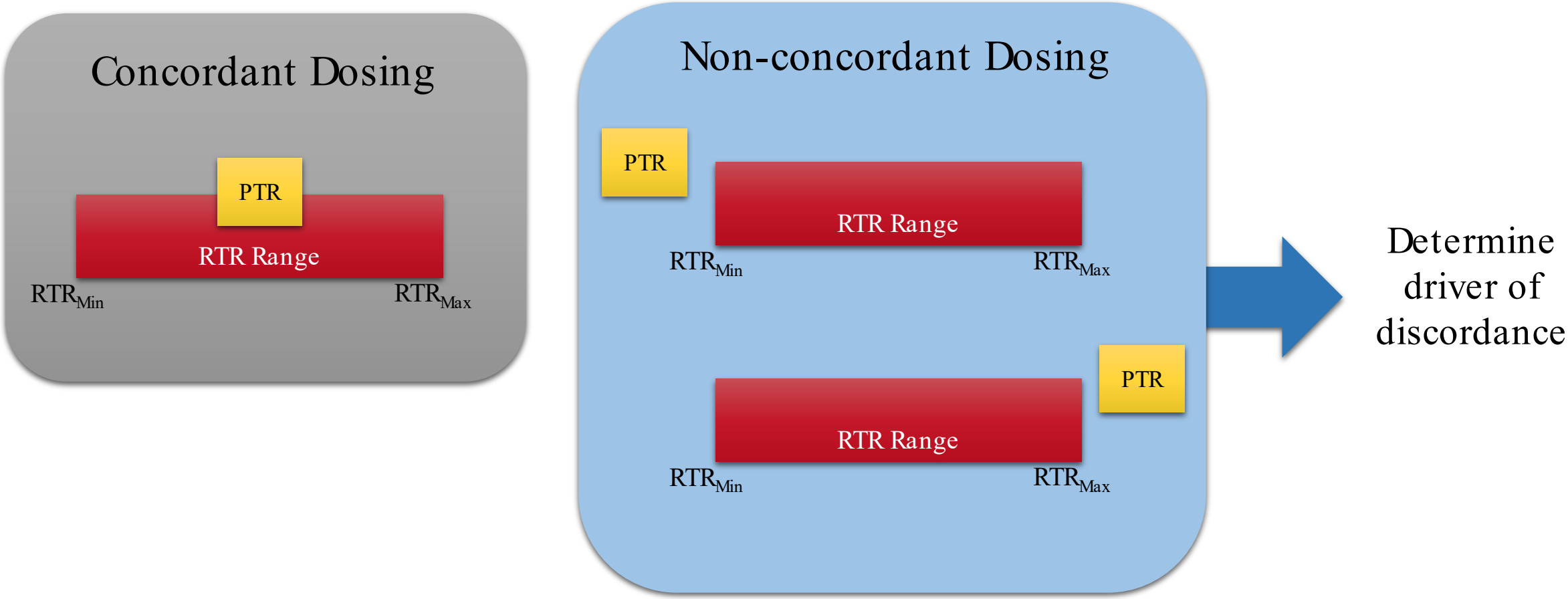
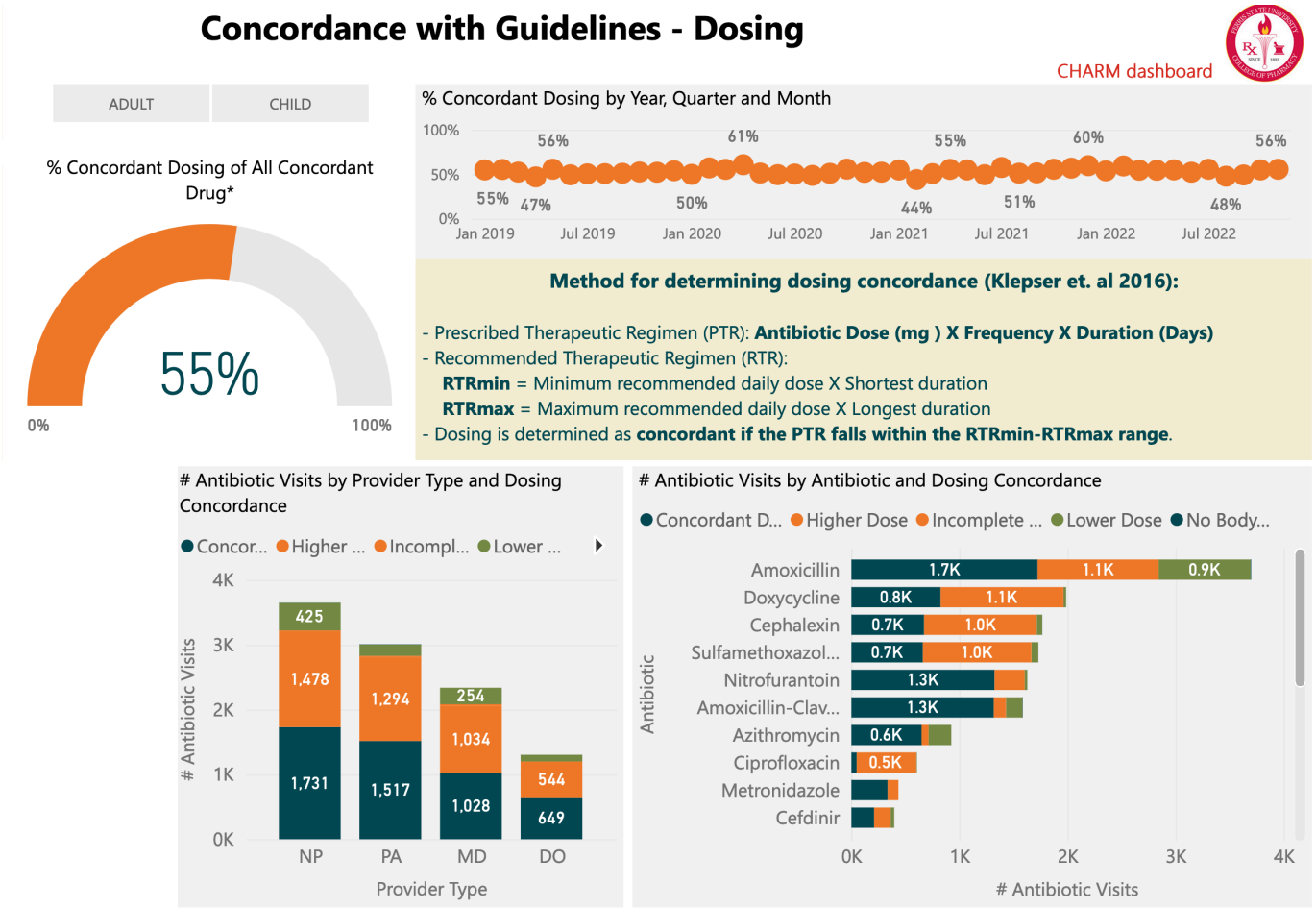
Klepser ME, et al. *Innovations in Pharmacy*. 2016.

