29 March 2022

A Novel Approach to Antibiotic Teaching

Alyssa Castillo, MD

Antibiotics in Action

(Hint: the answer is almost always ceftriaxone)

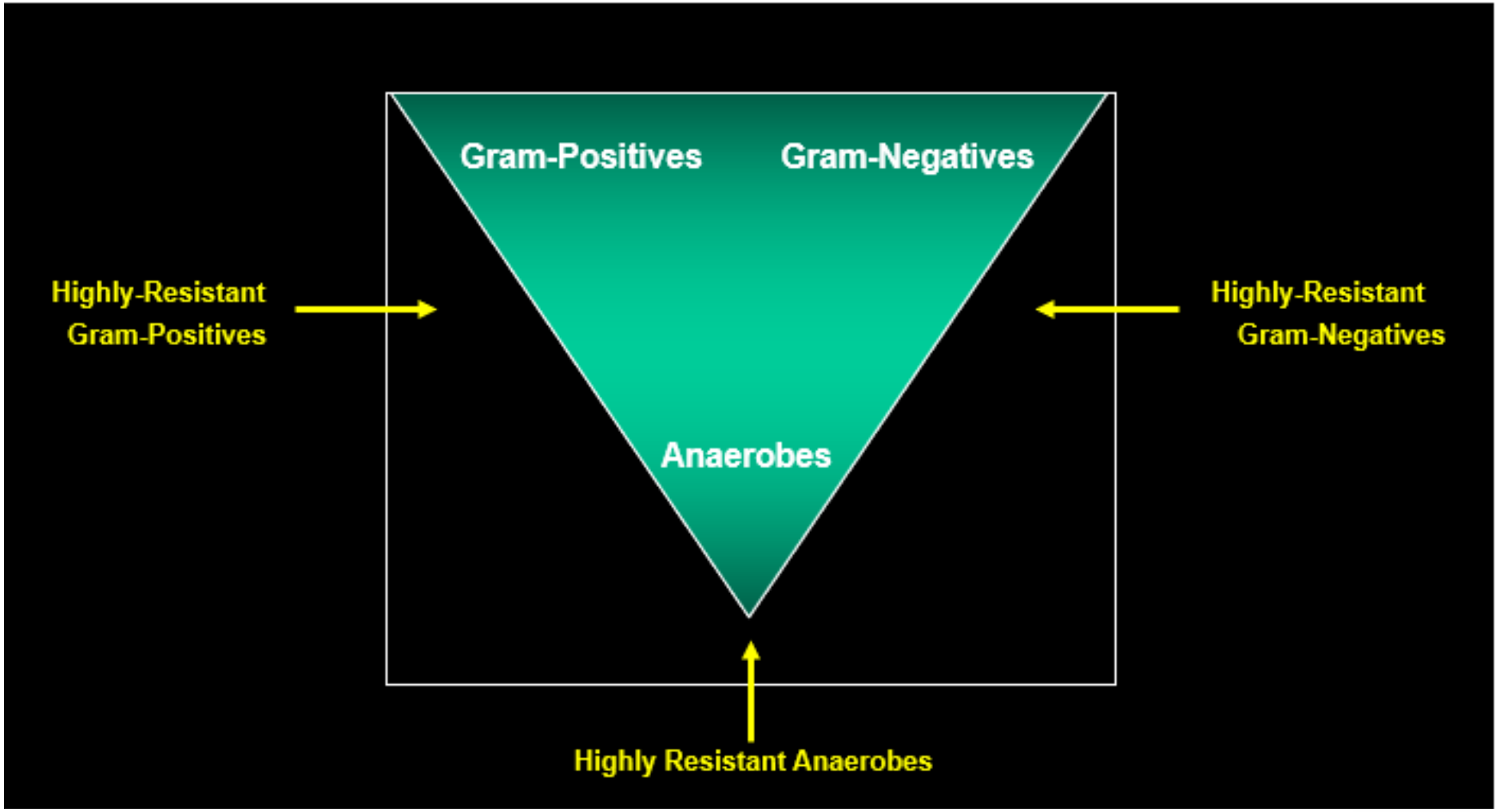
Learning Objectives

- To give you tools to strategically select antibiotics for the “BIG 3” infections: pneumonia, UTI, and cellulitis
- To “flip the narrative” – and focus on the most frequently utilized antibiotics and their spectrum (rather than review them all)

