

DEVELOPMENT OF CLINICAL PATHWAYS TO IMPROVE ANTIMICROBIAL STEWARDSHIP IN THE OUTPATIENT SETTING

NEBRASKA ANTIMICROBIAL STEWARDSHIP SUMMIT

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DISCLOSURES

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OBJECTIVES



Explain why outpatient antimicrobial stewardship (AMS) is needed



Identify barriers and possibilities for improving prescribing



Evaluate the evidence of different outpatient AMS interventions



How to develop an outpatient clinical pathway

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WHAT IS ANTIBIOTIC STEWARDSHIP (AMS)?

Effort to measure and improve how antimicrobials are prescribed by clinicians and used by patients

Involves implementing strategies to modify prescribing practices to align with evidence-based recommendations for diagnosis and management of diseases

Ensure the right drug, dose, frequency, and duration are utilized when prescribing antimicrobials

CDC core elements. <https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html>

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WHY OUTPATIENT STEWARDSHIP?

Over 60% of antibiotic expense is for outpatient

Over 85% of antibiotic use occurs in the outpatient settings

National surveillance study showed at least 30% of outpatient antibiotic prescriptions are unnecessary

50 % receive inappropriate dose, drug, or duration

CDC core elements. <https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html>

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CDC: OUTPATIENT ANTIBIOTIC PRESCRIBING

Table 3. Oral antibiotic prescribing by provider specialty — United States, 2020

Provider Specialty	Number of Antibiotic Prescriptions (Millions)	Antibiotic Prescriptions Per Provider, Rate
Primary Care Physicians	64.1	270
Physician Assistants & Nurse Practitioners	62.3	360
Surgical Specialties	15.3	172
Dentistry	23.4	191
Emergency Medicine	9.5	295
Dermatology	5.6	496
Obstetrics/Gynecology	4.6	123
Other	17.0	82
All Providers*	201.9	221

*Total may not add to all oral prescriptions (201.9 million) due to rounding.

Centers for Disease Control and Prevention. Outpatient antibiotic prescriptions — United States, 2020.
[Outpatient Antibiotic Prescriptions - United States, 2020 \(cdc.gov\)](https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html)

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CDC: OUTPATIENT ANTIBIOTIC PRESCRIBING

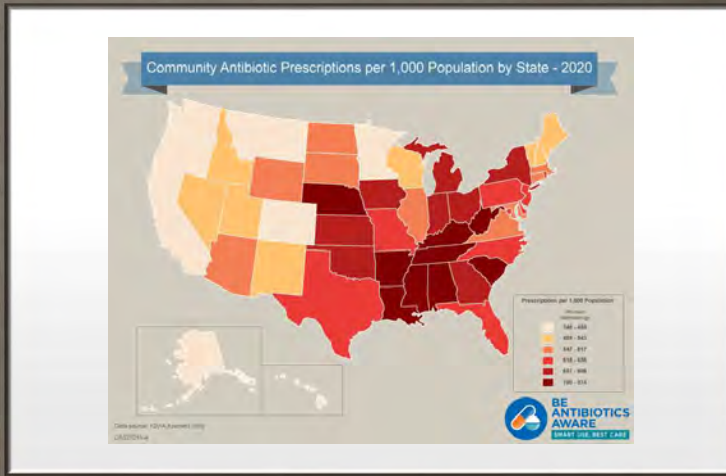
Table 2. Top oral antibiotic classes and agents—United States, 2020

Characteristics: Antibiotic class	Number of Antibiotic Prescriptions (Millions)	Antibiotic Prescriptions Per 1,000 Persons, Rate
Penicillins	43.2	131
Cephalosporins	30.2	92
Macrolides	29	88
Tetracycline	22.7	69
B-lactams, increased activity	21	64
Characteristics: Antibiotic agent	Number of Antibiotic Prescriptions (Millions)	Antibiotic Prescriptions Per 1,000 Persons, Rate
Amoxicillin	39.3	119
Azithromycin	27.6	84
Amoxicillin/clavulanic acid	21	64
Cephalexin	19.6	60
Doxycycline	19.5	59

Centers for Disease Control and Prevention. Outpatient antibiotic prescriptions — United States, 2020.
[Outpatient Antibiotic Prescriptions - United States, 2020 \(cdc.gov\)](https://www.cdc.gov/antibiotic-use/data/outpatient-antibiotic-prescriptions-united-states-2020)

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WE ARE BETTER HERE...



