Session 1

What Does It Mean to Recognize a Risk?

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CDC's National Training Collaborative for Healthcare Infection Prevention & Control

1

What does it TAKE to recognize risk?

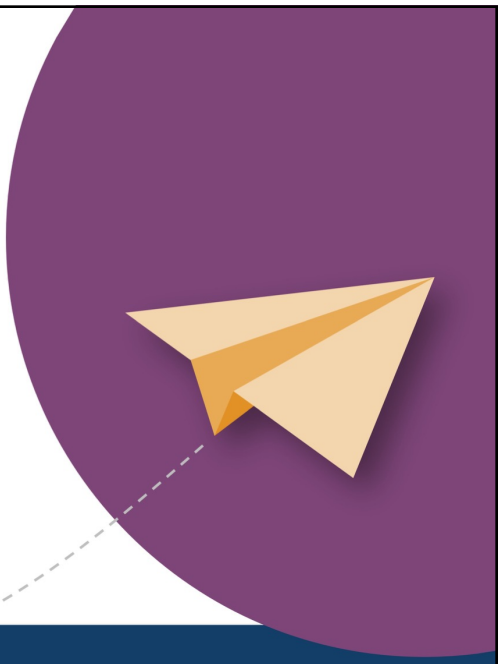
"Sorry, it's curiosity"

2

Welcome

Agenda

- Welcome and Introductions
- Recognizing Risk
- How Healthcare Is Different
- Where Is the Risk for Germs to Spread in Healthcare?
- Bringing It Together
- Conclusion



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Please share with us:

1. Years working as an Infection Preventionist (IP)?
2. Single or team-based?
3. Wear multiple hats?
4. IP superpower?

4

Discussion Question:

What Is "Risk"?

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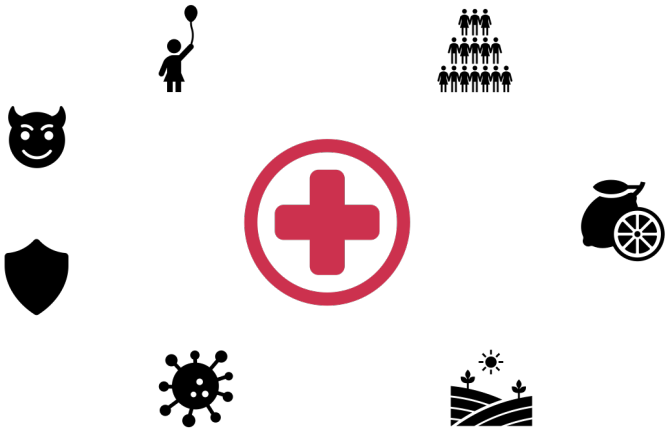
Why do we see new and unusual diseases?



Lashley, F., Durham, J., Emerging Infectious Diseases: Trends and Issues. 2002

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Key Takeaways

- ✓ Risk recognition is seeing the potential for a problem to happen.
- ✓ You can help control infections in healthcare by learning to recognize the risk for germs to spread and cause infection.

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Where Is the Risk for Germs to Spread in Healthcare?

8

Reflection

What's one risk for germs to spread that you might recognize in your daily work?

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Case of the Curious IP

Critically ill patient admitted to ICU

- Mechanically ventilated
- Bronchoscopy on day 2

Burkholderia gladioli grows day 10

- No flowers, plants, or exposures

Problem

- Urinal cake taped to oscillating fan

Stroever, S. 2024 SHEA Annual Conference: Interesting Cases

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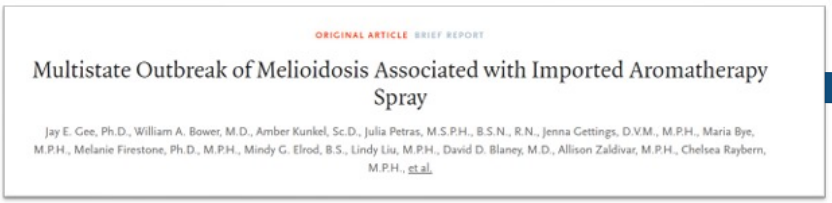

