
ANTIBIOTIC
STEWARDSHIP
Overview for Nursing
Medical
TABLET BY
EVERY DAY
Refills 4 times

LET'S MAKE A
C-DIFFERENCE
THE CDI PREVENTION COLLABORATIVE

Antibiotic Stewardship: Why It Matters

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

On a given day:

Do you know how many patients in the hospital are on antibiotics on a given day?

1. 20%
2. 50%
3. 70%

We Use a Lot of Antibiotics

- 1 in 2 patients are on antibiotic on a given day

Hospital

- 1 in 12 residents receive an antibiotic on a given day

Nursing Homes

- 13% of outpatient visits result in antibiotic prescription

Outpatient

https://www.cdc.gov/antibiotic-use/index.html

Not All Antibiotic Use is Necessary

- 30% of the antibiotics are unnecessary

Hospital

- Up to 75% of the antibiotics are unnecessary

Nursing Homes

- 30% of the antibiotics are unnecessary

Outpatient

https://www.cdc.gov/antibiotic-use/index.html

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Antibiotic Stewardship Defined

BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

Why Antibiotic Stewardship?

Fundamentally, antibiotic stewardship is a patient safety issue.

A formalized stewardship program can:

- Decrease unnecessary exposure to antibiotics
- Improve infection cure rates
- Reduce adverse drug reactions
- Slow the emergence of antibiotic resistance

Antibiotic Stewardship is Required

In addition to Improving the Appropriate Use, Antibiotic Stewardship Could Reduce Infection and Colonization with MDRO and *C. difficile*

Organism	Percent Reduction
MDRO	51%
ESBL	48%
MRSA	31%
C. difficile	32%

Antibiotic Stewardship Program is more effective when implemented with

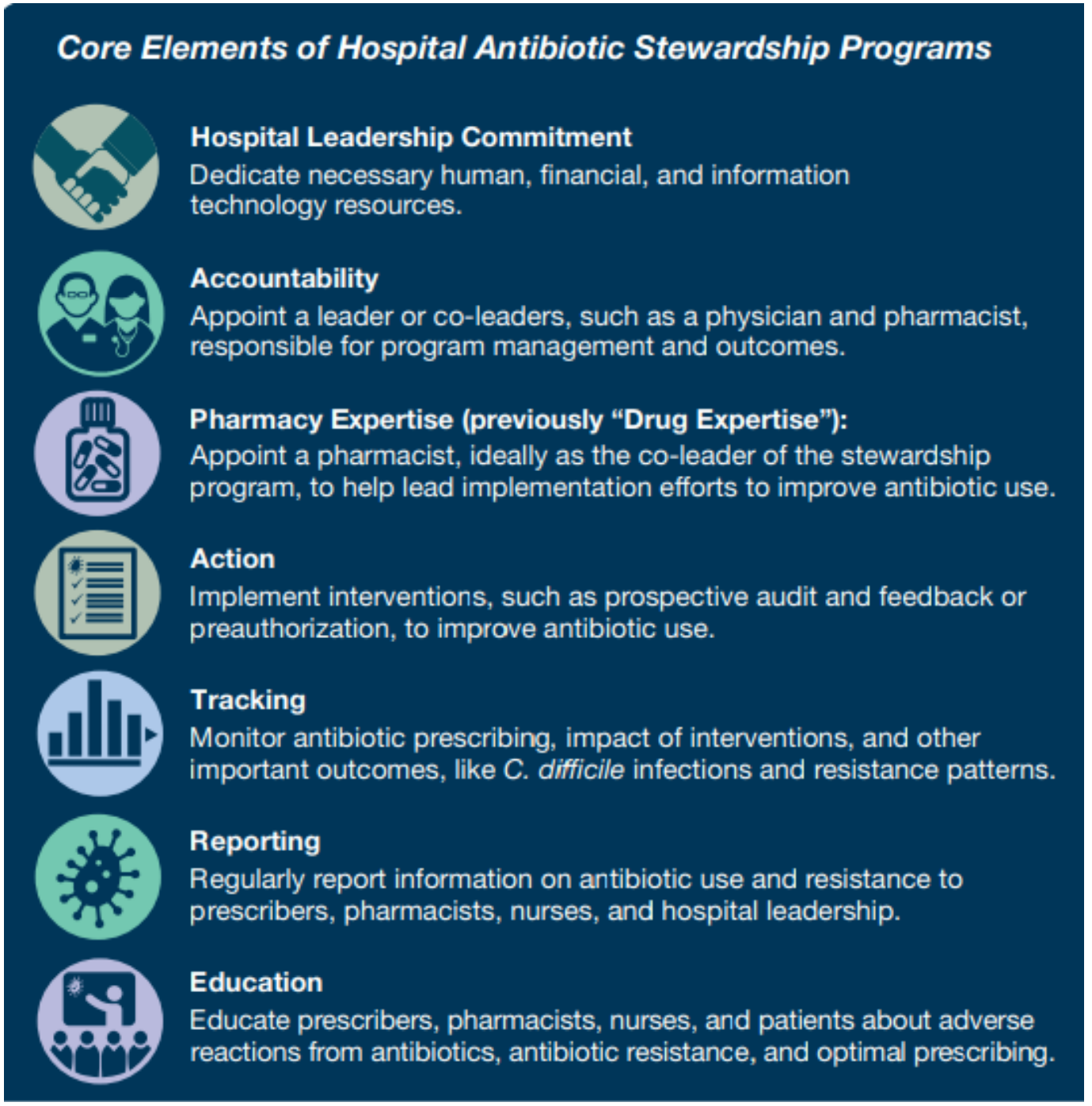
✓infection control measures

✓ especially hand hygiene

MDRO: multidrug resistant organisms
ESBL: Extended spectrum β lactamase producing organisms