Outpatient Antibiotic Prescriptions — United States, 2020 | Antibiotic Use | CDC

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AMBULATORY AMS NATIONAL COHORT DATA

Cross-sectional, multicenter survey assessing the frequency of ambulatory ASPs in US

1662 surveys sent with 172 responses (129 were included)

Only 9 (7%) had fully functional ambulatory ASP

57% had no program

45% had institution specific treatment guidelines (UTI, pharyngitis, sinusitis, otitis)

21% set at least 1 annual goal,

Others: 11% provider incentives, 10% required indication on antimicrobials, 6% required written accountable justification

Only 18% reported program effectiveness but of those 94% showed decrease antimicrobial utilization

Eudy, Joshua L et al. "Antimicrobial Stewardship Practice in the Ambulatory Setting From a National Cohort." *Open forum infectious diseases* vol. 7, 11 ofaa513. 24 Oct. 2020, doi:10.1093/ofid/ofaa513

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BARRIERS



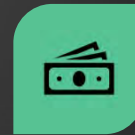
SUPPORT



PERSONNEL



TIME



FUNDING

El Feghaly, Rana E., et al. "Outpatient Antimicrobial Stewardship Programs in Pediatric Institutions in 2020: Status, Needs, Barriers." *Infection Control & Hospital Epidemiology*, 2021, pp. 1-7., doi:10.1017/ice.2021.416

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CDC Core Elements

Commitment
Demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety.

Action for policy and practice
Implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed

Tracking and reporting
Monitor antibiotic prescribing practices and offer regular feedback to clinicians, or have clinicians assess their own antibiotic prescribing practices themselves.

Education and expertise
Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on optimizing antibiotic prescribing.

CDC core elements. <https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html>

NATIONAL GUIDANCE

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NATIONAL GUIDANCE

The Joint Commission

- Identifying an antimicrobial stewardship leader
- Establishing an annual antimicrobial stewardship goal
- Implementing evidence-based practice guidelines related to the antimicrobial stewardship goal
- Providing clinical staff with educational resources related to the antimicrobial stewardship goal
- Collecting, analyzing, and reporting data related to the antimicrobial stewardship goal
- Effective Jan 1, 2020

R3 Report. "Antimicrobial Stewardship in Ambulatory Health care." The Joint Commission. June 2019; https://www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_23_antimicrobial_stewardship_amb_6_14_19_final2.pdf

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CDC: ACTION- CLINICAL PATHWAYS

- Task oriented and time sequenced plan of care of patients with a specific problem to improve quality of care and reduce unnecessary variation
 - Multidisciplinary plan of care
 - Steps in a course of treatment of care in a decision tree or other actions
 - Provide timeframes or criteria-based progression
 - Standardizes care for a specific clinical problem or procedure in a specific population



Hipp, Rachel et al. "A Primer on Clinical Pathways." *Hospital pharmacy* vol. 51,5 (2016): 416-21. doi:10.1310/hpj5105-416

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Lee et al.

CLINICAL GUIDELINE LITERATURE

Methods:

- Evaluated antibiotic prescribing patterns for acute respiratory tract infections, SSTI, and UTI in a single center urgent care site pre and post implementation of outpatient clinical guidelines
- Guidelines reviewed with all MDs and APRNs and pocket cards provided

Results:

- Significant improvement in guideline concordant (indication, drug, dose, frequency, duration) antibiotic prescribing by 20% ($P < 0.001$) in urgent care setting

Lee, Patricia et al. "Impact of outpatient antimicrobial stewardship guideline implementation in an urgent care setting." *Journal of the American Pharmacists Association : JAPHA*, S1544-3191(22)00217-5. 16 Jun. 2022, doi:10.1016/j.japh.2022.06.004

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CLINICAL GUIDELINE LITERATURE

Johnson et al.