CHARM Process



Tracking Outpatient Antimicrobial Use

- For common outpatient diagnoses, a discordant antibiotic and/or dosing regimen were prescribed more 70% of the time.



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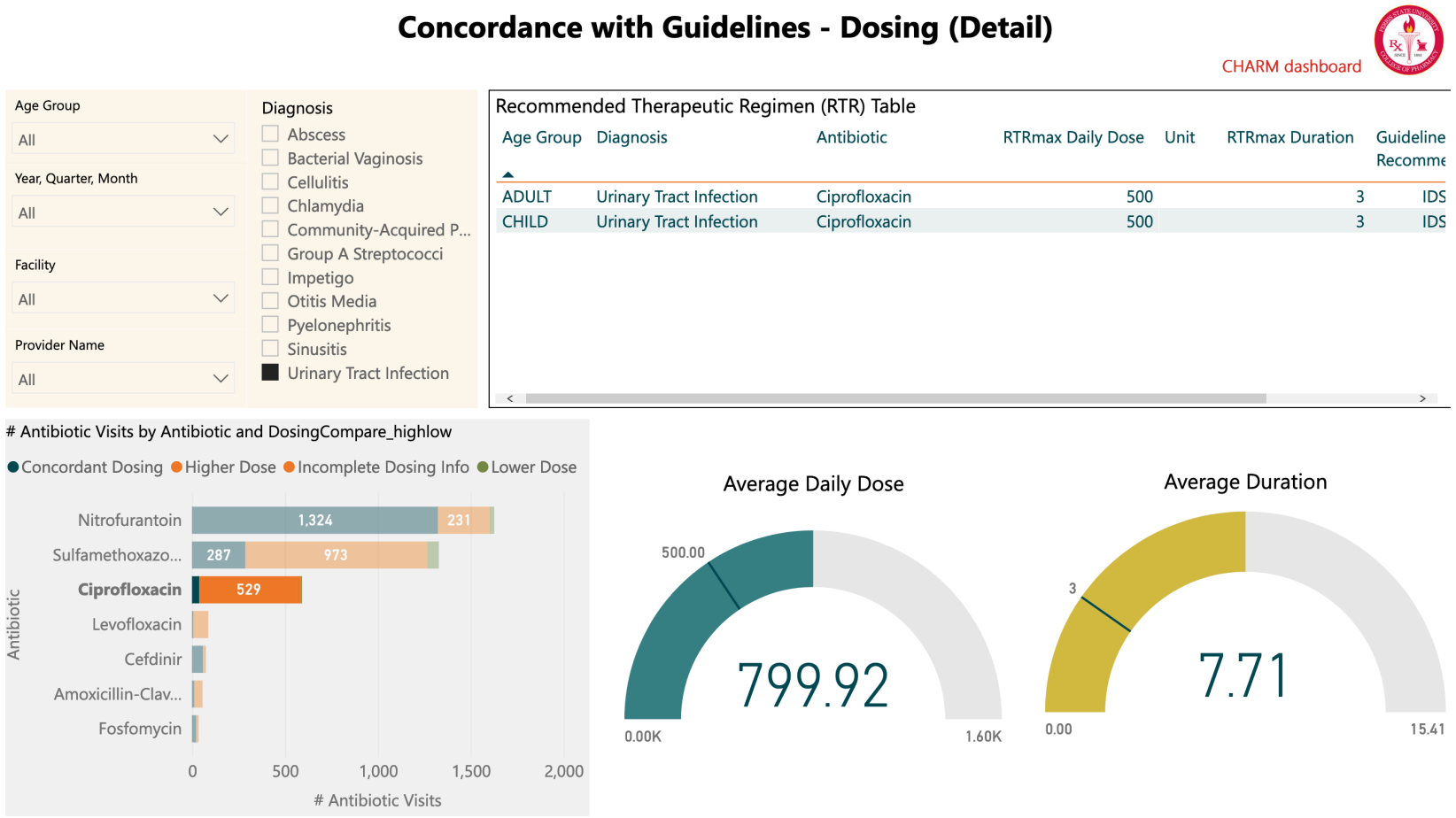
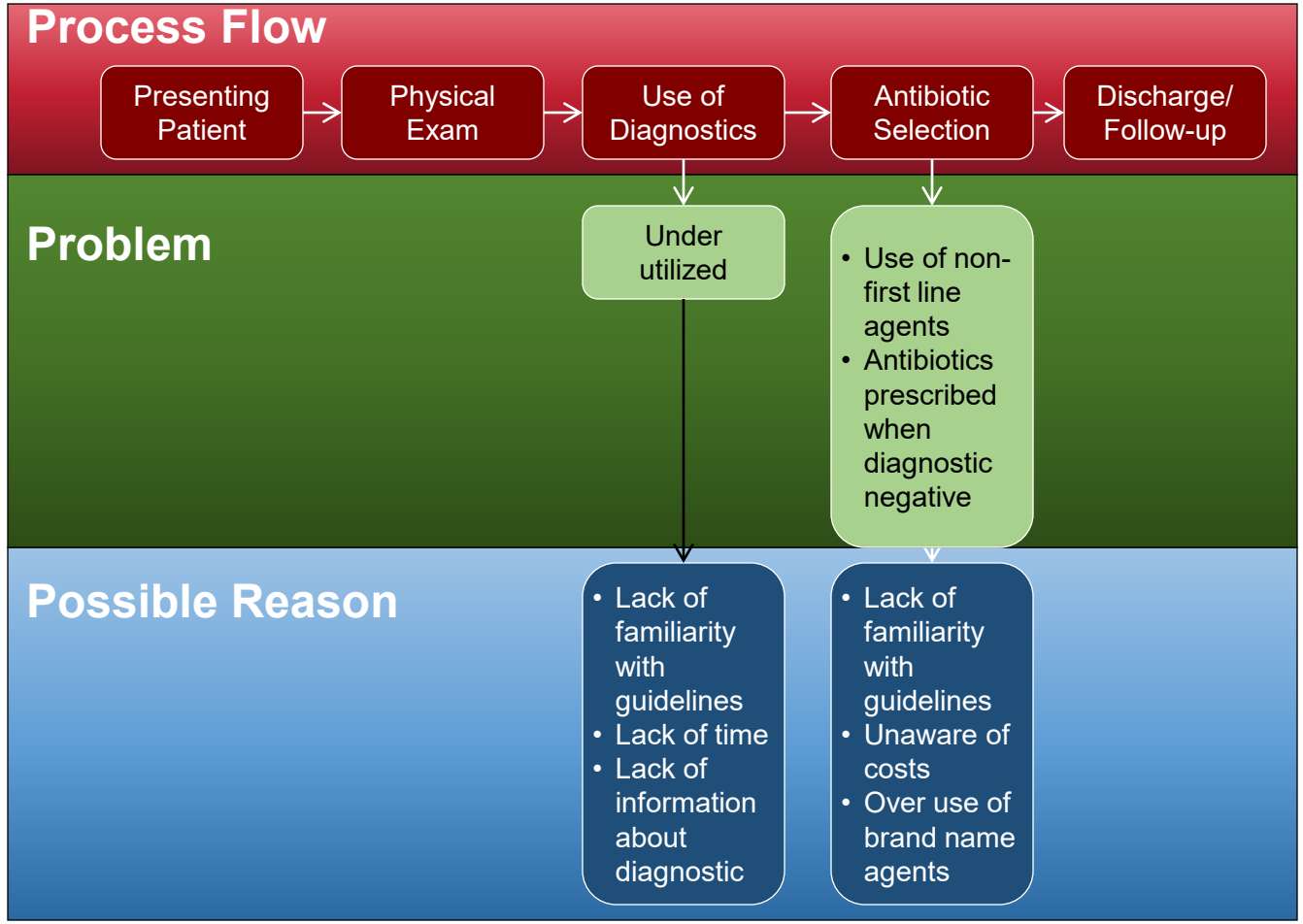
Tracking Outpatient Antimicrobial Use