Baur D. et al. Lancet Infectious Diseases. 2017;17:990-1001

Seven Core Elements of Hospital Antibiotic Stewardship



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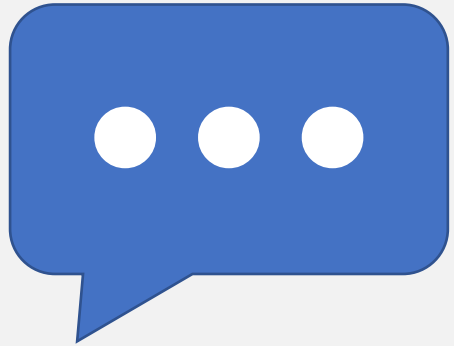
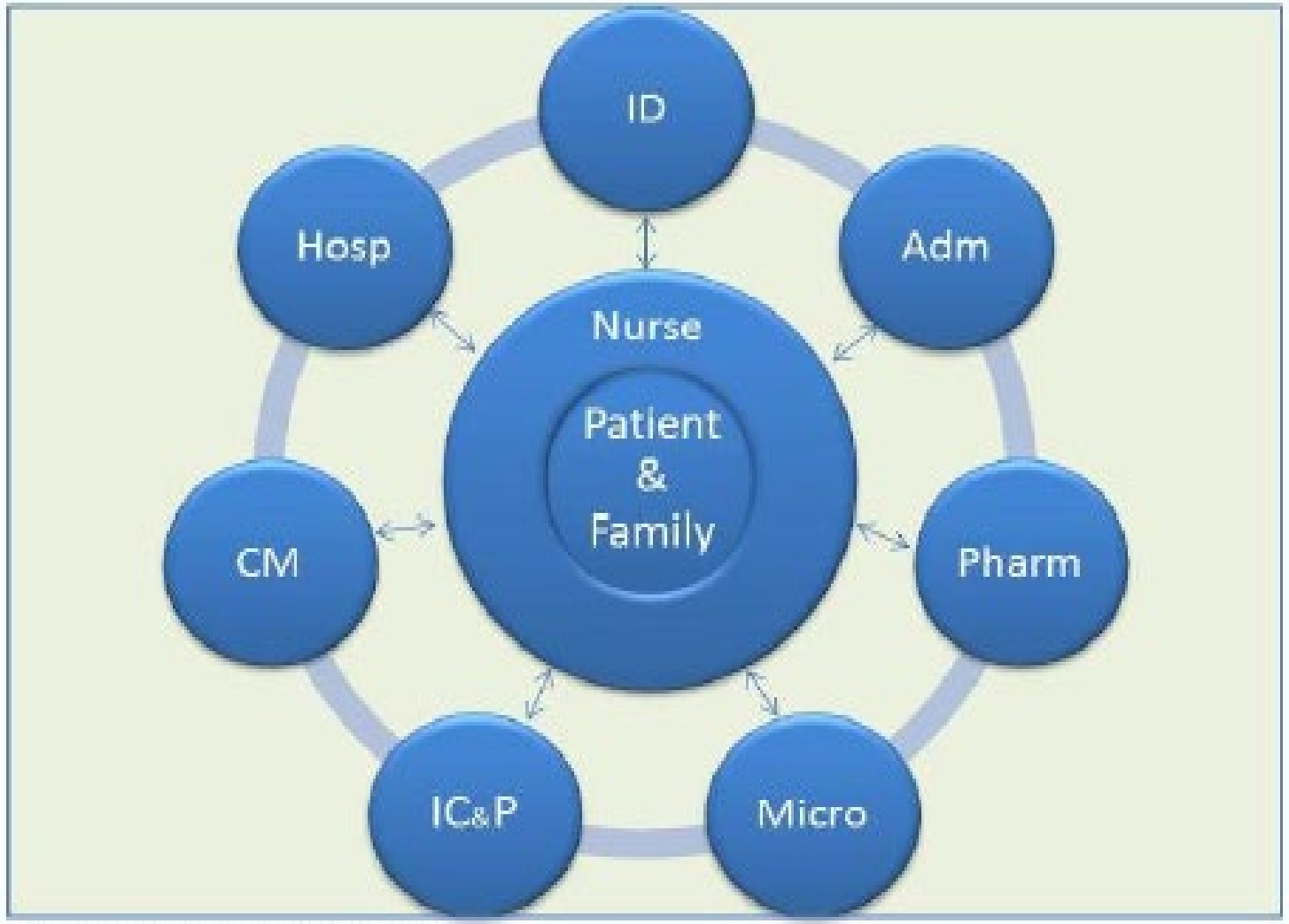
How Nursing Can Work to Improve Antibiotic Use

How is nursing already performing tasks related to stewardship?



Nurses are in a Unique and Vital Position for Optimizing Antibiotic Use



Examples of Bed Side Nurses' Role in Antibiotic Stewardship

Accountability:

- Taking part in the multidisciplinary ASP team, and asking questions of providers during rounding