<u>Today we will NOT discuss</u>:

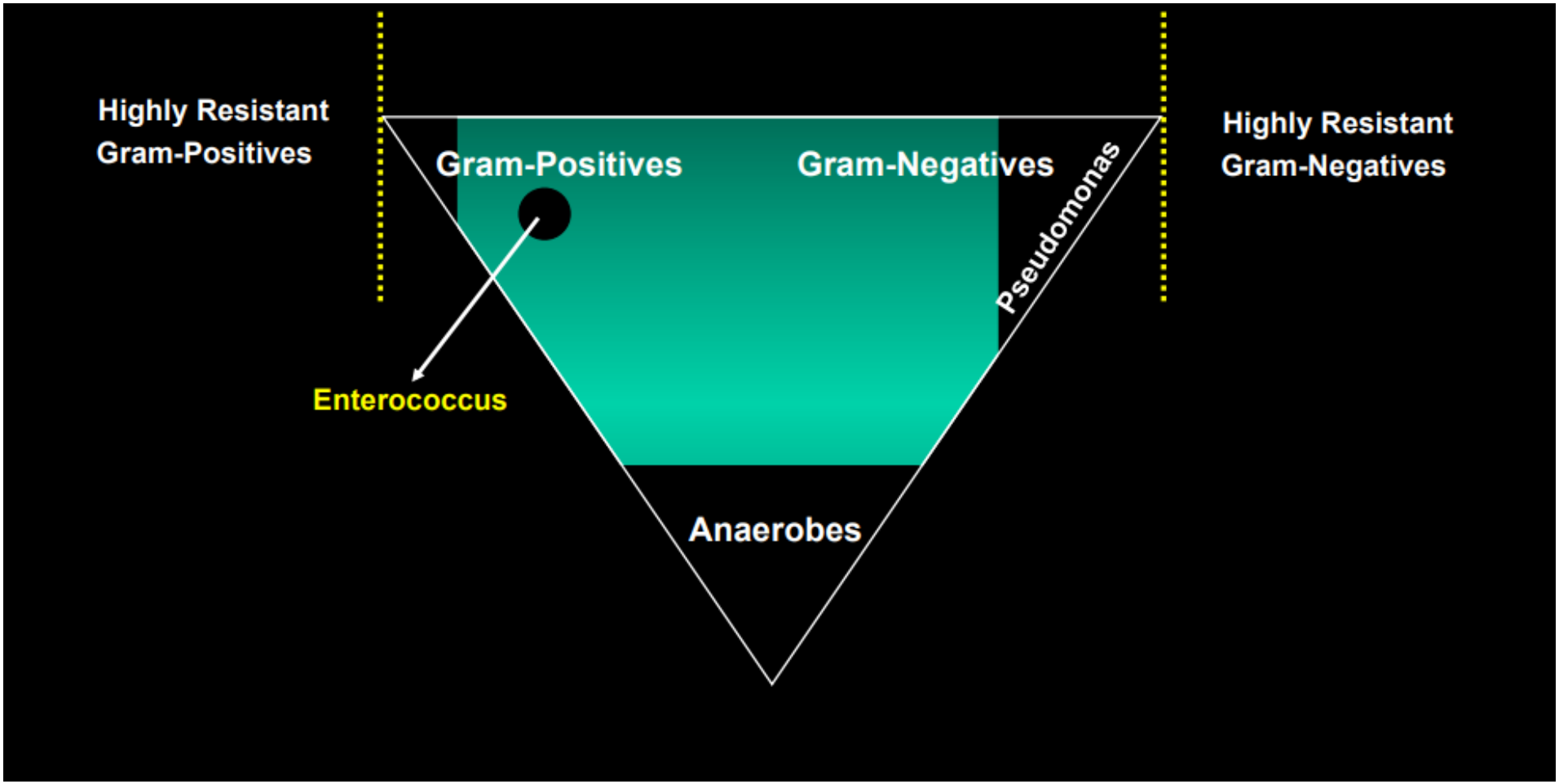
- Antibiotic mechanism of action
- Drug dosing
- Duration of therapy