Methods

- VA system
- Focused on acute uncomplicated bronchitis (AUB)
- Provided stepwise approach
 - Needs assessment- interviewed 80% of providers from clinics on current antibiotic prescribing
 - Education materials (CDC clinic posters, brochures, supportive care prescription pads)
 - Audit and feedback then targeted feedback (monthly comparison reports)
 - Chart reviews for select prescribers
 - Grand rounds presentation

Results:

- Audit and feedback on individual patient encounters on highest prescribers most effective and time efficient intervention for sustained improvement
- Reduced antibiotic prescribing for AUB from 64.6% to 36.8%

Johnson, Morgan et al. "Operationalising outpatient antimicrobial stewardship to reduce system-wide antibiotics for acute bronchitis." *BMJ Open Quality* 2021;10:e001275. doi: 10.1136/bmjog-2020-001275

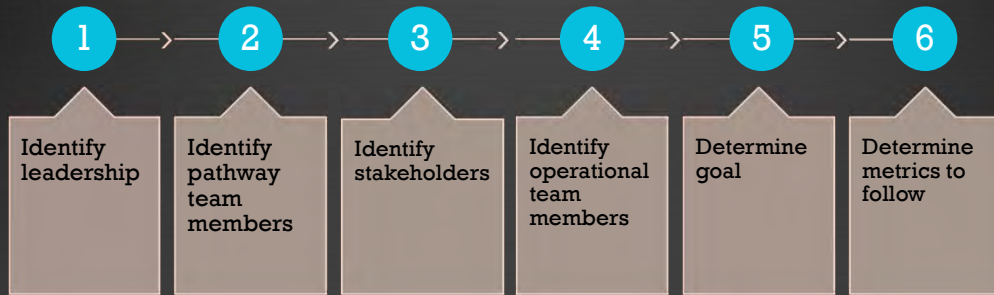
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WHICH CLINICAL PATHWAY DO I START WITH?

- Conduct needs assessment
- National guidelines established
- Engaged team members and stakeholders
- Resources available to assist with change
- Metrics can be acquired through electronic medical record

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WHERE TO BEGIN?



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CLINICAL PATHWAY TEAM



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CONTENTS OF CLINICAL PATHWAY



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PATHWAY DEVELOPED NOW WHAT?



Education

All people affected by clinical pathways
 Use pathway team members, educators,
 marketing, IT
 Include pathway education, implementation
 date, expectation of individual staff and
 consequences for not complying



Staff Resources

Order sets
 EMR pop-up
 Apps
 Pocket cards
 Posters

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EDUCATION

Preventing and Treating Ear Infections

Treatment

A doctor will determine what type of illness your child has by asking about symptoms and doing a physical examination. Your doctor can make the diagnosis of a middle ear infection by looking inside your child's ear to examine the eardrum and see if there is fluid in the middle ear.

Antibiotics are often not needed for middle ear infections because the body's immune system can fight off the infection on its own. But sometimes antibiotics, such as amoxicillin, are needed to treat otitis, severe cases, or cases that last longer than 2-3 days.

For mild cases of middle ear infection, your doctor might recommend **watchful waiting** or **delayed antibiotic prescribing**.

- Watchful waiting:** Your child's doctor may suggest watching and waiting to see if your child needs antibiotics. This gives the immune system time to fight off the infection. If your child doesn't feel better after 2-3 days of rest, extra fluids, and pain relievers, the doctor will write a prescription for an antibiotic.
- Delayed prescribing:** Your child's doctor may give an antibiotic prescription but will suggest that you wait 2-3 days to see if your child is still sick before filling it.