Action

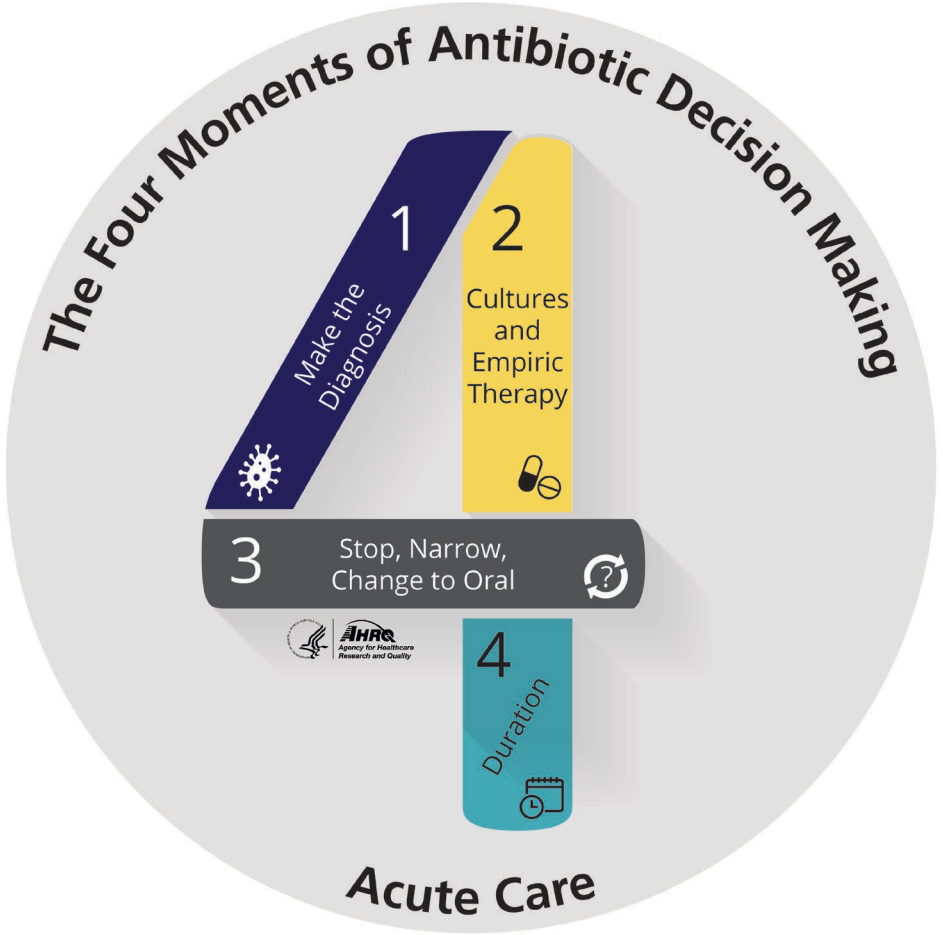
- Questioning the medical necessity of urine and *C. difficile* testing
- Ensuring proper urine and blood culturing techniques
- Ensuring prompt initiation of antibiotics especially in patients with sepsis
- Obtaining and recording an accurate penicillin allergy history
- Suggesting that the patient is ready for a switch from intravenous (IV) to oral (PO) antibiotics
- Initiating an antibiotic conversation for potential de-escalation or discontinuation

Education

- Educate patients and staff on use of antibiotics

Understanding the 4 Moments of Antibiotic Decision Making and the Role of Nurses in Assisting with the Decision

1. Does the patient have an infection that requires antibiotics?
2. Have appropriate cultures been ordered before starting antibiotics? What empiric therapy should be initiated?
3. A day or more has passed. Can antibiotics be stopped? Can therapy be narrowed? Can a change be made from IV to oral therapy?
4. What duration of antibiotic therapy is needed for the patient's diagnosis?



Tamma PD, Miller MA, Cosgrove SE. Rethinking how antibiotics are prescribed: incorporating the four moments of antibiotic decision making into clinical practice. JAMA 2018;321. doi: 10.1001/jama.2018.19509

1. Does the patient have an infection that requires antibiotics?

When antibiotics are not needed:

- Asymptomatic bacteriuria (ASB): positive urine culture but no sign or symptoms of a urinary tract infection
  - 50% in older women in nursing homes
  - 100% of catheterized patients
- An acute viral respiratory infection including COVID-19
- A decubitus ulcer with a positive culture but no fever or purulence
- *C. difficile* test if diarrhea is triggered by laxatives

2. Have appropriate cultures been ordered before starting antibiotics?

- Patients with suspected infections should have cultures from appropriate sites before antibiotics are started
- For patients with sepsis, blood cultures should be obtained prior to antibiotics