Antibiotic Spectra



Slide credit: Drs David Spach and Paul Pottinger

Ceftriaxone



Case 1a: UTI

A 35-year-old cisgender woman with no PMH presents to the ED with fevers, chills, flank pain, and dysuria.

A urinalysis is positive, and a urine culture is pending.

She is diagnosed with pyelonephritis, and admission is planned.

Audience Response Question

What antibiotic would you start?

- Ceftriaxone
- Cefepime
- Vancomycin
- Levofloxacin

Case 1a: UTI

A 35-year-old cisgender woman with no PMH presents to the ED with fevers, chills, flank pain, and dysuria.

A urinalysis is positive, and a urine culture is pending.

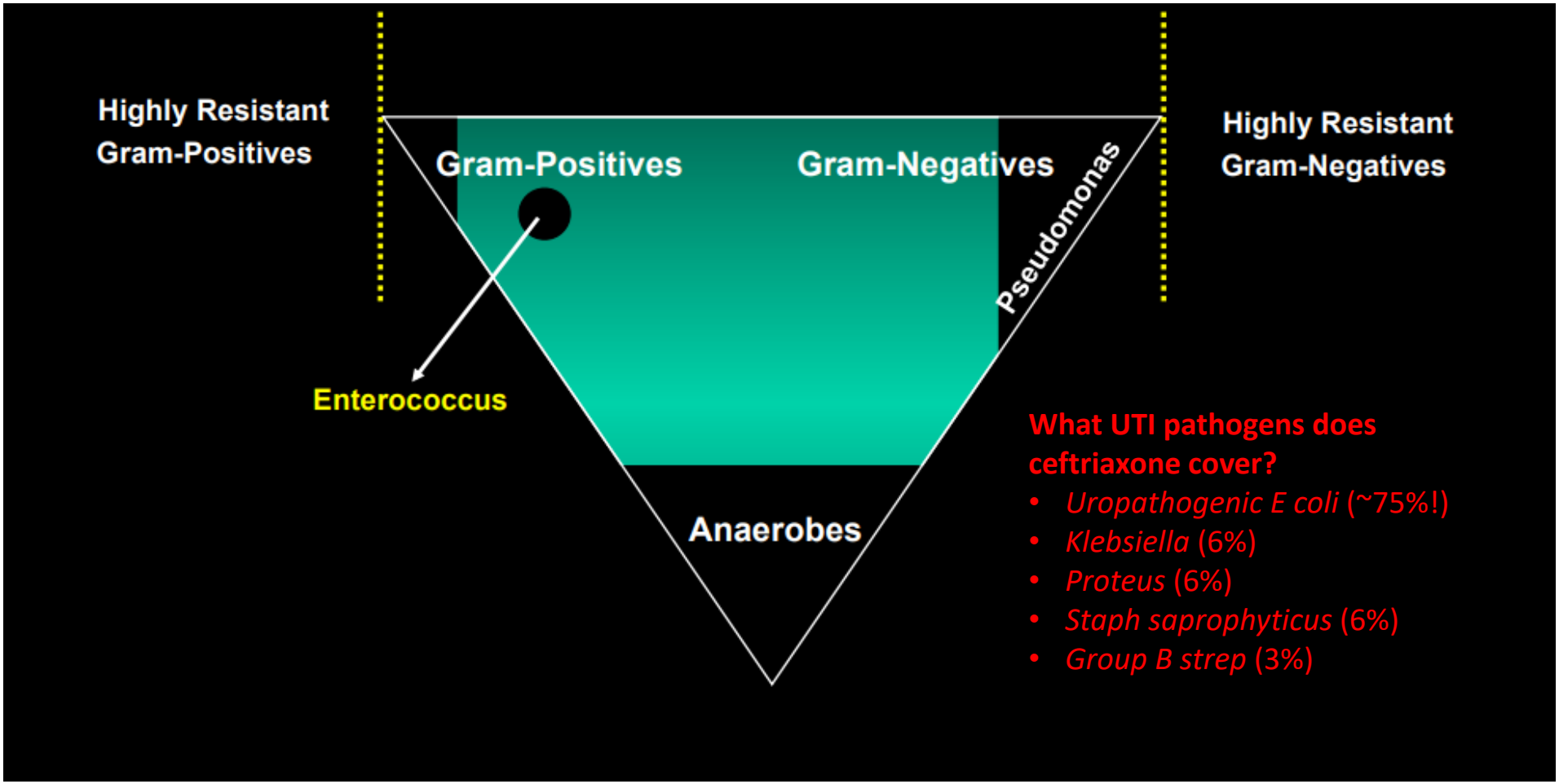
She is diagnosed with pyelonephritis, and admission is planned.