How to Feel Better

Some ways to feel better—whether or not antibiotics are needed for an ear infection:

- Rest.
- Drink extra water or other fluids.
- Take acetaminophen or ibuprofen to relieve pain or fever. Ask your doctor or pharmacist what medications are safe for your child to take and what dose to give your child.

Over-the-Counter Medicine and Children

Be careful about giving over-the-counter medicines to children. Not all over-the-counter medicines are recommended for children of certain ages.

- Pain relievers:
 - Children younger than 6 months: only give acetaminophen.
 - Children 6 months or older: it is OK to give acetaminophen or ibuprofen.
- Aspirin: but only serious illness that harms the liver and brain.

Be sure to ask your doctor or pharmacist about the right dosage of over-the-counter medicines for your child's age and size. Also, tell your child's doctor and pharmacist about all the prescription and over-the-counter medicines they are taking.

Prevention

You can help prevent ear infections by taking your best to stay healthy and take other healthy steps:

- Make sure your child is up to date on vaccinations and gets a flu vaccine every year. The pneumococcal vaccine protects against pneumococcal pneumonia, a common cause of middle ear infections.
- Wash your hands.
- Breastfeed exclusively until your baby is 6 months old and continue to breastfeed for at least 12 months.
- Don't smoke and avoid exposure to secondhand smoke.

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use

Preventing and Treating Bronchitis

Cough keeping you up at night? Soreness in your chest and feeling tired? You could have acute bronchitis, but be aware: an antibiotic will not help you get better.

What is Acute Bronchitis?

Bronchitis occurs when the airways of the lungs swell and produce mucus. That's what makes you cough. Acute bronchitis, often called a "chest cold," is the most common type of bronchitis. The symptoms last less than 3 weeks. If you're a healthy person without underlying heart or lung problems or a weakened immune system, this information is for you.

Symptoms

- Coughing with or without mucus production
- Soreness in the chest
- Fatigue (feeling tired)
- Mild headache
- Mild body aches
- Watery eyes
- Sore throat

Causes

- Acute bronchitis is usually caused by a virus and often occurs after an upper respiratory infection.
- Bacteria can sometimes cause acute bronchitis, but even in these cases antibiotics are NOT recommended and will not help you get better.

When to Seek Medical Care

See a healthcare professional if you or your child have any of the following:

- Temperature of 102.4°F or higher
- Cough with bloody mucus
- Shortness of breath or trouble breathing
- Symptoms that last more than 3 weeks
- Repeated episodes of bronchitis

BE ANTIBIOTICS AWARE

CDC

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ACUTE OTITIS MEDIA (AOM) CLINICAL PATHWAY 6 MONTHS – 12 YEARS

Children's HOSPITAL & MEDICAL CENTER

Does the patient have the following?

Check for all three of the criteria on equal and at least one of the following: bulging or redness of the eardrum, decrease hearing, pain or changes in eardrum color or shape, or otitis externa.

Exclusion Criteria

- Non-otitis media
- Otitis media with effusion (OME)
- Ear pain
- Temporary hearing loss
- Acute otitis externa
- Cold/Flu
- Acute otitis media with effusion (OME)
- Acute otitis media with effusion (OME)
- Otitis media with effusion (OME)
- Otitis media with effusion (OME)

Check the patient for non-otitis media (NOM): U.S. only: Temp < 102.4°F (38.6°C) and no bulging or redness of the eardrum. OR: Child has acute otitis media (AOM) or otitis externa.

Check for AOM: Children 3-24 months: either perforated or unperforated eardrum (any perforation) OR Children 24 months or older: otitis media with effusion (OME) or otitis externa.

First-Line Antibiotic Therapy

Amoxicillin (high strength 80 mg/kg/24 hr) or Amoxicillin-clavulanate (high strength) 16 mg/kg/24 hr (based on amoxicillin) for 10-14 days.