When Testing for Infectious Agents Is Not Needed

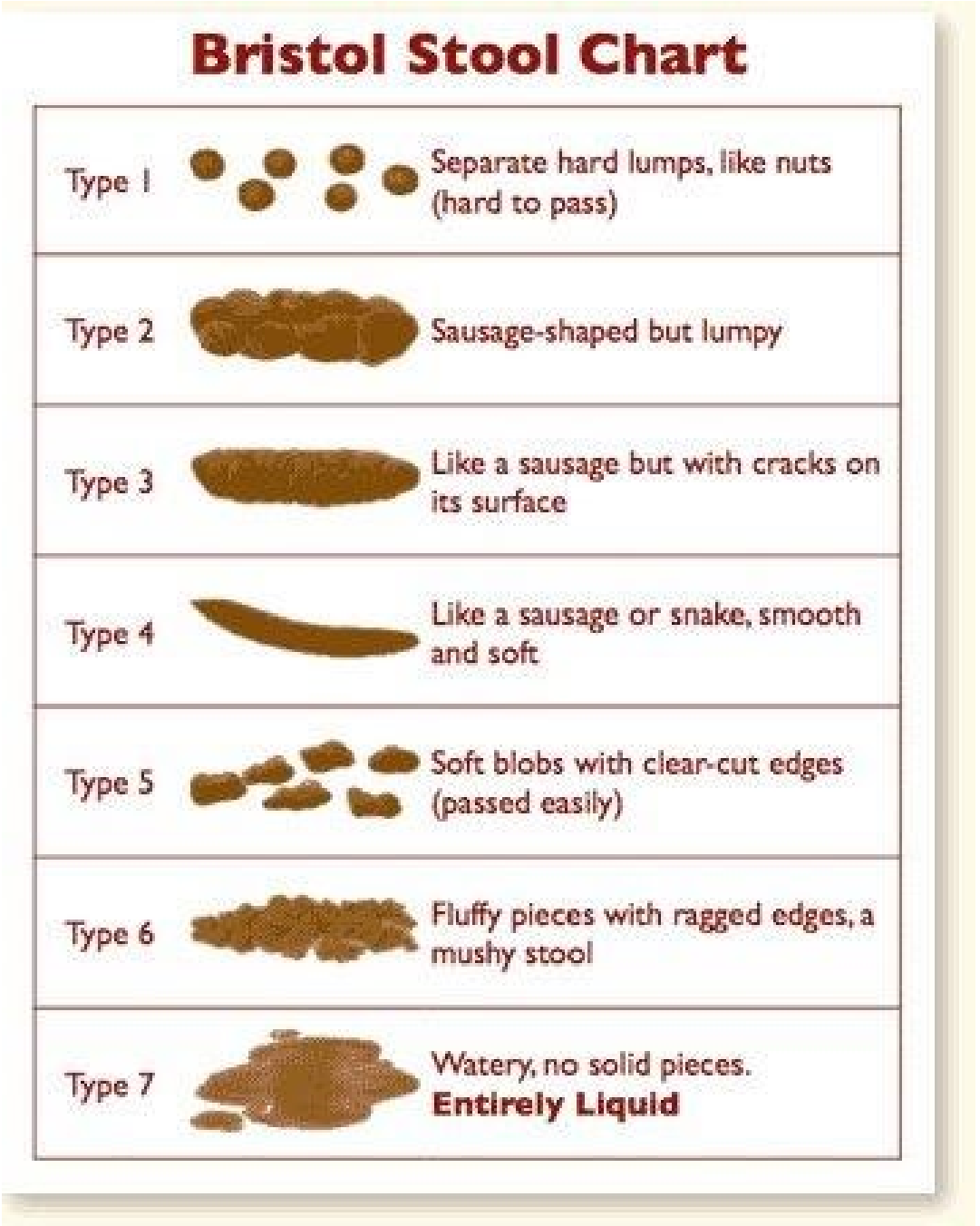
- Stool for *C. difficile* when patient is on laxatives
- Urine culture for foul smelling or cloudy urine

When to Test for *C. difficile*

- Diarrhea with ≥ 3 loose stool per day with no other explanation
- Stool should be loose enough to take she shape of the container (Bristol stool chart type 6 or 7)

When you should not test

- Patient is on laxatives for the past 24-48 hours
  - Stop laxative and observe
- After treatment to check for cure



When to Obtain a Urine Sample

YES!

- Dysuria, urgent or frequent urination, suprapubic pain or tenderness, flank pain or costovertebral angle tenderness, acute hematuria, or pelvic discomfort
- New onset or worsening sepsis with no identifiable cause
- Fever or altered mental status without evidence of another source on history, physical examination, or laboratory testing
- Preoperative evaluations, prior to urologic surgeries where mucosal bleeding is anticipated
- In spinal cord injury patients: increased spasticity, autonomic dysreflexia, sense of unease

https://www.cdc.gov/hai/prevent/cauti/without-indwelling.html

When to Obtain a Urine Sample

- Odorous, cloudy, or discolored urine in the absence of other localizing signs/symptoms
- Reflex urine cultures based on urinalysis results, such as pyuria, in the absence of other indications
- Urine culture to document response to therapy unless symptoms fail to resolve
- Screening for ASB in most groups
- Preoperative evaluations in most groups

https://www.cdc.gov/hai/prevent/cauti/without-indwelling.html

2. What empiric therapy should be initiated?

The Provider prescribes Appropriate Empiric Antibiotic using:

- Narrow spectrum for the suspected organism and site of infection
- Takes into consideration local susceptibility data (i.e. antibiogram)
- Patient's specific factors
  - Allergies
  - Severity of illness
  - Comorbidities

The Nurse ensures timely antibiotic administration:

- The nurse receives the orders, reviews dose/time for accuracy, checks for allergy, and administers and records the antibiotics.

Do you know:

What is the most common reason for antibiotics in the hospital?

1. Urinary tract infection
2. Respiratory tract infection
3. Skin infection

Most Common Indications for Antibiotics

Hospital	
LRTI	35%
UTI	22%
SSTI	16%
Total	73%

Nursing Homes	
UTI	30%
SSTI	22%
LRTI	15%
Total	67%

LRTI: lower respiratory tract infection
UTI: urinary tract infection
SSTI: skin and soft tissues infection

Thompson et al. IDweek 2018
Magill SS. JAMA 2014; 312(14);1438-1446

3. A day or more has passed. Can antibiotics be stopped? Can therapy be narrowed? Can a change be made from IV to oral therapy?

De-escalation of Antibiotic Treatment

Based on culture and additional test results

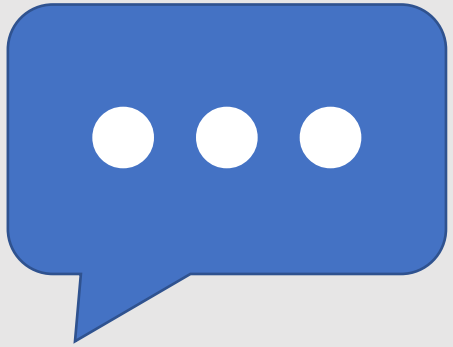
- Blood culture
- Urine culture
- Influenza testing
- Chest x-ray

Can we shift agents from a higher-risk antibiotic?

Can we shorten the duration of the antibiotic therapy?