ORIGINAL ARTICLE BRIEF REPORT

Multistate Outbreak of Melioidosis Associated with Imported Aromatherapy Spray

Jay E. Gee, Ph.D., William A. Bower, M.D., Amber Kunkel, Sc.D., Julia Petras, M.S.P.H., B.S.N., R.N., Jenna Gettings, D.V.M., M.P.H., Maria Bye, M.P.H., Melanie Firestone, Ph.D., M.P.H., Mindy G. Elrod, B.S., Lindy Liu, M.P.H., David D. Blaney, M.D., Allison Zaldivar, M.P.H., Chelsea Raybern, M.P.H., et al.

4 patients
Matched isolates
Room Spray = Better Homes and Gardens

Implications for Practices

- Expand review of microbiology cultures
- Review odor management policy
- Identify "illicit" products

Stroever, S. 2024 SHEA Annual Conference: Interesting Cases

Risk Recognition:

Seeing the potential for a problem to happen

- Seeing a potential problem doesn't mean the problem will definitely happen!
- We take action to keep something bad from happening.

It's a cold January day and in your Emergency Department

70-year-old woman with history of falls

Slight cough + runny nose
Foley placed + admitted

- Day 2: Variety of labs → High WBC→ IV and antibiotics
- Day 3: Rhino positive + Urine from catheter → ESBL Ecoli >100,000 CFU
  - Some gastrointestinal distress from initial antibiotics
- Day 4: Change antibiotics and extend to 10-day course
- Day 8: Loose stools continue and increase in intensity
- Day 9: C Diff PCR positive

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Discussion Question:

What "Risks" come from Devices?

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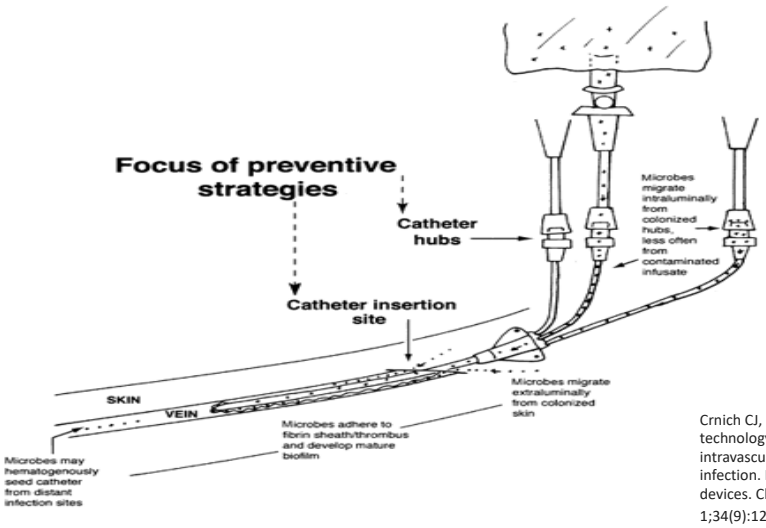

Crnich CJ, Maki DG. The promise of novel technology for the prevention of intravascular device-related bloodstream infection. I. Pathogenesis and short-term devices. Clin Infect Dis. 2002 May 1;34(9):1232-42. doi: 10.1086/339863. Epub 2002 Apr 2. PMID: 11941550.