Treatment for Patients with Possible Allergy

Penicillin Allergy Pathway

Highly Penicillin-allergic patients (anaphylaxis, angioedema, or severe allergic reaction using penicillins) should be treated with clindamycin 16 mg/kg/24 hr (based on clindamycin) for 10-14 days.

Difficult-to-Treat Patients (allergic to penicillins, cephalosporins, or clindamycin): Clindamycin 16 mg/kg/24 hr (based on clindamycin) for 10-14 days.

Clinical Pathway for the Evaluation/Treatment of Children with Community-Acquired Pneumonia

Goals and Metrics

Parent Education

Provider Resources

Child with Suspected Community-Acquired Pneumonia

Initial Antibiotic Recommendations

Considerations for Treatment Failure

Related Pathway

Related Order Sets

Assess Patient for Presence and Severity of Pneumonia

Mild Pneumonia (Outpatient Treatment)

Moderate-Severe Pneumonia (Inpatient Treatment)

Severe Pneumonia (ICU Treatment)

Outpatient Diagnostic Testing

Initial Antibiotic Recommendations

ER/Inpatient Diagnostic Testing

Initial Antibiotic Recommendations

Considerations for Treatment Failure

Evaluation and Management of Treatment Failure

Transition to Oral Antibiotics

Inpatient Discharge Criteria

Evidence

See All Evidence

CHOP Programs

Division of Infectious Diseases

CHOP Outpatient Antimicrobial Stewardship Program

Educational Media

Primary Care Perspectives Podcast for Pediatricians

Episode 3: Community-acquired Pneumonia in Children

How to Treat Dehydration from Stomach Issues in Children

PEP Pediatric Pneumonia

Related Links

Page in Atlas: When to Call the Doctor

PATHWAY EXAMPLES

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PATHWAY EXAMPLES

ACUTE OTITIS MEDIA
 EXECUTIVE SUMMARY
 Physician Author: Dr. Melissa G. Cooney

Children's
 HOSPITAL & MEDICAL CENTER

Primary Objective
 Develop a pathway for treating acute otitis media (AOM) in Children's Physicians and Urgent Care clinics that standardizes first and second line antibiotic selection according to published literature taking into account local antibiotic resistance patterns.

Recommendations

Inclusion Criteria:

- Tenderness
- Children < 6 months or > 12 years of age
- Tympanostomy tubes
- Anatomic abnormalities
- Cleft palate
- Genetic conditions with craniofacial abnormalities such as Down Syndrome
- Immune deficiencies
- Cochlear implants
- Children with acute otitis media with effusion without acute otitis media

Exclusion:

- Older children with AOM usually present with a history of rapid onset of ear pain.
- Young pre-verbal children with AOM usually present with a history of rapid onset of signs and symptoms such as irritability (assessed by pulling/tugging/rubbing/holding of the ear, irritability, excessive crying, abnormal fever, or changes in the child's sleep or behavior pattern as noted by the child's caregivers). These findings other than otitis are nonspecific and frequently overlap those of an uncomplicated viral upper respiratory infection (URI). Other symptoms of a viral URI, such as cough and nasal discharge or stuffiness, often precede or accompany AOM and are nonspecific also. Accordingly, clinical history alone is poorly predictive of the presence of AOM, especially in younger children.^{1,2}

Distinguishing AOM from Otitis Media with Effusion (OME)

- OME may occur either as the aftermath of an episode of AOM or as a consequence of Eustachian tube dysfunction attributable to URI. It may also precede or predispose to the development of AOM.³
- OME does not represent an acute infectious process that benefits from antibiotics.⁴

Examination of the Tympanic Membrane (TM)

- Visualization of the tympanic membrane with observations of a visible ear effusion (VEE) and inflammatory changes is necessary to establish the diagnosis of AOM with certainty. Failure or failure of the tympanic membrane on otoscopy has the highest predictive value for the presence of VEE.⁵

Disclaimer: This pathway has been created as a guide to practitioners and is not intended to be used as a substitute for professional judgment. These pathways are subject to change without notice. All recommendations herein are for educational purposes only and do not constitute a medical opinion or advice. For more information, please contact the pathway team at childrens.pathways@childrenshospital.org.