4. What duration of antibiotic therapy is needed for the patient's diagnosis?

- Be aware of your facility guidelines for treatment of common infections
  - Usually, 5-7 days
- Review the duration of antibiotic prophylaxis for surgical procedures



Discuss: Perceived Barriers to Antibiotic Stewardship and Potential Solutions

Increased workload for nurses

Lack of physician support

Limited knowledge

Lack of experience or confidence

Nurses' input not valued

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Collaborating with the Antibiotic Stewardship Team

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Practice: Talking with Your Medical Team

How to speak to physicians when you want to reassess the need for patient to be on antibiotics

Instructions

Working in your small groups, use the SBAR tool to draft a conversation for your assigned scenario.

- Be realistic; package the need-to-know information for the physician/pharmacist.
- Be prepared to share your conversation with the group. The person whose birthday is closest to today will present your work.

SITUATION

BACKGROUND

ASSESSMENT

RECOMMENDATION

Example: Using the SBAR Tool

SITUATION	"Mrs. Flint is currently experiencing watery stools."
BACKGROUND	"She is a 69-year-old woman with hypercholesterolemia and mild anemia who was admitted last night after a syncopal episode at her local grocery store. She was treated for a UTI 2 months ago with ciprofloxacin."
ASSESSMENT	"Mrs. Flint reports taking laxatives at home because she is chronically on iron supplements. Her home bowel regimen has been continued in the hospital."
RECOMMENDATION	Even though she has a risk factor for C. *difficile*, I wanted to make sure you know she is on laxatives. Should we stop the laxatives and reassess for need for C. *difficile* testing later?"

Example: *Talking to physician about whether the patient has an infection that requires antibiotics*

SBAR

SITUATION	"Mrs. X was started on ceftriaxone for UTI, and I want to confirm that is still being considered."
BACKGROUND	"She is an 80 yo nursing home resident who was admitted for hip fracture 2 days ago. She received morphine for pain control and for the last day has had altered mental status. Last evening, the team held her morphine and also sent urine culture and ordered ceftriaxone for possible UTI. The antibiotic is scheduled to start this morning and I want to confirm that it is still appropriate."
ASSESSMENT	"I received report from the overnight nurse that her mental status improved after stopping morphine, she has no fever, and denies dysuria or abdominal or suprapubic pain. I took care of her on the day of admission and to me her mental status is back to baseline. Her urine culture is pending but urinalysis looks normal. I think her mental status changes may have been from morphine."
RECOMMENDATION	"What do you think about discontinuing or holding her antibiotic and observing her mental status?"

Example: *Talking to physician about the appropriate cultures ordered before starting antibiotics*

SBAR

SITUATION	"Mr. X is in the ICU with shock, requiring IV fluids, and broad-spectrum antibiotics have been ordered."
BACKGROUND	"He is a 56 yo man with congestive heart failure and COPD. He presented to the ED with rapid breathing, cough, and wheezing. His chest x-ray showed bilateral infiltrates, and his differential diagnosis was CHF exacerbation, COPD exacerbation with viral pneumonia, or bacterial pneumonia per the ED note. The ED ordered ceftriaxone in their admission orders. After a few hours in the ED, he developed worsening hypotension and low-grade fever requiring ICU admission. We have been giving him IV fluids and the resident just ordered a lactate and broadened his antibiotics. I did not see any orders for cultures."
ASSESSMENT	"I overheard the team discussing that he may have cardiogenic or septic shock. Our sepsis order set says to collect blood cultures before starting antibiotics. I don't think the sepsis order set was used and no cultures were ordered. I wonder if the resident thought those would have been done in the ED."
RECOMMENDATION	"Should I go ahead and collect blood cultures before I hang the antibiotics? Would you like to go ahead and use the sepsis order set to make sure we are adhering to our standard practices?"

Example: *Talking to pharmacist or physician about stopping or narrowing the use of antibiotics*

SBAR

SITUATION	"Mr. X was transferred out of ICU after a 2-day ICU admission for pneumonia and sepsis and is on Zosyn and vancomycin."
BACKGROUND	"He is a 75 yo man who was admitted with septic shock due to pneumonia and was started on Zosyn and vancomycin. He improved and was transferred to our unit early this morning. He is currently on 2L oxygen and has been ambulating. His blood cultures are negative."
ASSESSMENT	"He seems to be on really big gun antibiotics for someone who looks well."
RECOMMENDATION	"I wanted to check if you were planning to narrow his antibiotic coverage? Does he still need both drugs? Does he need a different antibiotic altogether?"

Example: *Talking to pharmacist or physician about the duration of antibiotic therapy*

SBAR

SITUATION	"Mrs. X is ready for discharge after admission for cellulitis."
BACKGROUND	"65 yo F with diabetes who was admitted 3 days ago with right leg cellulitis. She was treated with cefazolin and has improved. ID was consulted and recommended total 5 days treatment. She is now ready for discharge."
ASSESSMENT	"I was reviewing her discharge instructions and I saw that she is prescribed Keflex for 1 week which seems much longer that she needs."
RECOMMENDATION	"It seems that she only needs two more days of antibiotics, but the prescription has been written for a 7-day course. Can you change it to 2 more days per ID recommendations?"

Nurse-Driven AS Activities

Antibiotic stewardship efforts should focus on optimizing appropriate use rather than simply reducing use.

- Questioning the medical necessity of urine cultures
- Ensuring proper urine and blood culturing techniques
- Initiating an antibiotic conversation regarding switch to oral or discontinuation
- Obtaining and recording an accurate penicillin allergy history

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How to Educate Patients and Families

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Patient Education Materials Help Patients Make Informed Healthcare Decisions

Tips for Creating Materials

- **Be realistic about what you want to communicate**.
  - Focus on what your patient needs to know, not on what is nice to know.
  - Pay attention to the patient (and family's) concerns.
- Write at a 5-6 grade level.
  - Write conversationally.
  - Use the active voice and short sentences of 8-10 words.
- Use images to reinforce key messages.
  - Make sure the images are culturally appropriate.
- Format the document with headings and small chunks of information (3-5 sentences or bullets). Make sure that the most important information is first.