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Clinical Features of Line Sepsis

Nonspecific	*Highly Suggestive of Line Sepsis*
Fever	Source of sepsis unapparent
Chills shaking rigors	Patient unlikely candidate for sepsis
Hypotension shock	Intravascular line in place (or recently in place)
Hyperventilation	Inflammation or purulence at site
Gastrointestinal • pain • vomiting • diarrhea	Abrupt onset, with shock
Neurologic • confusion • seizures	Sepsis response to antimicrobial therapy or dramatic improvement after removal of device

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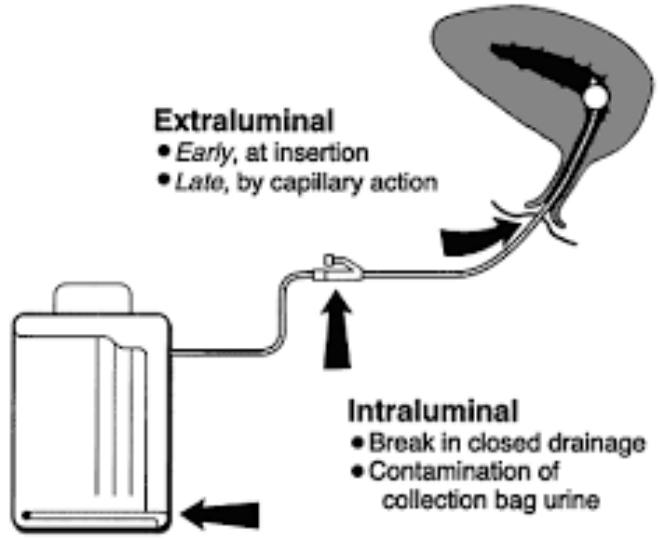

Tambyah, PA. 2001 Emerg. Inf. Disease

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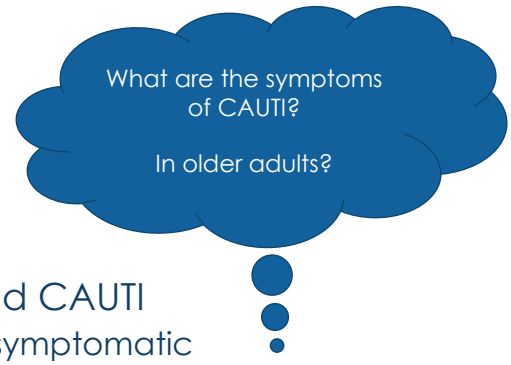
Bacteriuria is NOT the same as a Catheter-associated UTI



- Bacteriuria
  - ❖Bacteria in the urine
  - ❖Positive urine culture
- Difference between bacteriuria and CAUTI
  - ❖Bacteriuria can be symptomatic or asymptomatic
  - ❖CAUTI requires presence of symptoms consistent with UTI

AHRQ. 2017. The culture of culturing. https://www.ahrq.gov/hai/quality/tools/cauti-itc/modules/implementation/education-bundles/urine-culturing/when-to-order/cultures-slides.html

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Common Triggers for Inappropriate Cultures

Chronically catheterized patients have bacteriuria

99% of the time

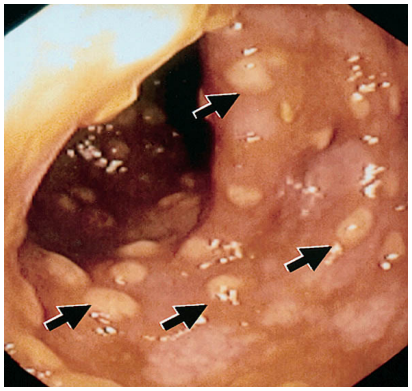
Signs:

- Color
- Smell
- Sediment
- Cloudy urine
- White cells in urine

AHRQ. 2017. The culture of culturing. https://www.ahrq.gov/hai/quality/tools/cauti-ltc/modules/implementation/education-bundles/urine-culturing/when-to-order/cultures-slides.html

Clostridioides difficile (C diff)

- Antibiotic exposure
  - ❖Symptom onset: 1 dose to 6 weeks or longer
- May experience:
  - ❖Watery diarrhea
  - ❖Lower abdominal pain
  - ❖Fever
  - ❖Loss of appetite/nausea
  - ❖General feeling of unease
- High white count & bleeding
- Broad inflammation of the colon



Reflection

- When you recognize that risk, what's one thing you can do to help stop germs from spreading?

