Antimicrobial Resistance

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MedNet21
Center for Continuing Medical Education

The Ohio State University
Wexner Medical Center

Objectives

- Highlight the burden of antimicrobial resistance (AMR)
- Discuss factors contributing to the emergence of AMR
- Review common pathogens displaying AMR

Antimicrobial Resistance (AMR)

"If we do not act to address the problem of AR, we may lose quick and reliable treatment of infections that have been a manageable problem in the United States since the 1940s. Drug choices for the treatment of common infections will become increasingly limited and expensive - and, in some cases, nonexistent."

-A Public Health Action Plan to Combat Antimicrobial Resistance

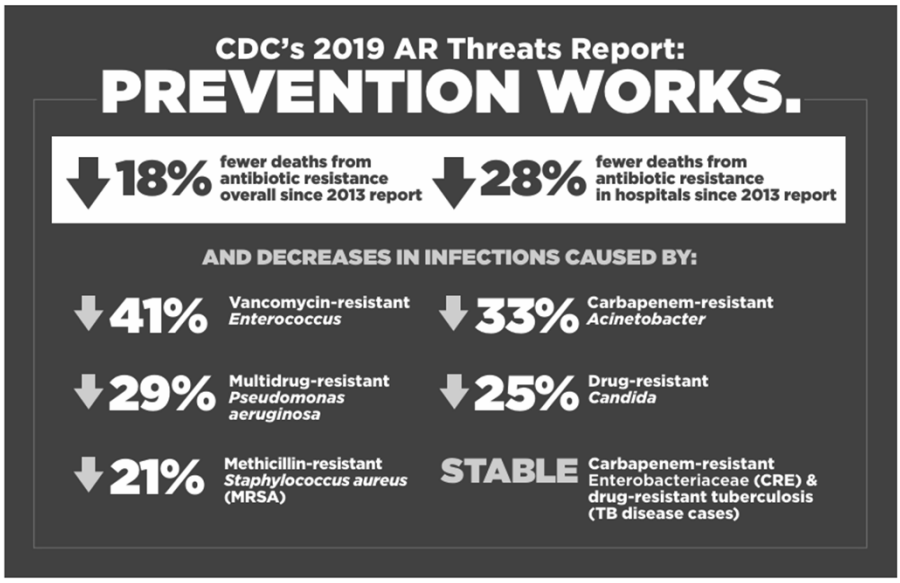
CDC 1999

Background

- Antibiotics are unlike any other agent in that use in one patient can compromise efficacy in another
- Prevalent use
  - 200-300 million antibiotic prescriptions annually
    - 45% outpatient
- 25-40% of hospitalized patients receive antibiotics
  - 10-70% are unnecessary or sub-optimal
  - 5% of hospitalized patients who receive antibiotics experience an adverse reaction
- Changes in antibiotic use are paralleled by changes in resistance patterns

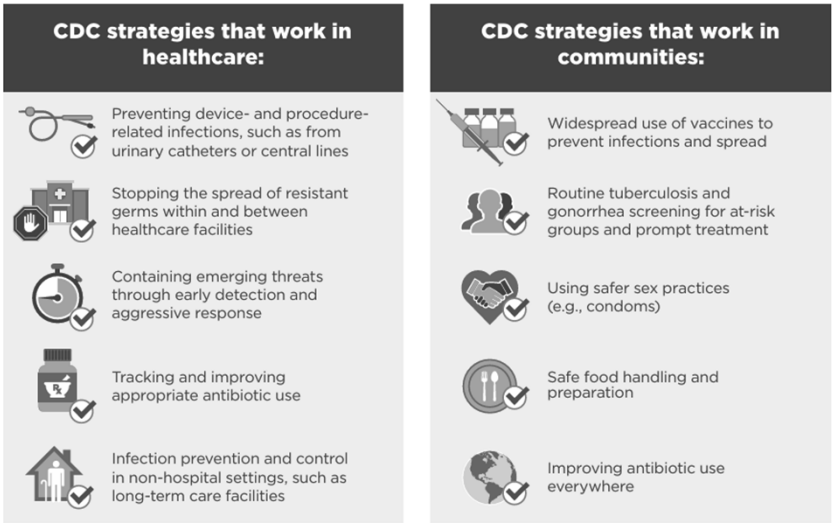
Klevens et al. *Public Health Rep*. 2007;122(2):160-166.
Stone et al. *Am J Inf Control*. 2005;33(9);542-547.

Antimicrobial Resistance (AMR)



CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019.

Strategies to Reduce AMR



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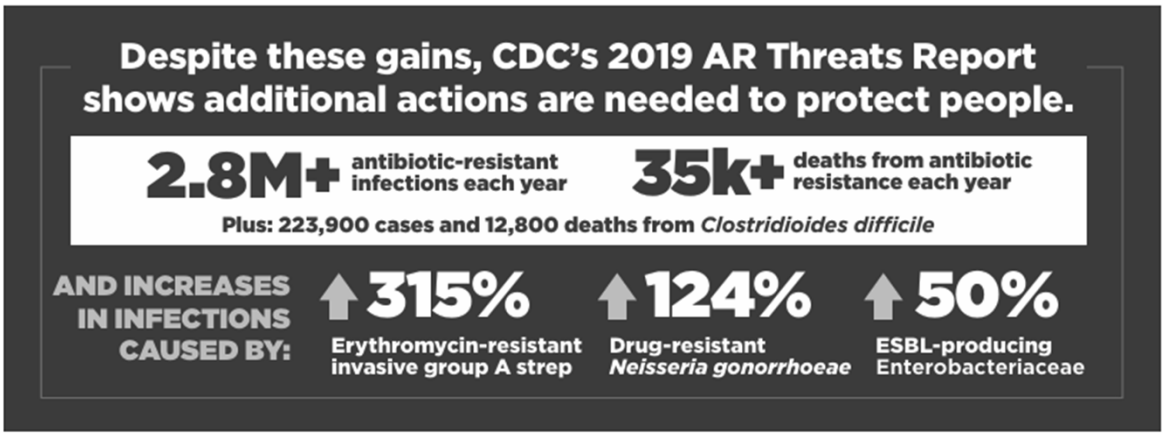
AMR Challenges