Develop Program Priorities

- Identify areas of concern
- Create a process map of elements that contribute to the problem
- List primary and secondary desired outcomes for each area of concern
  - Antibiotic prescription rates, cost, resistance rates, rates of hospitalization



Develop Initiatives to Address Problems

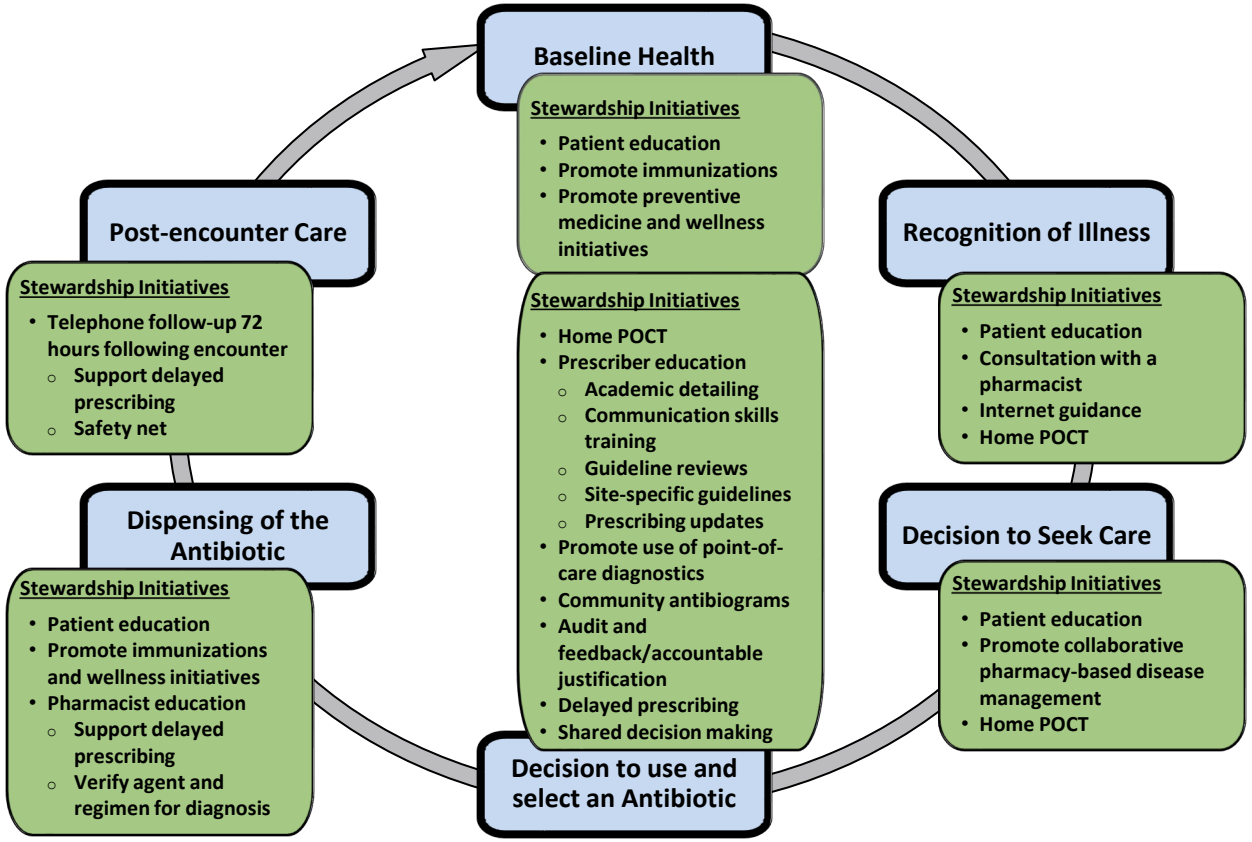
- List interventions that would likely improve outcome
- For each intervention, develop a process or workflow describing the intervention and individuals involved
- Establish a timeline for implementation and assessment of outcomes
  - This is essential to make sure everyone has the same expectations
- Seek approvals if necessary

Develop Procedure to Monitor Progress and Outcomes

- Assess the impact of each intervention of desired outcomes
- Track continued feasibility of each intervention
- Determine if interventions and outcomes yielded the desired impact on the area of concern
- Refine initiatives as needed

Outpatient Infection Journey

- Goal is to keep people at their baseline health.
  - This should be a primary outpatient stewardship activity.



Low Hanging Outpatient Antimicrobial Stewardship Fruit

- Tracking and reporting
- Linking antibiotic use to a diagnosis
- Updating patient allergy information
- Promoting immunization initiatives
- Monitoring antibiotics during transitions of care

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Actionable Data is the Key

- Timely, granular data is needed:
  - To assesses and track performance
  - Identify potential areas for the development of initiatives
  - To track the impact of initiatives
  - To present to prescribers for education
  - To justify outpatient stewardship activities
  - For benchmarking
- Without good data you are just wasting resources and effort.

State Bench Marking

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- Demographics
- Antibiotic Summary
- Medication Details
- Diagnosis Details
- Drug Choice
- Dosing Evaluation
- Category Details
- Benchmarking