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History of Antibiotics

- Penicillin discovered in 1928
- Improvement in survival and advances in modern medicine
- 1/3 of antibiotics are prescribed inappropriately
  - ❖Wrong agent, dose, duration, frequency, or indication
  - ❖Large percentage of pediatric antibiotics

Image: https://blogs.iwatch.org/hiv-id-observations/wp-content/uploads/sites/2/2014/06/Penicillin-July-1943-Science-Pub1.gif

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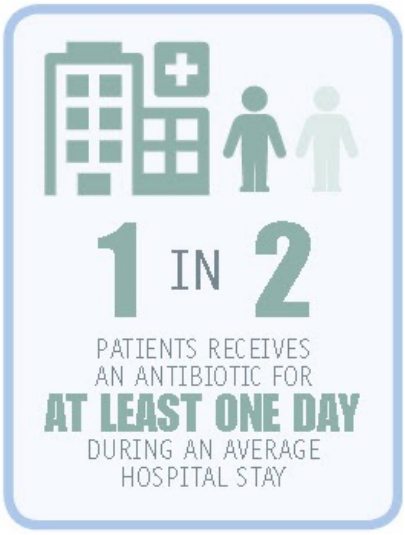
U.S. Annual Impact

- Antimicrobial Resistance:
  - 2.8 million illnesses & 35,000 deaths annually
- *Clostridioides difficile* Infections:
  - 223,900 hospitalizations & 12,000 deaths



CDC (2019). Antibiotic Resistance Threats in the United States

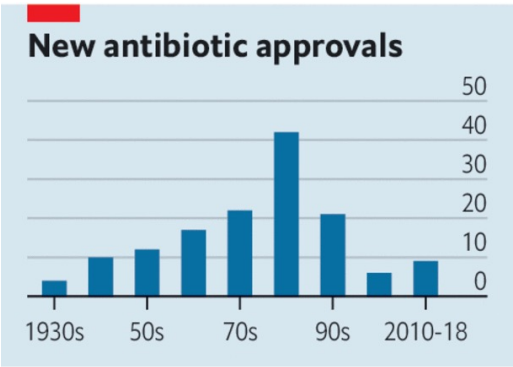
Consequences of Inappropriate Antibiotic Use

Patient
- Resistance
- Adverse Effects
- Limited treatment options
- Hospital-acquired conditions
- Cost burden
- Missed days at work or school
- Prolonged hospital admissions

Healthcare System
- Cost burden
- Waste
- Drug shortages
- Infection control concerns

Community
- Resistance
- Cost burden

Bad Drugs, Few New Drugs



The Economist

10x'20

Ten new ANTIBIOTICS by 2020

- ~50 antibiotics in development
- Limited dosing or safety information in pediatric patients

Image Source: Economist, IDSA

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One Health is the idea that the health of people is connected to the health of animals and our shared environment.

When we protect **one**, we help protect **all**.

www.cdc.gov/onehealth

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Your community

Healthcare Facilities

Water & Soil

Around the World

Food Supply

CDC. 2021. Where Resistance Spreads. https://www.cdc.gov/drugresistance/where-resistance-spreads.html

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From: Antibiotic resistance: a call to action to prevent the next epidemic of inequality

- 60% of people working in US meat-processing plants are Black or Hispanic/Latinx
- Can increase occupational exposure to resistant germs

Nadimpalli, M., Chan, C., & Doron, S. Nature Medicine Feb 2021 p. 187-190

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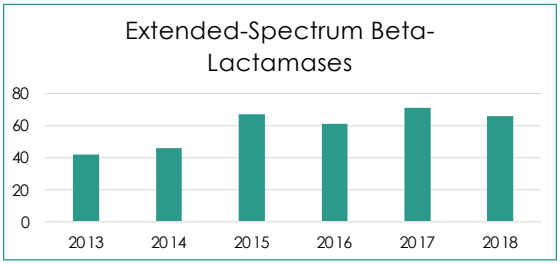
How Old is this Patient?