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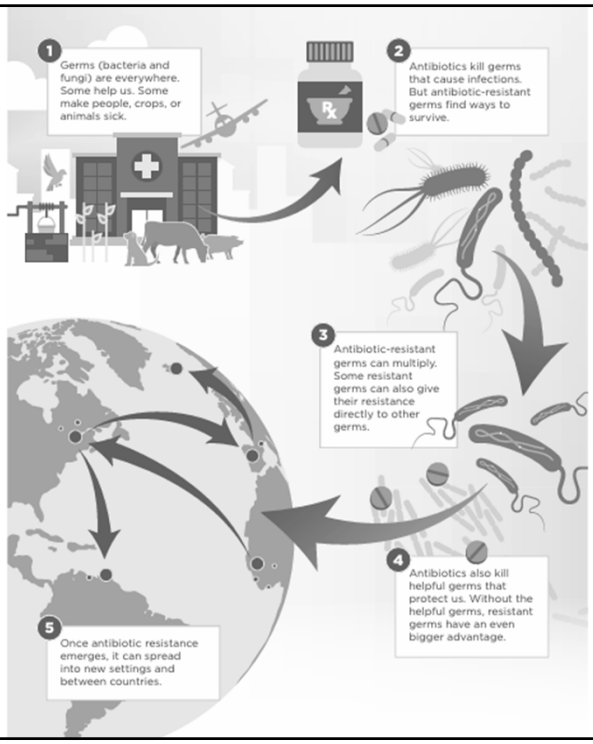
How Antibiotic Resistance Spreads



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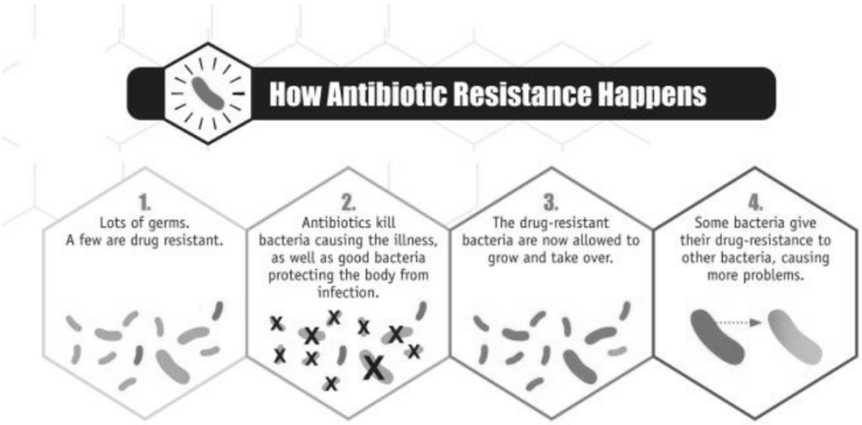
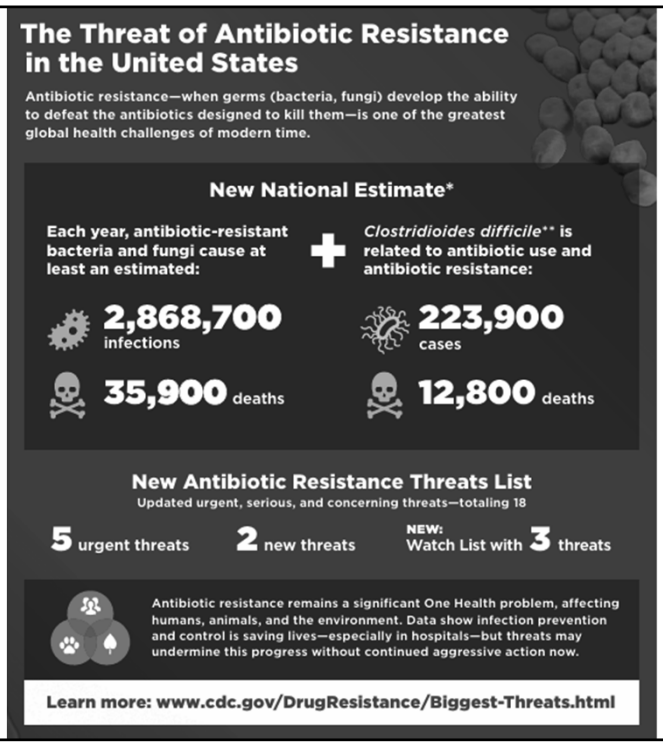
Bacterial Resistance



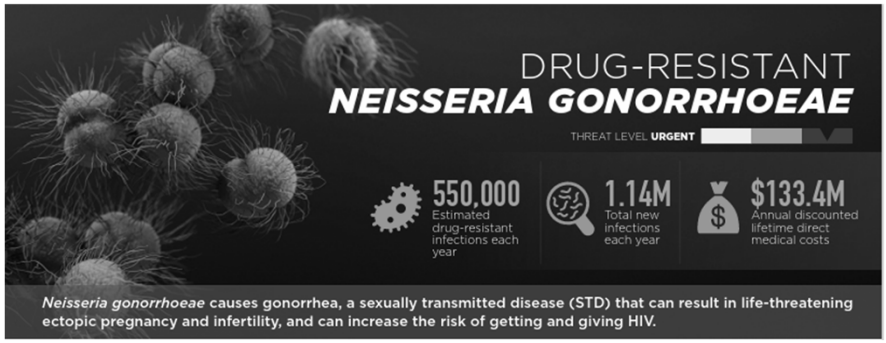
CDC's *Antibiotic Resistance Threats in the United States, 2019*

Antibiotic Resistance Can Emerge Quickly

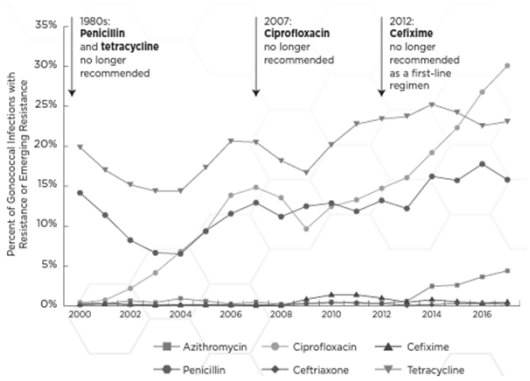
Antibiotic Approved or Released	Year Released	Resistant Germ Identified	Year Identified
Penicillin	1941	Penicillin-resistant *S. aureus*	1942
Methicillin	1960	MRSA	1960
Extended-spectrum cephalosporins	1980	ESBL-producing *E. coli*	1983
Daptomycin	2003	Daptomycin-resistant MRSA	2004
Ceftazidime-avibactam	2015	Ceftazidime-avibactam KPC-producing *K. pneumoniae*	2015