Audience Response Question

What antibiotic would you start?

- Ceftriaxone
- Cefepime
- Vancomycin
- Levofloxacin

Ceftriaxone



What UTI pathogens does ceftriaxone cover?

- *Uropathogenic E coli* (~75%!)
- *Klebsiella* (6%)
- *Proteus* (6%)
- *Staph saprophyticus* (6%)
- *Group B strep* (3%)

Case 1: Urinary Tract Infection

1. For inpatient UTI in a patient without risk factors for resistance*, use ceftriaxone.
   → *Risk factors: recent urologic procedure, history of MDRO, etc.

Case 1b: UTI

A 35-year-old cisgender woman presents to her primary care physician (PCP) with fevers, chills, flank pain, and dysuria.

A urinalysis is positive, and a urine culture is pending.

She is diagnosed with pyelonephritis, and of course you give a dose of ceftriaxone in the office. Discharge to home is planned.

Audience Response Question

What antibiotic would you send to her pharmacy?

- Ceftriaxone
- Ciprofloxacin
- Amoxicillin

Case 1b: UTI

A 35-year-old cisgender woman presents to her primary care physician (PCP) with fevers, chills, flank pain, and dysuria.

A urinalysis is positive, and a urine culture is pending.

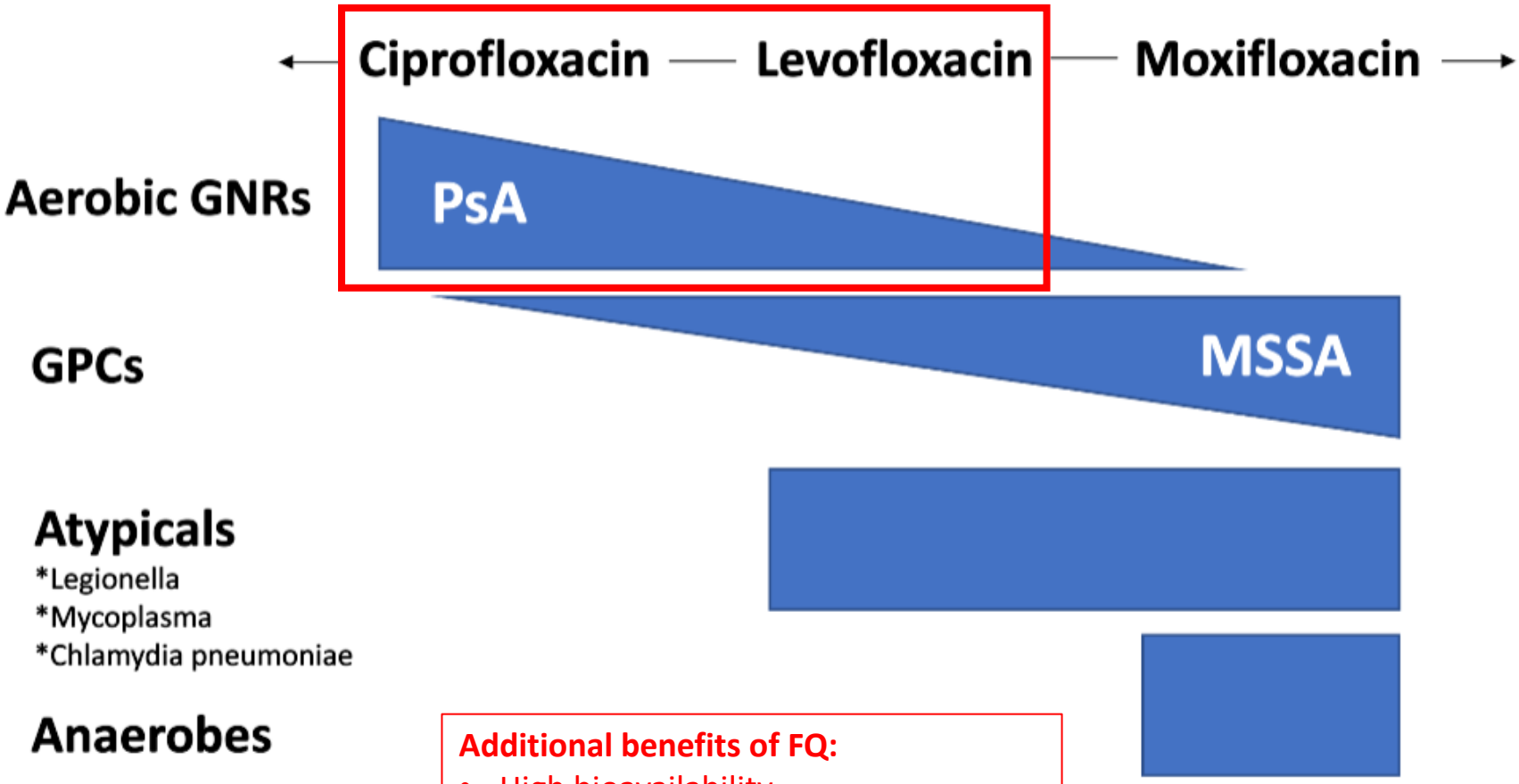
She is diagnosed with pyelonephritis, and of course you give a dose of ceftriaxone in the office. Discharge to home is planned.