Guideline for the Management of Community-Acquired Pneumonia

DEFINITION:
Community-Acquired Pneumonia (CAP) is pneumonia that occurs within 48 hours of hospital admission or is present on admission to the hospital.

EXECUTIVE SUMMARY: see Appendix 4 for details

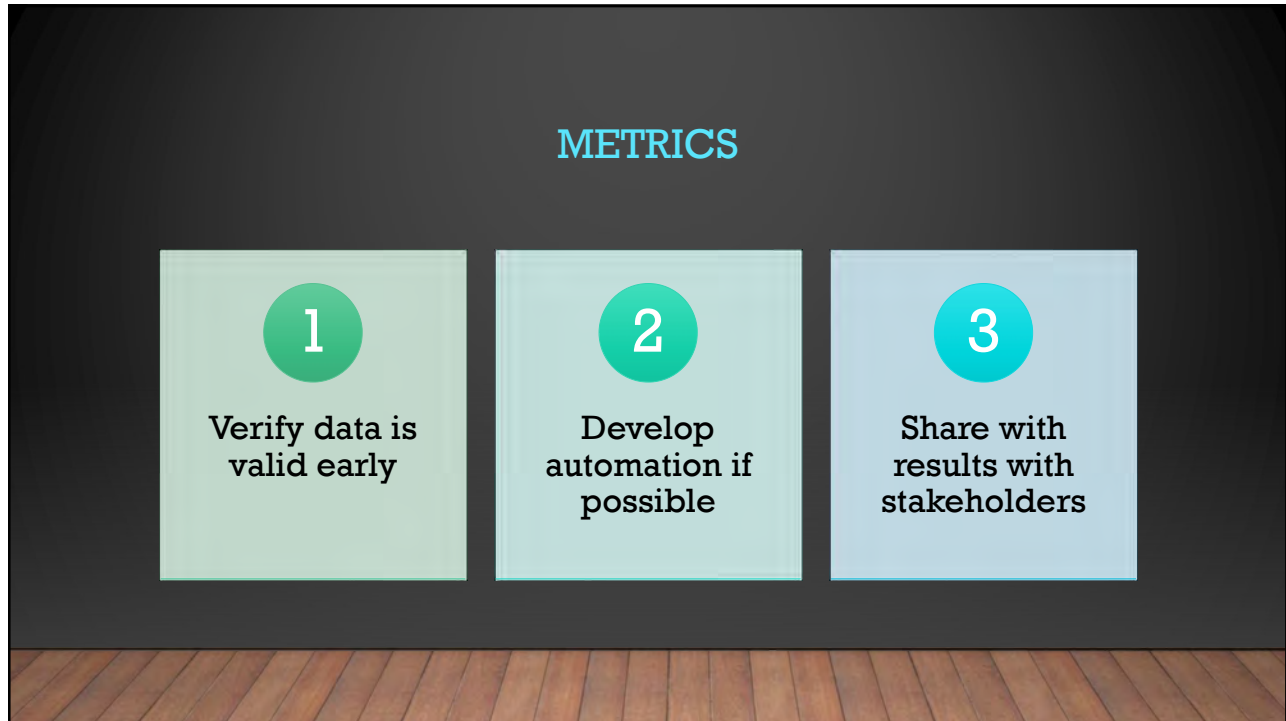
Patient not being admitted to the hospital:	
<p>No comorbidities:</p> <ul style="list-style-type: none"> Amoxicillin OR Doxycycline 	<p>Comorbidities present:</p> <ul style="list-style-type: none"> Malignancy, alcoholism, asplenia, diabetes, chronic heart/lung/liver/kidney disease Amoxicillin/Clavulanic OR cefuroxime PLUS azithromycin OR doxycycline Severe beta-lactam allergy: Fluoroquinolone (levofloxacin or moxifloxacin)
Patient Admitted to the hospital:	
<p>Non-Specific:</p> <ul style="list-style-type: none"> Ampicillin/Sulbactam OR Ceftriaxone PLUS Azithromycin OR Doxycycline (preferred) Levofloxacin 	<p>Specific:</p> <ul style="list-style-type: none"> Septic shock, respiratory failure, or 3 minor criteria See Box 1 below Ampicillin/Sulbactam OR Ceftriaxone PLUS azithromycin* OR levofloxacin Severe beta-lactam allergy: Levofloxacin
Do not routinely add broad spectrum antibiotics. Evaluate risk factors.	
<ul style="list-style-type: none"> If history of respiratory tract colonization with MRSA, gram-negative not resistant to CAP agents, OR recent hospital stay with use of IV antibiotics (15 days) → Obtain sputum culture <ul style="list-style-type: none"> if culture positive for MRSA consider add Vancomycin or linezolid if culture positive for Pseudomonas consider use of Piperacillin/tazobactam OR Cefepime Patients improving on typical CAP therapy do not need to have antibiotic adjusted 	<ul style="list-style-type: none"> Always obtain respiratory tract diagnostic testing and modify therapy based on results MRSA sputum colonization, post-influenza pneumonia, severe necrotizing pneumonia <ul style="list-style-type: none"> Consider addition of vancomycin or linezolid to typical CAP therapy Resistant gram-negative equimolar colonization (Pseudomonas, organisms resistant to typical CAP therapy) <ul style="list-style-type: none"> Consider piperacillin/tazobactam* PLUS azithromycin* OR Cefepime PLUS Azithromycin* Recent hospital stay with use of IV antibiotics (15 days) <ul style="list-style-type: none"> Consider addition of vancomycin or linezolid PLUS <ul style="list-style-type: none"> Piperacillin/tazobactam* PLUS azithromycin* OR Cefepime PLUS Azithromycin*
<p>Early transition to oral therapy recommended in non-severe CAP</p> <p>Duration of Therapy: 5 days for Most Patients</p>	