CDC Antibiotic Resistance Threat Report



- Gonorrhea spreads easily & is often asymptomatic
- Can cause serious health issues including ectopic pregnancy and infertility
- Timely diagnosis & routine screening with prompt & effective treatment is crucial
- Ceftriaxone last reliable agent
- CDC STI Treatment Guidelines excellent resource



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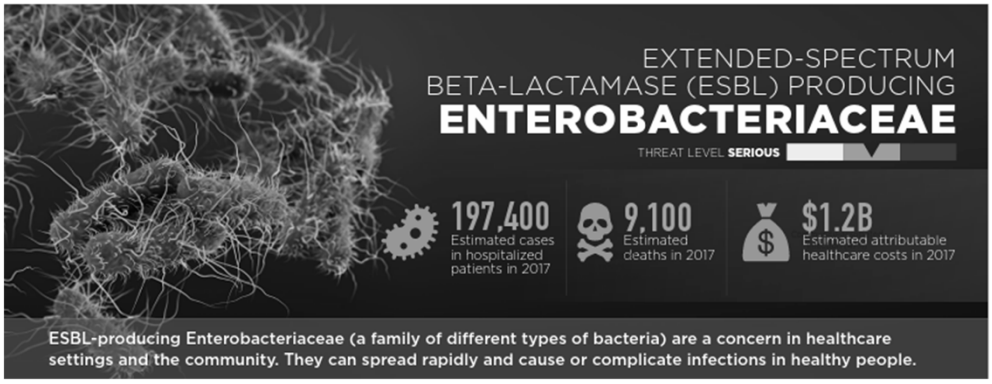
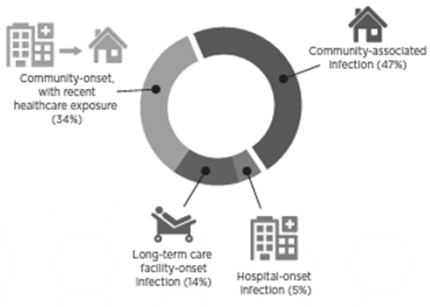


- Infections include UTIs, intra-abdominal infections, pneumonia, and bacteremia
- ESBL enzymes easily spread from one bacteria to another
- Hydrolyze penicillins and cephalosporins
  - May require hospitalization for IV carbapenem therapy (unless urinary isolate susceptible to PO options)



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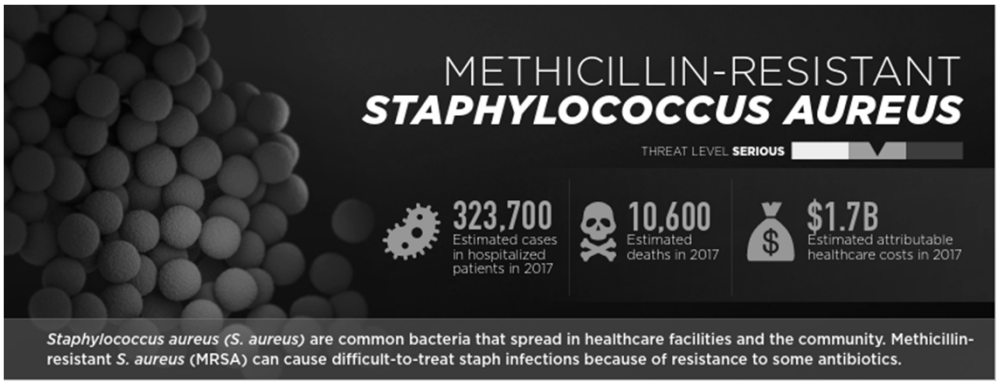
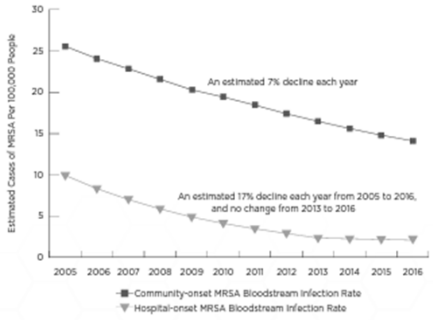


- Hospital reductions in MRSA have stalled
- Community MRSA infections may be connected to the opioid crisis
- Now resistant to many first-line options including clindamycin



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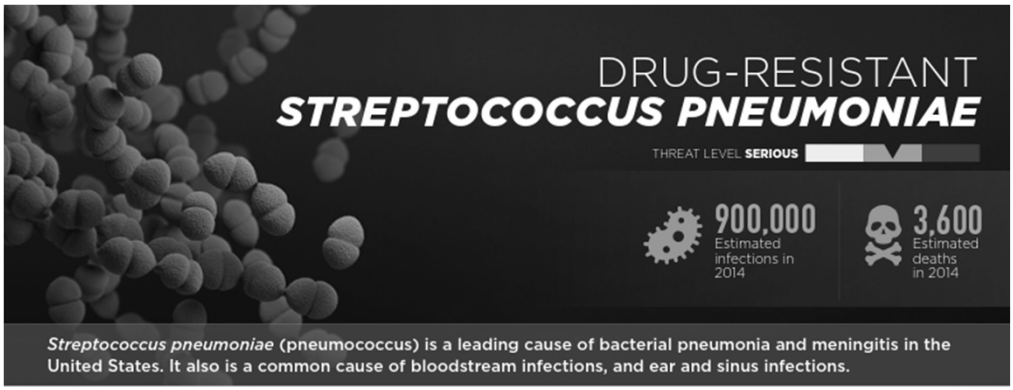
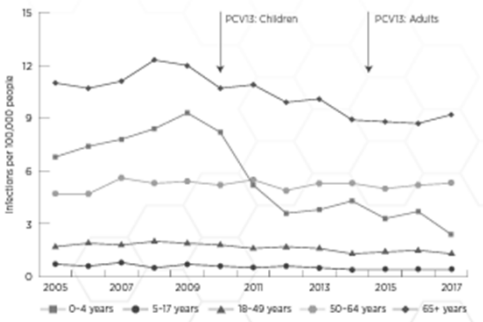
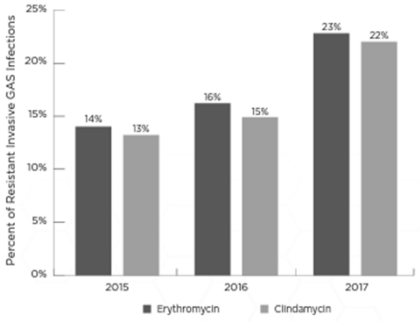


- One of the only drug-resistant bacteria with an effective vaccine to prevent infections
- Encouraging vaccination can slow the spread of pneumococcal resistance
- Resistance to penicillin (PO), tetracycline, and erythromycin common



CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019.