CDC Patient Education Handouts

You've Been Prescribed an Antibiotic in the Hospital for an Infection

Your healthcare team has decided you or your loved one has an infection that requires antibiotics, or needs antibiotics to prevent an infection in certain circumstances, such as before surgery. Antibiotics save lives, and they are critical tools for treating a number of common infections, such as pneumonia, and for life-threatening conditions such as sepsis. They need to be used properly because they can cause side effects and lead to antibiotic resistance.

But when antibiotics are needed, the benefits outweigh the risks of side effects or antibiotic resistance. There are some important things you should know about your antibiotic treatment.

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Your healthcare team may run tests before you start taking an antibiotic.

- Your team may take samples (from your blood, urine or other areas) to run tests to look for bacteria. These tests are important to determine if you need an antibiotic at all and, if you do, which antibiotic will work best.

After a few days of treatment, your healthcare team might change, or even stop, your antibiotic.

- While they are working to find out what is making you sick, your team has started you on an antibiotic.
- If test results show a different antibiotic would be better to treat your infection, they will change your antibiotic.
- Your team may review antibiotic therapy 48 to 72 hours after it is started based on your clinical condition and microbiology culture results, and stop or change antibiotic orders as needed—an important step in your care.
- In some cases, once your team has more information, they might decide that you do not need an antibiotic at all. They may find out that you don't have an infection, or that the antibiotic you're taking won't work against your infection. For example, an infection caused by a virus can't be treated with antibiotics. Staying on an antibiotic when you don't need it won't help you and the side effects could still hurt you.

You may experience side effects from your antibiotic.

- Like all medications, antibiotics have side effects. Some of these can be serious.
- Let your healthcare team know if you have any known allergies when you are admitted to the hospital.
- Common side effects of antibiotics can include rash, dizziness, nausea, yeast infections, and diarrhea.
- The most serious side effects include *Clostridium difficile* infection (also called *C. difficile* or *C. diff*) and life-threatening allergic reactions. *C. difficile* causes diarrhea that can lead to severe colon damage and death.
  - Diarrhea caused by *C. difficile* can be serious and must be recognized and treated quickly. When you are taking an antibiotic and you develop diarrhea, let your healthcare team know immediately.
  - The risk of getting *C. difficile* diarrhea can last for up to several months even after you are no longer getting antibiotics. You should let your healthcare team know if you develop diarrhea even after you are no longer getting an antibiotic.

CDC

[You've Been Prescribed an Antibiotic in the Hospital for an Infection]

[C.diff Risk: How to Help Your Loved One]

[Preventing the Spread of C.diff at Home]

[Recognizing C.diff at Home (flyer)]

[Recognizing C.diff at Home (pocket card)]

Antibiotic Stewardship:
Right antibiotic
Right indications
Right duration
Right patient

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Thank You!

Contact: cdifference@aha.org

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THE CDI PREVENTION COLLABORATIVE

The CDI Prevention Collaborative is a program of the Health Research & Educational Trust supported by the Centers for Disease Control and Prevention (CDC) and the Agency for Healthcare Research and Quality of the U.S. Department of Health and Human Services (HHS) under CDC/HHS as part of a financial assistance award totaling $1,289,897 with 100% funded by CDC/HHS Funding Opportunity OT18-1802, entitled "Strengthening Public Health Systems and Services through National Partnerships to Improve and Protect the Nation's Health."

The contents are those of the author(s) and do not necessarily represent the official view of, nor an endorsement by, CDC/HHS, or the U.S. Government.