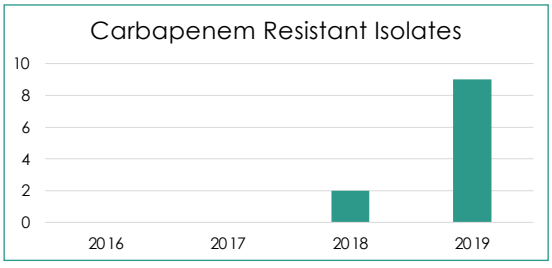
- Patient with kidney infection
  - ❖Urine culture with >100K of *E. coli*
- 14 days of IV antibiotics + inpatient admission

Escherichia coli (ESBL positive)			
MIC Interp	MIC Dilutn	MIC Interp	MIC Dilutn
		S	4
R	>=32	R	>=32
R	>=64		
R		S	<=4
R		R	
R	>=64	R	>=64
R	>=64		
R	>=4	R	>=4
		S	<=0.5
		Pos	Pos
R	>=16	R	>=16
		S	<=0.25
S	<=16	S	<=16
R	>=16	R	>=16
R	>=320	R	>=320

"Super Bugs" in Pediatrics

- Extended-spectrum beta-lactamases (ESBLs)
- Carbapenem-resistant Enterobacteriaceae (CRE)





Medernach RL, et al. *Dis Clin North Am*. 2018;32(1):1-17.

Cost of Antibiotic Misuse

- $20,000/infection = Amounts to $20 billion nationally
- Including:

↑ microbiology tests
↑ hospital stay
↑ missed days of work or school
↑ treatments for adverse drug reactions

Ventola CL. *PT*. 2015; 40(4):277-83.

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Discussion Question:

What are Antibiotic "Risks"?

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Antibiotics Can Harm Patients

Melanoma Associated With Long-term Voriconazole Therapy

A New Manifestation of Chronic Photosensitivity

Severe Acute Respiratory Failure in Healthy Adolescents Exposed to Trimethoprim-Sulfamethoxazole

Jenna O. Miller, MD, FAAP,[a] Jane Taylor, MD, MS,[b] Jennifer L. Goldman, MD, MS[c,d]

Image Sources: Klancir et al. (2017). Acta Dermatovenerol. Croat
Solensky et al. (2018). Up To Date

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Bringing It Together

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It's a cold December day and in your Emergency Department

70-year-old woman with history of falls

Slight cough + runny nose
Foley placed + admitted

- Day 2: Variety of labs → High WBC→ IV and antibiotics
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Discussion Question:

What "Risks" did you identify in this scenario?

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4 Moments of Antibiotic Prescribing or Optimization

Moment 1

- Does this patient have an infection that requires antibiotics?

Moment 2

- Have cultures been taken before antibiotics?
- Do we need to start an antibiotic before the results?

Moment 3

- A day or more has passed.
- Can I stop, narrow, or change to oral therapy?

Moment 4

- What duration of therapy is needed?

Tamma PD, Miller MA, Cosgrove SE. *JAMA.* 2019;321(2):139-140.

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

- **Asymptomatic bacteriuria**
  - ❖No benefit observed with treatment
  - ❖No harm observed with avoiding treatment

Risk alert:
Urine obtained from the catheter, patient asymptomatic, other infectious cause

Tamma PD, Miller MA, Cosgrove SE. *JAMA.* 2019;321(2):139-140.
Nicolle LE. *Clin Infect Dis.* 2019;68(10):1611-15
Marik P. *N Engl J Med.* 2001;344(9):665-671.