- Implicated in “strep throat”
- No resistance to penicillin/amoxicillin but allergies commonly reported
- Resistance to erythromycin and clindamycin is rising



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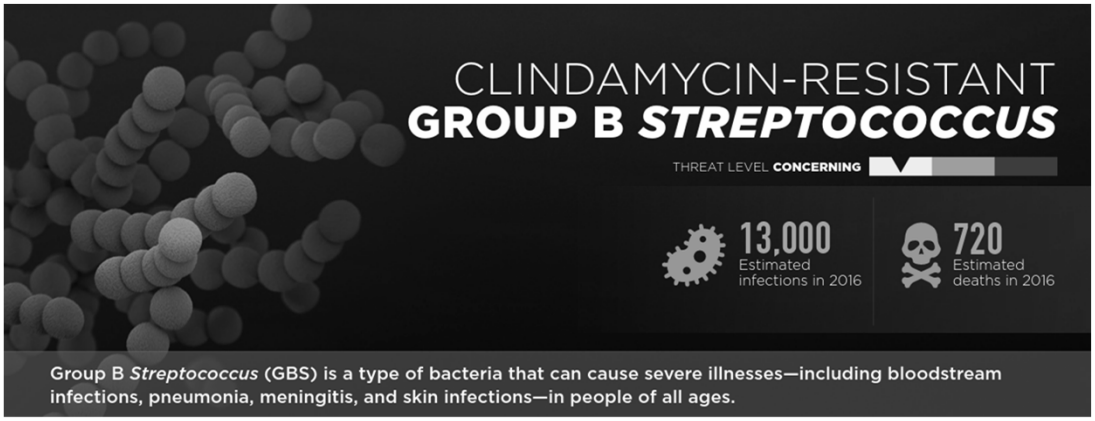
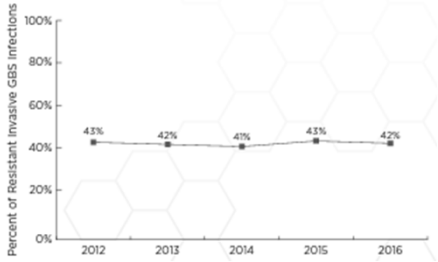


- Can be passed from mother to infant during labor threatening newborns with sepsis
- Clindamycin resistance limits prevention and treatment options for adults with severe penicillin allergies



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Antimicrobial Stewardship 101

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MedNet21
Center for Continuing Medical Education

The Ohio State University
Wexner Medical Center

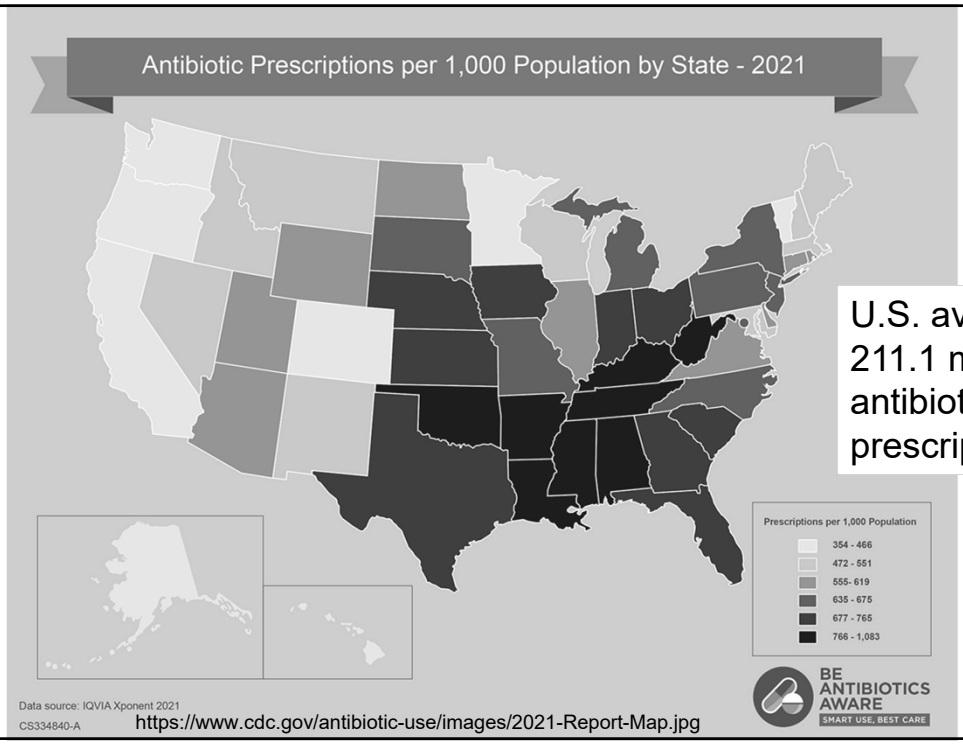
Objectives

- Examine the core elements of outpatient antimicrobial stewardship
- Discover resources available (🔍QR codes)
- Discern how to best implement in your clinical setting