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Additional Resources

BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

References

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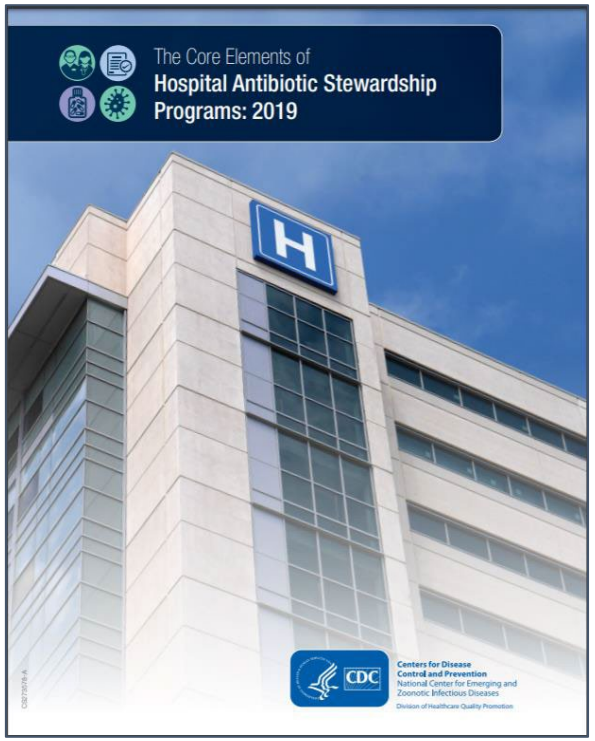
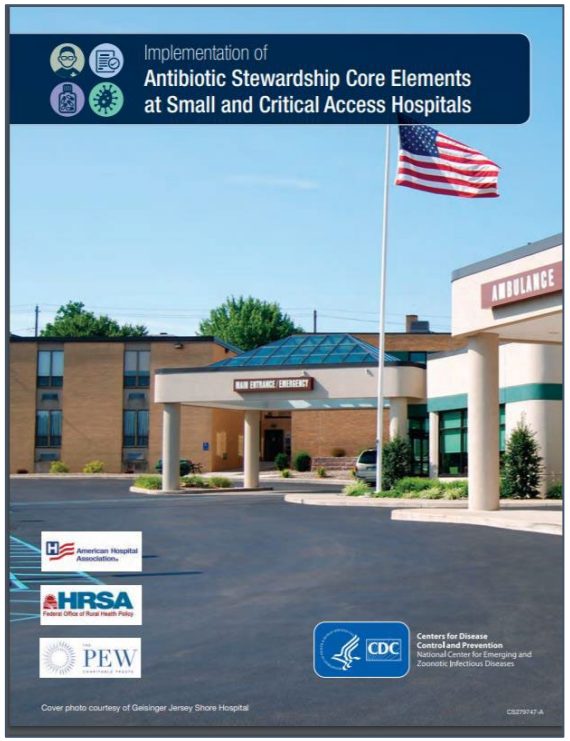
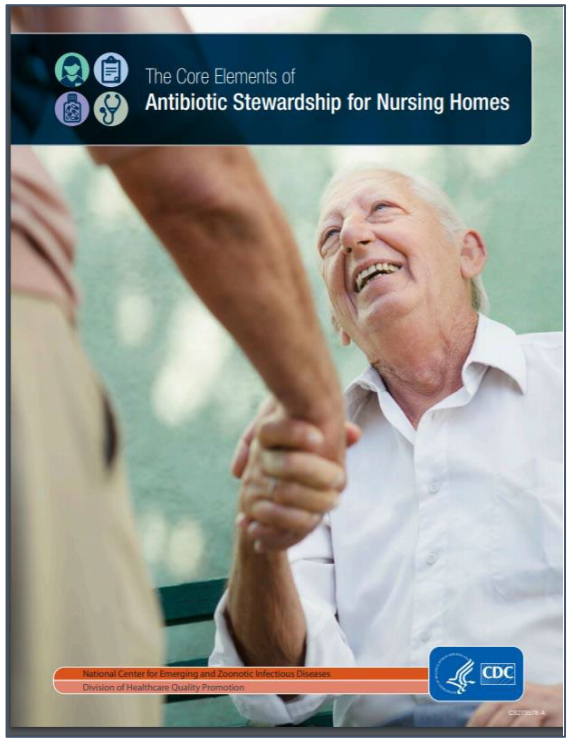
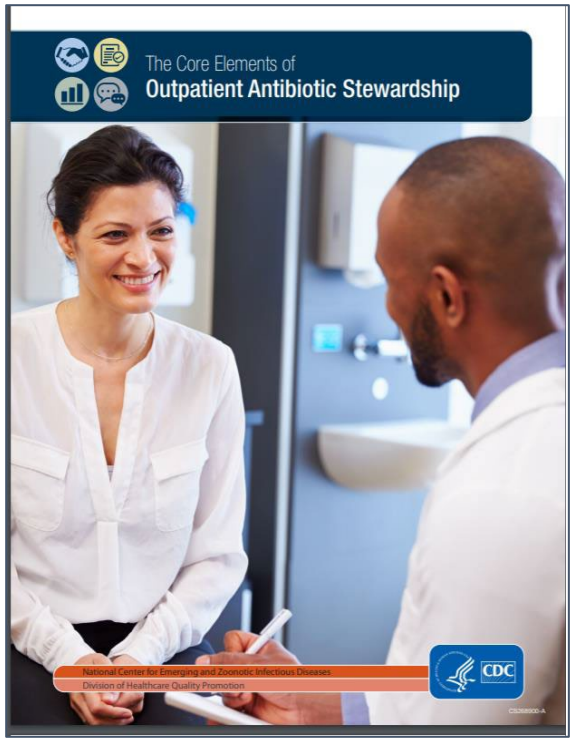
- Infographic: Antibiotic stewardship in nursing homes. https://www.cdc.gov/antibiotic-use/core-elements/pdfs/Infographic-Antibiotic-Stewardship-Nursing-Homes-508.pdf