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Safe Antibiotic Use

- Use with care
- Don't treat viruses
- Depends on person and bacteria
- Duration
- Have risks
- When to seek care

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Symptom Management

Check out resources on Kids Health

https://kidshealth.org/ChildrensMercy/en/parents/otitis-media.html?ref=search

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2. What antibiotic should I start?

Remember the micro review at the beginning ☺

- Consider common bacteria for this infection and patient
- Consider of patient factors (e.g., MRSA history, immunocompromised, allergies)
- Clinical practice guidelines or tertiary resources
- Utilization of antibiogram (if available)

2018 Gram Positive Antibiogram (% Susceptible)

Organism	# of isolates tested	Ampicillin	Cefotaxime	Clindamycin	Erythromycin	Gentamicin[a]	Linezolid	Meropenem	Nitrofurantoin[b]	Oxacillin	Penicillin	Penicillin (Oral)	Rifampin[a]	Tetracycline	Trim/Sulfa	Vancomycin
Enterococcus faecalis	204	100	-	-	-	-	-	-	100	-	99	-	-	-	-	100
All Staphylococcus aureus	1657	-	-	78	48	99	100	-	98	68	0	-	100	95	96	100
MSSA	1155	-	-	77	60	99	100	-	97	100	0	-	100	95	96	100
MRSA	502	-	-	82	19	99	100	-	100	0	0	-	100	95	96	100
Staphylococcus epidermidis	179	-	-	50	24	84	100	-	100	34	0	-	99	86	58	100
Streptococcus pneumoniae *	101	-	-	90	50	-	-	93	-	-	-	72§	-	-	-	100
Meningitis breakpoint		-	88†	-	-	-	-	-	-	-	70†	-	-	-	-	-
Nonmeningitis breakpoint		-	97‡	-	-	-	-	-	-	-	97‡	-	-	-	-	-

Tamma PD, Miller MA, Cosgrove SE. *JAMA*. 2019;321(2):139-140.

2. What antibiotic should I start?

GI distress is not a true allergy!

- Consider potential allergies:
  - ❖10% report penicillin (PCN) allergies; 1% truly allergic
  - ❖26% increased *C. diff* risk and 69% increased MRSA risk
  - ❖True allergy
    - Hives, immediate reactions (within 1 hour), swelling, wheezing
  - ❖Consider controlled challenges in low-risk patients
  - ❖PCN allergies doesn't mean all beta lactams have to be avoided

Blumenthal KG, Lu N, Zhang Y, Li Y, Walensky RP, Choi HK. *BMJ*. 2018;361:k2400.
Vyles D, Chiu A, Routes J, et al *Pediatrics*. 2018;14(5):e20173466.
Eaddy Norton A, Konvinse K, Phillips EJ, Dioun Broyles A. *Pediatrics*. 2018;141(5):e20172497.

3. Can I stop, narrow antibiotics or switch to oral therapy?

Antibiotic could have been stopped!

Narrow: Decreases broad-spectrum antibiotic use

Switch: Minimize line entries, potentially reduce cost and length of stay

Tamma PD, Miller MA, Cosgrove SE. *JAMA*. 2019;321(2):139-140.

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4. What duration of antibiotic therapy is needed?

Antibiotic duration increased!

Shorter is better!

Variability in prescribed antibiotic durations

Late-career physicians: *more likely* prescribe >8-day durations

Mean durations = 7-8 days

Tamma PD, Miller MA, Cosgrove SE. *JAMA*. 2019;321(2):139-140.
Fernandez-Lazaro CI, Brown KA, Langford BJ, et al *Clin Infec Dis*. 2019

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Do you feel like you have a role in antibiotic stewardship initiatives?