Inpatient Antimicrobial Stewardship

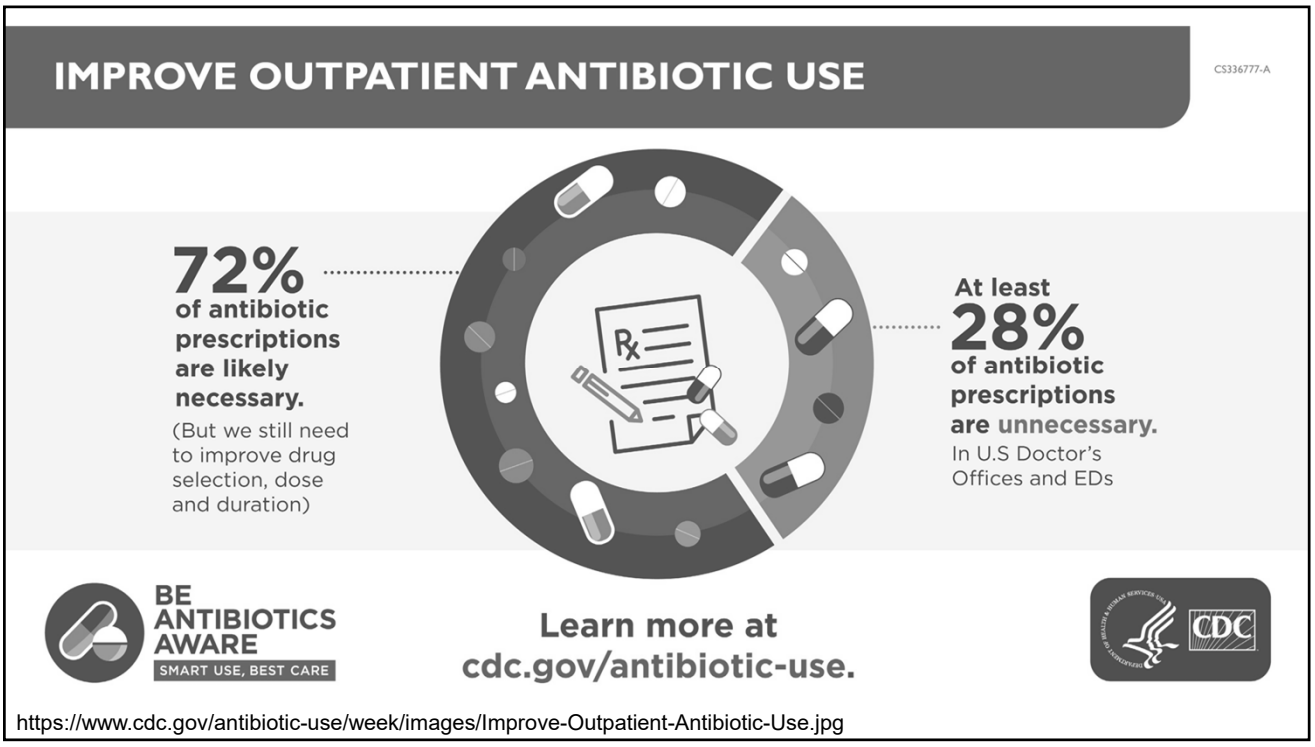
- Required at all hospitals by Joint Commission
- Encountering these efforts daily while rounding
  - Restricted antimicrobials
  - Prospective audits with intervention & feedback
  - IV to oral conversion of antimicrobials
  - Education
  - Guidelines & clinical pathways

OUTPATIENT



https://www.cdc.gov/antibiotic-use/images/2021-Report-Map.jpg

U.S. average 211.1 million antibiotic prescriptions



https://www.cdc.gov/antibiotic-use/week/images/Improve-Outpatient-Antibiotic-Use.jpg

Total inappropriate antibiotic use

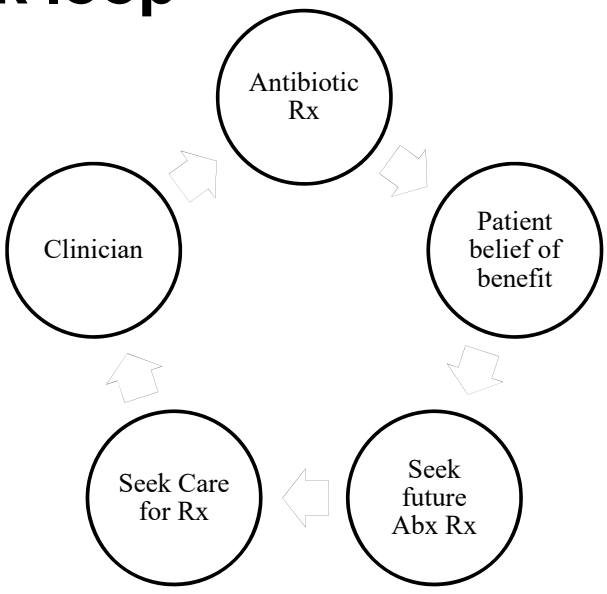
50%

- **Unnecessary use**
- **Inappropriate Selection**
- **Inappropriate Dosing**
- **Inappropriate Duration**

Reasons behind inappropriate Rx

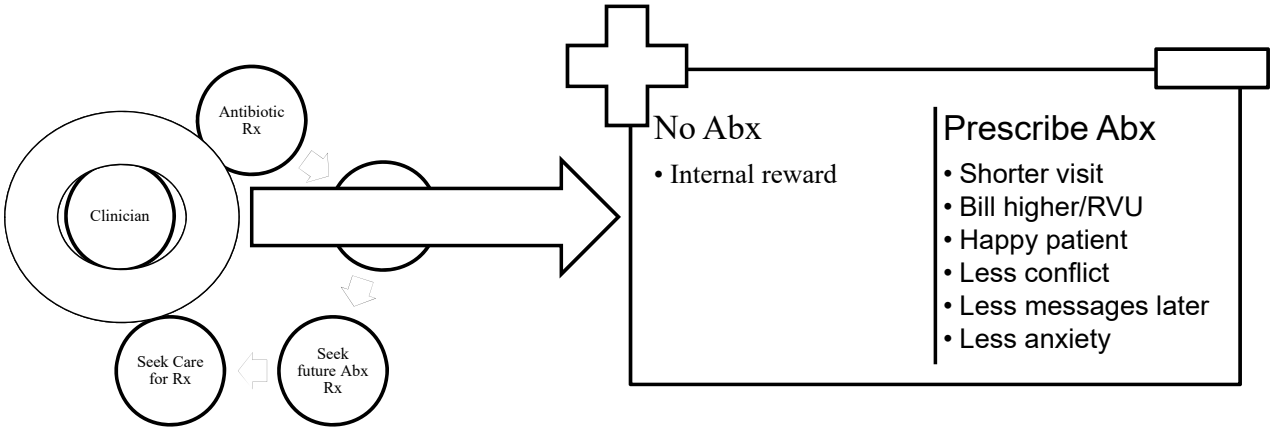
- Primarily psychologically & socially rooted
  - Rx is a **BEHAVIOR**, not a scientific decision
- Lack of awareness
  - Clinicians do not perceive they are prescribing inappropriately
- Misaligned incentives
- Inadequate knowledge regarding guidelines
- Fear from complications of infections
- All complicated by a feedback loop

Feedback loop



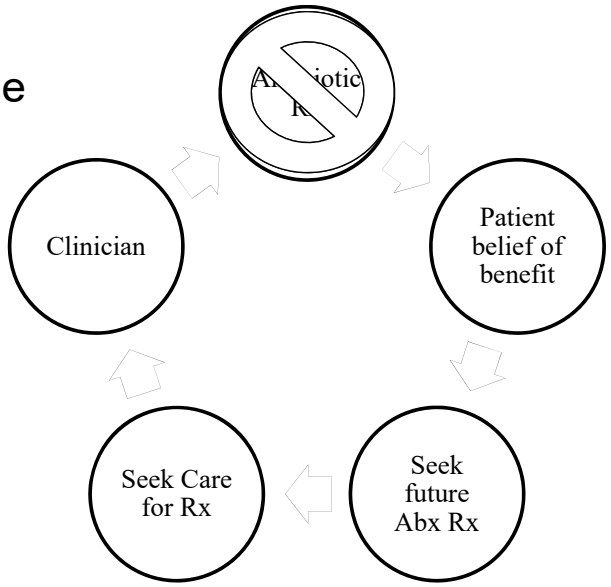
Shi Z, Barnett ML, Jena AB, Ray KN, Fox KP, Mehrotra A. Association of a Clinician's Antibiotic-Prescribing Rate With Patients' Future Likelihood of Seeking Care and Receipt of Antibiotics. Clin Infect Dis. 2021 Oct 5;73(7):e1672-e1679. doi: 10.1093/cid/ciaa1173.