CDC Antibiotic Stewardship Guidance









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

Antibiotic Study Cheat Sheet

IDSTEWARDSHIP TRAINING
at www.LearnAntibiotics.com

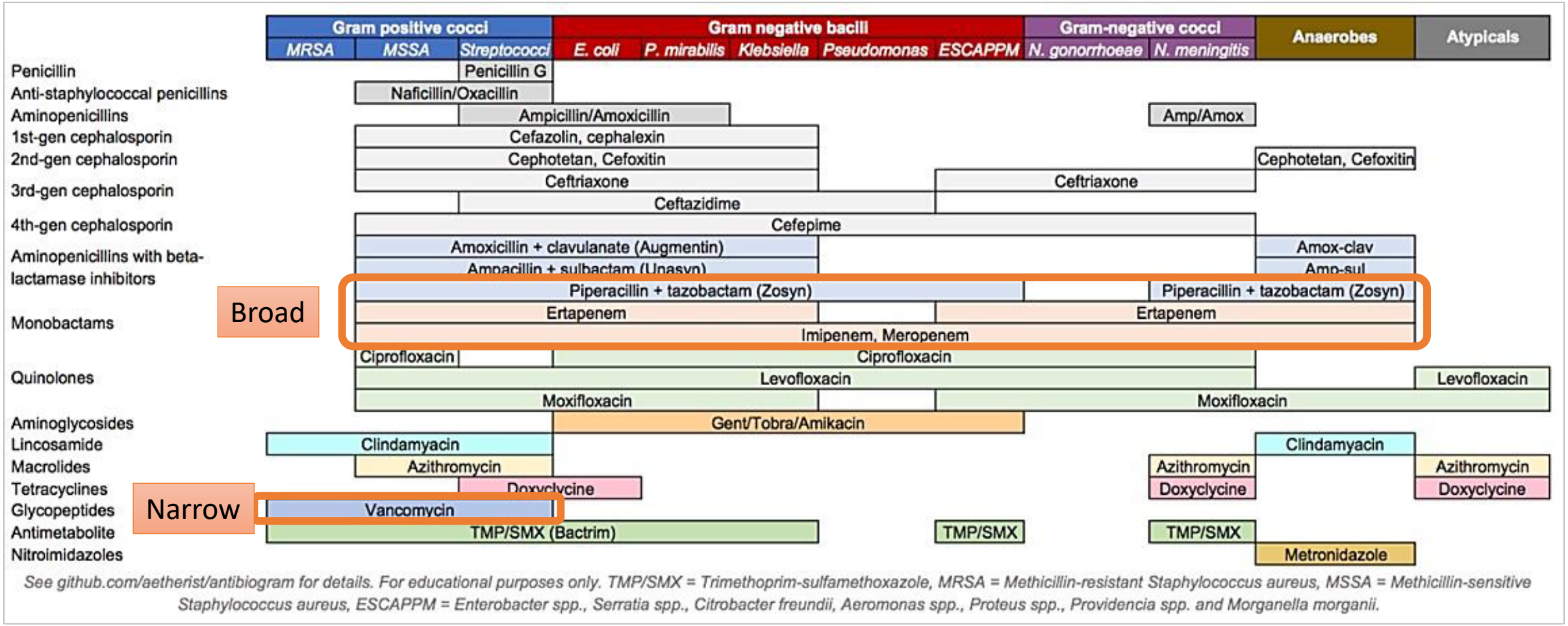
When You See…	Consider Using…
GRAM POSITIVES	
MSSA	Oral: cephalexin; IV: Oxacillin, nafcillin, cefazolin
MRSA	Oral: Bactrim, doxycycline, clindamycin, linezolid, tedizolid; IV: vancomycin, daptomycin, telavancin, dalbavancin, oritavancin, ceftaroline, tigecycline
Enterococci	Ampicillin, then vancomycin, then linezolid (VRE), daptomycin (VRE), or tigecycline (VRE)
Strep. pyogenes or *Strep. agalactiae*	Penicillin, clindamycin
Strep. pneumoniae or Viridans group Strep	Ceftriaxone, levofloxacin, amoxicillin-clavulanic acid (beware penicillin & macrolide resistance)
GRAM NEGATIVES	
Pseudomonas aeruginosa	Oral: ciprofloxacin, levofloxacin; IV: pip/taz, ceftazidime, ceftazidime-avibactam, cefepime, ceftolozane-tazobactam, imipenem-cilastatin, meropenem, meropenem-vaborbactam, aztreonam, aminoglycosides, polymyxins
E. coli	Oral: cephalexin, amoxicillin-clavulanic acid, Bactrim, nitrofurantoin, fosfomycin, ciprofloxacin, levofloxacin; IV: ceftriaxone, ampicillin-sulbactam, cefepime, piperacillin-tazobactam, ertapenem
Stenotrophomonas	Bactrim, levofloxacin
ESBL+	Carbapenems, ceftolozane-tazobactam, ceftazidime-avibactam, polymyxins, aminoglycosides, fosfomycin
Carbapenem resistant	ESBL+ drug list minus carbapenems but plus imipenem-cilastatin-relebactam
MISCELLANEOUS	
Anaerobes	Oral: Metronidazole, clindamycin, amoxicillin-clavulanic acid, moxifloxacin; IV: ampicillin-sulbactam, piperacillin-tazobactam, cefoxitin, cefotetan, ertapenem, tigecycline
Clostridium difficile	Oral vancomycin or fidaxomicin → Metronidazole no longer preferred
Atypicals	Macrolides, fluoroquinolones, tetracyclines
Candida albicans	Fluconazole
Candida krusei	Micafungin, anidulafungin, or caspofungin
Aspergillus	Voriconazole
CMV	Valganciclovir, letermovir, ganciclovir (IV)
HSV	PO: acyclovir, valacyclovir; IV: acyclovir
Cryptosporidium	Nitazoxanide

See This…	Think NOT for…
Daptomycin	Pneumonia
Tigecycline	Bacteremia or Pseudomonas
Linezolid	MRSA bacteremia
Cefepime	Anaerobes, Enterococci
Ertapenem	Acinetobacter, Pseudomonas, Enterococci - "APE"
Aztreonam	Gram positives
Aminoglycoside monotherapy	Non-UTI indication
Rifampin	Monotherapy
Micafungin	UTI or meningitis
Fluconazole	Candida krusei

With this…	Beware…
Beta-lactams	GI upset, seizures
Bactrim	Hyper-K+, allergy, myelosuppression
Fluoroquinolones	QT prolong, CNS effects, tendon rupture, peripheral neuropathy, binding cations, aortic rupture
Aminoglycosides	Ototoxicity, nephrotoxicity
Macrolides	QT prolong
Tetracyclines	Phototox., esophagitis
Tigecycline	Nausea/ vomiting
Daptomycin	CK elevation
Linezolid	Thrombocytopenia, peripheral neuropathy, optic neuritis
Vancomycin	Nephrotoxicity
Rifampin	Hepatotoxicity, DDIs
Azoles	Hepatotoxicity, DDIs
Amphotericin B	Hypo-K, Hypo-Mg, infusion rxn, nephrotox

http://training.idstewardship.com/wp-content/uploads/2019/08/Antibiotic-Study-Cheat-Sheet-August-2019.pdf

Antibiotics Spectrum: Narrow vs. Broad



See github.com/aetherist/antibiogram for details. For educational purposes only. TMP/SMX = Trimethoprim-sulfamethoxazole, MRSA = Methicillin-resistant Staphylococcus aureus, MSSA = Methicillin-sensitive Staphylococcus aureus, ESCAPPM = Enterobacter spp., Serratia spp., Citrobacter freundii, Aeromonas spp., Proteus spp., Providencia spp. and Morganella morganii.