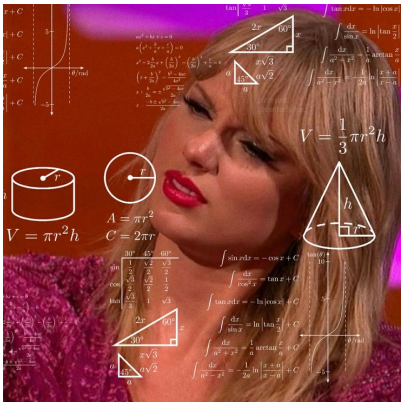

Image source: Billboard, pinterest

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Antibiotic Stewardship (AS) =

Optimization + Multidisciplinary

Hospital Administration
- Provide formal and financial support for ASP

Prescribers
- Prescribe appropriate antibiotics (right drug, dose, indication, and duration)
- Reassess antibiotic appropriateness during treatment
- Provide education to families and patients

Pharmacy
- Optimize antibiotic use by recommending appropriate drugs and doses
- Perform 48-hour timeouts to assess continued need for antibiotics
- Assess for eligibility for IV to PO conversion for antibiotics

Nursing
- Obtain cultures prior to antibiotics if possible
- Recognize opportunities for IV to PO conversion for antibiotics
- Identify and thoroughly document antibiotic adverse reactions
- For more ways nurses serve as members of the ASP team click here

Microbiology
- Supply patient-specific culture/sensitivity data & hospital antibiogram
- Provide useful testing methods (i.e. rapid diagnostic tests)

Infection Control
- Monitor/prevent the spread of multidrug resistant organisms
- Promote proper hygiene practices

Data Analyst
- Gather meaningful antibiotic use data to disseminate

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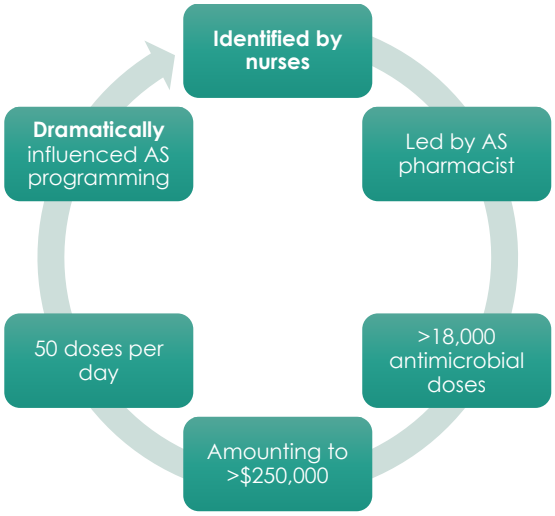
Reducing Antimicrobial Waste



Nurses can and should make significant contributions to antibiotic safety!

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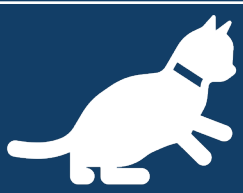
Conclusion

- ✓ Risk recognition is seeing the potential for a problem to happen.
- ✓ You can help control infections in healthcare by learning to recognize the risk for germs to spread and cause infection.



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Questions

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How to Get Involved and Feedback

- Project Firstline on CDC.gov: https://www.cdc.gov/infectioncontrol/projectfirstline/index.html
- CDC's Project Firstline on Facebook: https://www.facebook.com/CDCProjectFirstline
- CDC's Project Firstline on Twitter: https://twitter.com/CDC_Firstline
- Project Firstline *Inside Infection Control* on YouTube: https://www.youtube.com/playlist?list=PLvrp9iOILTQZQGtDnSDGViKDdRtIc13VX
- To sign up for Project Firstline e-mails, click here: https://tools.cdc.gov/campaignproxyservice/subscriptions.aspx?topic_id=USCDC_2104

- *Healthcare Risk Recognition in Action* video clip: https://www.cdc.gov/infectioncontrol/projectfirstline/videos/RiskRecognition-inAction-LowRes.mp4
- Project Firstline feedback form: https://www.cdc.gov/infectioncontrol/pdf/projectfirstline/TTK-ParticipantFeedback-508.pdf
- Placeholder for partners to add their own links

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