Feedback loop



Feedback loop

- We are part of the cycle
- We **can** change
- Our patients behavior WILL change



CDC Core Elements of Outpatient Antimicrobial Stewardship

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

CDC Core Elements of Outpatient ASP

- **Commitment**
  - Dedication to appropriate antibiotic prescription & patient safety
- Action for policy & practice
- Tracking & reporting
- Education & expertise

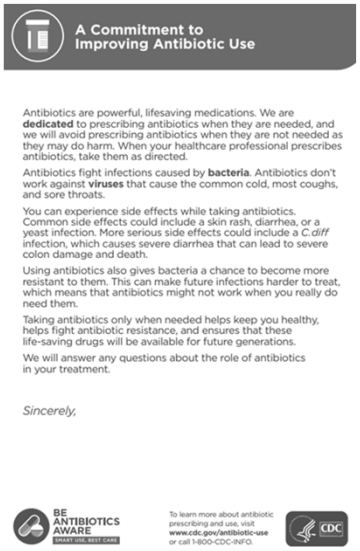
Commitment

- Display **public commitments** in support of ASP
- Identify a **leader** to direct activities within a facility
- Communicate with **all clinic staff** members to set patient expectations
    - This includes front desk, medical assistants, nurses, administrative staff

Commitment Poster

- In 2014 study by Meeker et al, evaluated use of poster in exam rooms effect on antibiotic prescriptions in acute URI
- Result: 19.7% absolute percentage reduction of inappropriate antibiotic prescribing rate relative to control
    - Results did not diminish over time

Commitment Poster



A Commitment to Improving Antibiotic Use

Antibiotics are powerful, lifesaving medications. We are **dedicated** to prescribing antibiotics when they are needed, and we will avoid prescribing antibiotics when they are not needed as they may do harm. When your healthcare professional prescribes antibiotics, take them as directed.

Antibiotics fight infections caused by **bacteria**. Antibiotics don't work against **viruses** that cause the common cold, most coughs, and sore throats.

You can experience side effects while taking antibiotics. Common side effects could include a skin rash, diarrhea, or a yeast infection. More serious side effects could include a *C.diff* infection, which causes severe diarrhea that can lead to severe colon damage and death.

Using antibiotics also gives bacteria a chance to become more resistant to them. This can make future infections harder to treat, which means that antibiotics might not work when you really do need them.

Taking antibiotics only when needed helps keep you healthy, helps fight antibiotic resistance, and ensures that these life-saving drugs will be available for future generations.

We will answer any questions about the role of antibiotics in your treatment.

Sincerely,

BE ANTIBIOTICS AWARE
SMART USE. BEST CARE

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use or call 1-800-CDC-INFO.

CDC

Soure: cdc.gov

Commitment Poster

A COMMITMENT TO OUR PATIENTS

WE ARE ANTIBIOTICS AWARE

Antibiotics Aren't Always The Answer

Antibiotics save lives. When a patient needs antibiotics, the benefits outweigh the risks of side effects or antibiotic resistance. When antibiotics aren't needed, they won't help you, and the side effects could still harm you.

At Ohio State, we're committed to appropriate antibiotic prescribing. We're doing our part in the fight against antibiotic resistance.

YOUR OHIO STATE PRIMARY CARE PROVIDERS

Read more at go.osu.edu/antibiotic

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Commitment Poster - Minnesota

Commitment Poster - DIY

https://www.health.mn.gov/diseases/antibioticresistance/hcp/commitkit

CDC Core Elements of Outpatient ASP

- Commitment
- **Action for policy & practice**
  - Implement at least one policy or practice to improve, assess if it works & modify as needed
- Tracking & reporting
- Education & expertise

Action for Policy & Practice

- Use **evidence-based diagnostic criteria** & **treatment** recommendations

- Use delayed prescribing practices or watchful waiting, when appropriate
  - Acute otitis media, sinusitis, etc

CDC treatment guidelines

https://www.cdc.gov/antibiotic-use/clinicians/adult-treatment-rec.html

Action for Policy & Practice

- Support for clinical decisions
- Utilizing call centers or RN hotlines as triage to prevent unnecessary visits

Action - Over the Counter "Prescription Pad"

- Education for patients on how to manage symptom control in acute respiratory illness
- Improves efficiency for clinician, decreases errors & allows for transaction to occur
  - ALL improve patient satisfaction

Over the Counter "Prescription Pad"

Symptom Relief for Viral Illnesses

BE ANTIBIOTICS AWARE
SMART USE. BEST CARE

1. DIAGNOSIS

- ○ Cold or cough
- ○ Middle ear fluid (Otitis Media with Effusion, OME)
- ☐ Flu
- ○ Viral sore throat
- ○ Bronchitis
- ○ Other:

You have been diagnosed with an illness caused by a virus. Antibiotics do not work on viruses. When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. The treatments prescribed below will help you feel better while your body fights off the virus.

2. GENERAL INSTRUCTIONS

- ○ Drink extra water and fluids.
- ○ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ☐ For sore throats in older children and adults, use ice chips, sore throat spray, or lozenges.
- ○ Use honey to relieve cough. Do not give honey to an infant younger than 1.

3. SPECIFIC MEDICINES

- ☐ Fever or aches:
- ○ Ear pain:
- ○ Sore throat and congestion:

Use medicines according to the package instructions or as directed by your healthcare professional. Stop the medication when the symptoms get better.