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IMPLEMENT
CHANGE



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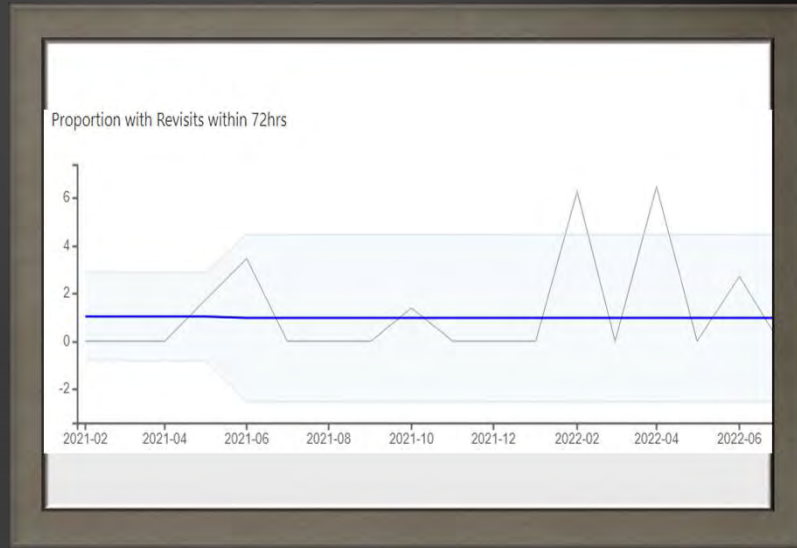


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METRICS EXAMPLE



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SUSTAINABILITY



MONITOR
SUCCESS



PROVIDE
REMINDERS



EDUCATIONAL
REFRESHERS



STATUS
UPDATES



INCENTIVIZE
COMPLIANCE

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