Gender
- female
- Male

Age Group
- Adult
- Child

Ethnicity: All

Race: All

Antibiotic: All

Diagnosis: All

% Of Concordant Dosing out of Concordance Drug Choice
47.65%

% Concordant Drug Choice
43.26%

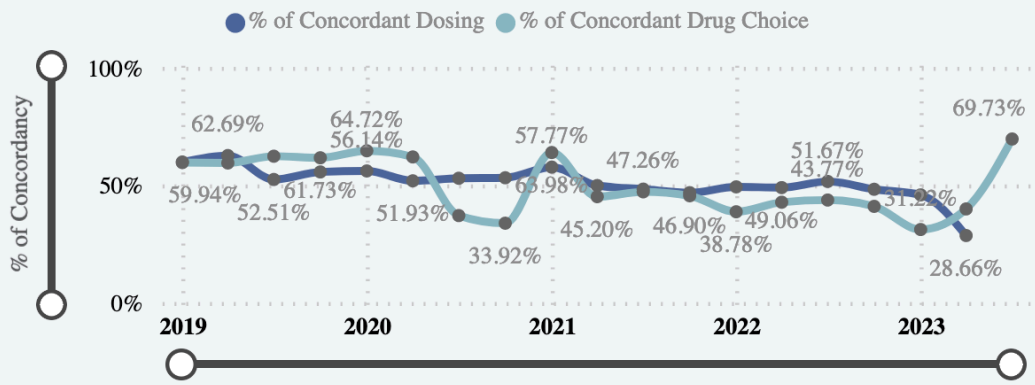
Antibiotic Prescriptions to 1000 Prescriptions

Antibiotic Prescriptions of 1000 Patients

Diagnosis Details

Diagnosis	% Of Prescriptions	% of Concordant Drug Choice	% of Concor Dosing
URINARY TRACT INFECTION	35.36%	43.26%	47.(
OTITIS MEDIA	19.62%	75.41%	70.9
GROUP A STREPTOCOCCI	14.80%	76.26%	40.(
CELLULITIS	14.34%	59.51%	40.5
COMMUNITY-ACQUIRED PNEUMONIA	5.04%	70.93%	50.4
ABSCESS	4.85%	62.18%	72.(
SINUSITIS	3.00%	50.10%	70.5
IMPETIGO	1.11%	57.51%	43.8
Total	**100.00%**	**59.28%**	**53.6**

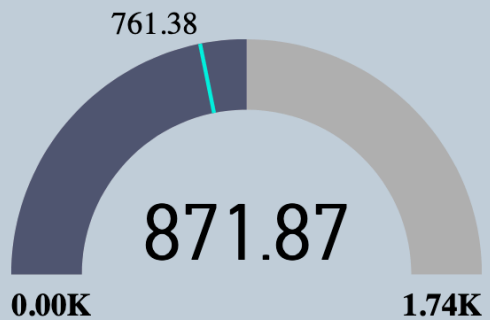
% of Concordancy by Year, Quarter and Month



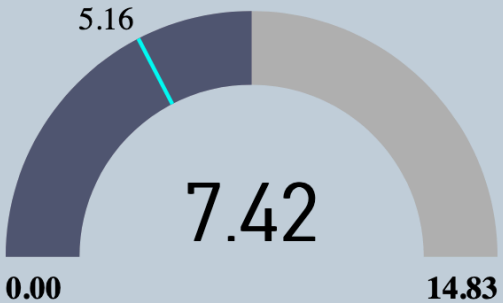
Antibiotic Details

Antibiotic_Name	% Of Prescriptions	% of Concordant Drug Choice	% of Conco Dosing
CEPHALEXIN	24.84%	42.38%	44
AMOXICILLIN	22.67%	92.51%	54
AMOXICILLIN-CLAVULANATE	12.81%	70.51%	71
DOXYCYCLINE	10.53%	44.68%	42
SULFAMETHOXAZOLE-TRIMETHOPRIM	9.10%	91.50%	40
NITROFURANTOIN	7.03%	99.52%	84
AZITHROMYCIN	5.77%	54.73%	42
CIPROFLOXACIN	5.58%	90.92%	8
CEFDINIR	4.01%	80.17%	67
Total	**100.00%**	**59.28%**	**53**

Average Daily Dose (mg)



Average Length of Therapy (Days)



Outpatient Antimicrobial Stewardship Metrics

System-Level

- Prescribing data
  - Normalized
- Rates of concordance
- Rate of identification of a diagnosis for prescriptions
- Benchmarking among clinics and with other health systems
- Rates of immunizations

Prescriber-Level

- Granular prescribing data
- Rates of concordance for target diagnoses
- Benchmarking among peers
- Rates of immunizations

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