4. FOLLOW UP

- ☐ If not improved in ____ days/hours, if new symptoms occur, or if you have other concerns, please call or return to the office for a recheck.
- ○ Phone:
- ○ Other:

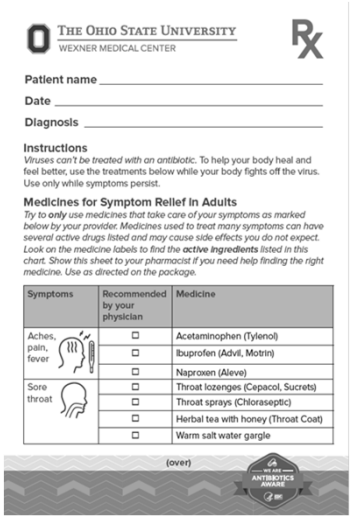
Signed: _____

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

CDC

Soure: cdc.gov

Over the Counter "Prescription Pad"



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℞

Patient name _____

Date _____

Diagnosis _____

Instructions

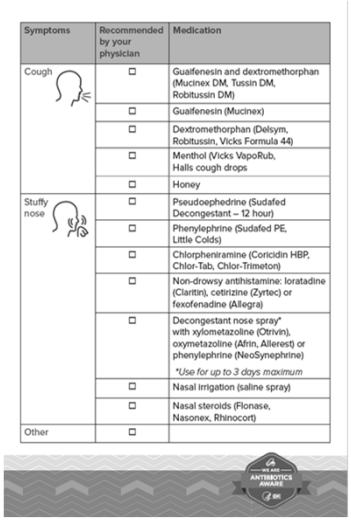
Viruses can't be treated with an antibiotic. To help your body heal and feel better, use the treatments below while your body fights off the virus. Use only while symptoms persist.

Medicines for Symptom Relief in Adults

*Try to **only** use medicines that take care of your symptoms as marked below by your provider. Medicines used to treat many symptoms can have several active drugs listed and may cause side effects you do not expect. Look on the medicine labels to find the **active ingredients** listed in this chart. Show this sheet to your pharmacist if you need help finding the right medicine. Use as directed on the package.*

Symptoms	Recommended by your physician	Medicine
Aches, pain, fever	☐	Acetaminophen (Tylenol)
	☐	Ibuprofen (Advil, Motrin)
	☐	Naproxen (Aleve)
Sore throat	☐	Throat lozenges (Cepacol, Sucrets)
	☐	Throat sprays (Chloraseptic)
	☐	Herbal tea with honey (Throat Coat)
	☐	Warm salt water gargle

(over)



Symptoms	Recommended by your physician	Medication
Cough	☐	Guaifenesin and dextromethorphan (Mucinex DM, Tussin DM, Robitussin DM)
	☐	Guaifenesin (Mucinex)
	☐	Dextromethorphan (Delsym, Robitussin, Vicks Formula 44)
	☐	Menthol (Vicks VapoRub, Halls cough drops
	☐	Honey
Stuffy nose	☐	Pseudoephedrine (Sudafed Decongestant – 12 hour)
	☐	Phenylephrine (Sudafed PE, Little Colds)
	☐	Chlorpheniramine (Coricidin HBP, Chlor-Tab, Chlor-Trimeton)
	☐	Non-drowsy antihistamine: loratadine (Claritin), cetirizine (Zyrtec) or fexofenadine (Allegra)
	☐	Decongestant nose spray* with xylometazoline (Otrivin), oxymetazoline (Afrin, Allerest) or phenylephrine (NeoSynephrine) *Use for up to 3 days maximum*
	☐	Nasal irrigation (saline spray)
	☐	Nasal steroids (Flonase, Nasonex, Rhinocort)
Other	☐	

CDC Core Elements of Outpatient ASP

- Commitment
- Action for policy & practice
- **Tracking & reporting**
  - Monitor antibiotic prescribing practices & offer regular feedback to clinicians or have them monitor themselves
- Education & expertise

Tracking & Reporting

- Self-evaluate antibiotic prescription practices
- Participate in CME & QI activities

- Implement at least one antibiotic prescription tracking & reporting system
- Assess & share performance on quality measures & established reduction goals
  - HEDIS measures

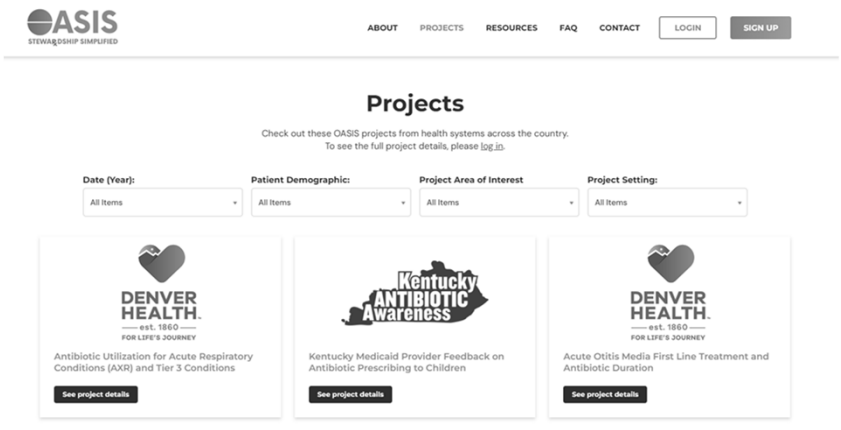
Tracking & Reporting – CDC

Contents

https://www.cdc.gov/antibiotic-use/pdfs/Measurement-Evaluation-Improve-Outpatient-508.pdf

Tracking & Reporting

- **OASIS Stewardship Simplified**



https://oasisstewardship.org/

CDC Core Elements of Outpatient ASP

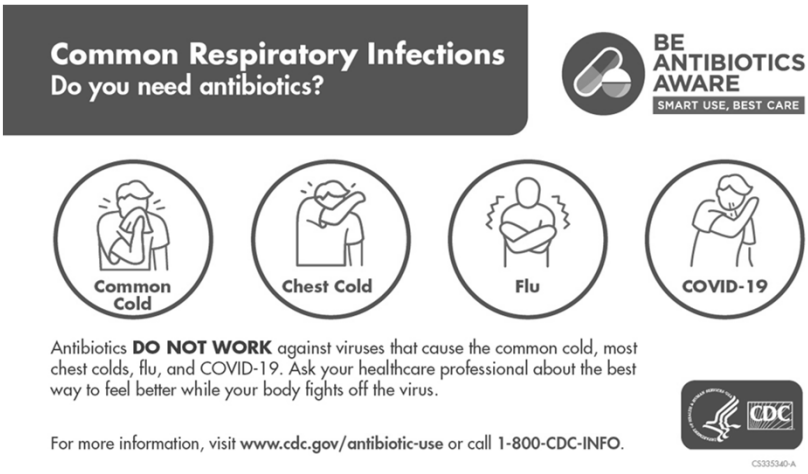
- Commitment
- Action for policy & practice
- Tracking & reporting
- **Education & expertise**
  - Provide educational resources to clinicians & patients on antibiotic prescribing
  - Ensure access to needed expertise on optimizing antibiotic prescribing

Education & Expertise

- Educate patients about
  - when antibiotics are needed & not needed
  - potential harms of antibiotics treatments
  - risks of antimicrobial resistance
- Discussing antibiotic allergy versus intolerance
  - Penicillin allergies…

Education & Expertise

- Educate patients – CDC infographics



Education & Expertise

- Communication skills training for clinicians
  - Providers poorly predict when patients want antibiotics
  - **DART – Dialogue Around Respiratory Illness Treatment modules**
    - Free online (directed towards parents of children)
    - https://www.uwimtr.org/dart/

ASP→ in practice

- Patient with pharyngitis

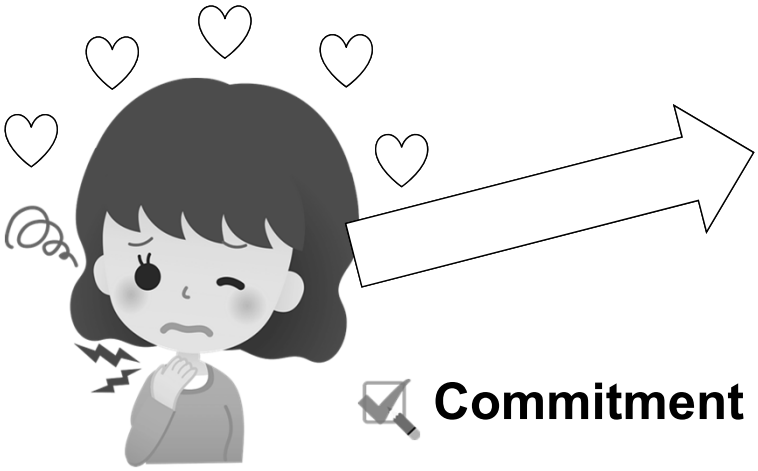
ASP → in practice

- Patient calls with complaint of sore throat
- **Triage line:** recommends patient present to clinic for further evaluation

☑ **Commitment & Policy**

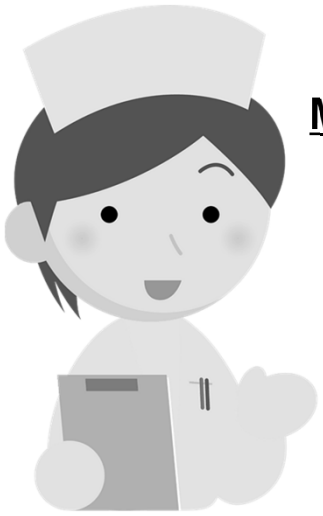
ASP→ in practice

- Patient sees poster in exam room



☑ **Commitment**

ASP→ in practice



<u>MA sets expectations</u>

- Does NOT promise antibiotics
- Reassure patient they will get great care

☑ **Commitment & Policy**

Policy & Practice – pharyngitis

☑ Evidence based diagnostic criteria

Centor criteria (>2)

- Fever
- Tonsillar exudates
- Tender cervical lymphadenopathy
- Absence of cough

→ **Rapid antigen detection test**

→  **No antibiotics**

→  **Antibiotics recommended**

https://www.cdc.gov/antibiotic-use/clinicians/adult-treatment-rec.html

Policy & Practice – pharyngitis

☑ Evidence based treatment

- + Centor → **+** RADT → Antibiotics for GAS
- Pick the <u>correct</u> antibiotic for the <u>correct</u> duration
- You appropriately select amoxicillin for 10 days… until patient **declares PCN allergy**

Education – pharyngitis

- Discuss allergy further ☑

- Recall GAS antibiotic resistance to azithromycin & clindamycin are increasingly common ☑

Source: cdc.gov

Education – pharyngitis

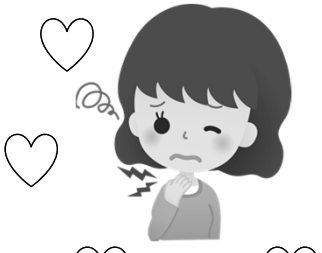
- Discuss allergy further ☑
- Decide amoxicillin is safe to use, educate patient AND <u>adjust flag</u> in the chart / EMR ☑

ASP – pharyngitis

- + Centor → **-** RADT → **No** Antibiotics

☑ **Evidence based diagnostic criteria**

ASP– pharyngitis

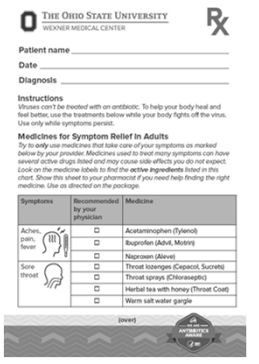


- + Centor → **-** RADT → **No** Antibiotics
- Astute clinician you suspect it is likely viral
  - Educate patient

    ☑ **Effective Education**

  - Provide supportive care recommendations

    ☑ **Policy & practice**



THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Rx

Patient name _____

Date _____

Diagnosis _____

Instructions

Viruses can't be treated with an antibiotic. To help your body heal and feel better, use the treatments below while your body fights off the virus. Use only while symptoms persist.

Medicines for Symptom Relief in Adults

*Try to **only** use medicines that take care of your symptoms as marked below by your provider. Medicines used to treat many symptoms can have several active drugs listed and may cause side effects you do not expect. Look on the medicine labels to find the **active ingredients** listed in this chart. Show this sheet to your pharmacist if you need help finding the right medicine. Use as directed on the package.*

Symptoms	Recommended by your physician	Medicine
Aches, pain, fever	☐	Acetaminophen (Tylenol)
	☐	Ibuprofen (Advil, Motrin)
	☐	Naproxen (Aleve)
Sore throat	☐	Throat lozenges (Cepacol, Sucrets)
	☐	Throat sprays (Chloraseptic)
	☐	Herbal tea with honey (Throat Coat)
	☐	Warm salt water gargle

(over)

Tracking – pharyngitis

- Depending on size of practice this can vary
- **Example:**
  - **Review rapid test results & antimicrobial use**
    - Even small chart review can be beneficial
  - **HEDIS measure for pharyngitis**
  - **OASIS project**

Tracking