Audience Response Question

What antibiotic would you send to her pharmacy?

- Ceftriaxone
- Ciprofloxacin
- Amoxicillin

Fluoroquinolones



Additional benefits of FQ:

- High bioavailability
- Excellent renal penetration
- Can be safely used in bacteremia (PO)

Case 1: Urinary Tract Infection

1. For inpatient UTI in a patient without risk factors for resistance*, use ceftriaxone.
   → *Risk factors: recent urologic procedure, history of MDRO, etc.

1. For outpatient pyelonephritis, use ciprofloxacin or levofloxacin.
   → Excellent bioavailability and kidney penetration

Case 1c: UTI

A 35-year-old cisgender woman presents to her primary care physician (PCP) with urinary frequency, urgency, dysuria, and suprapubic pain.

A urinalysis is positive, and a urine culture is pending.

She is diagnosed with cystitis.

Audience Response Question

What antibiotic would you start?

- Ceftriaxone
- Levofloxacin
- Doxycycline
- Nitrofurantoin

Case 1c: UTI

A 35-year-old cisgender woman presents to her primary care physician (PCP) with urinary frequency, urgency, dysuria, and suprapubic pain.

A urinalysis is positive, and a urine culture is pending.

She is diagnosed with cystitis.

Audience Response Question

What antibiotic would you start?

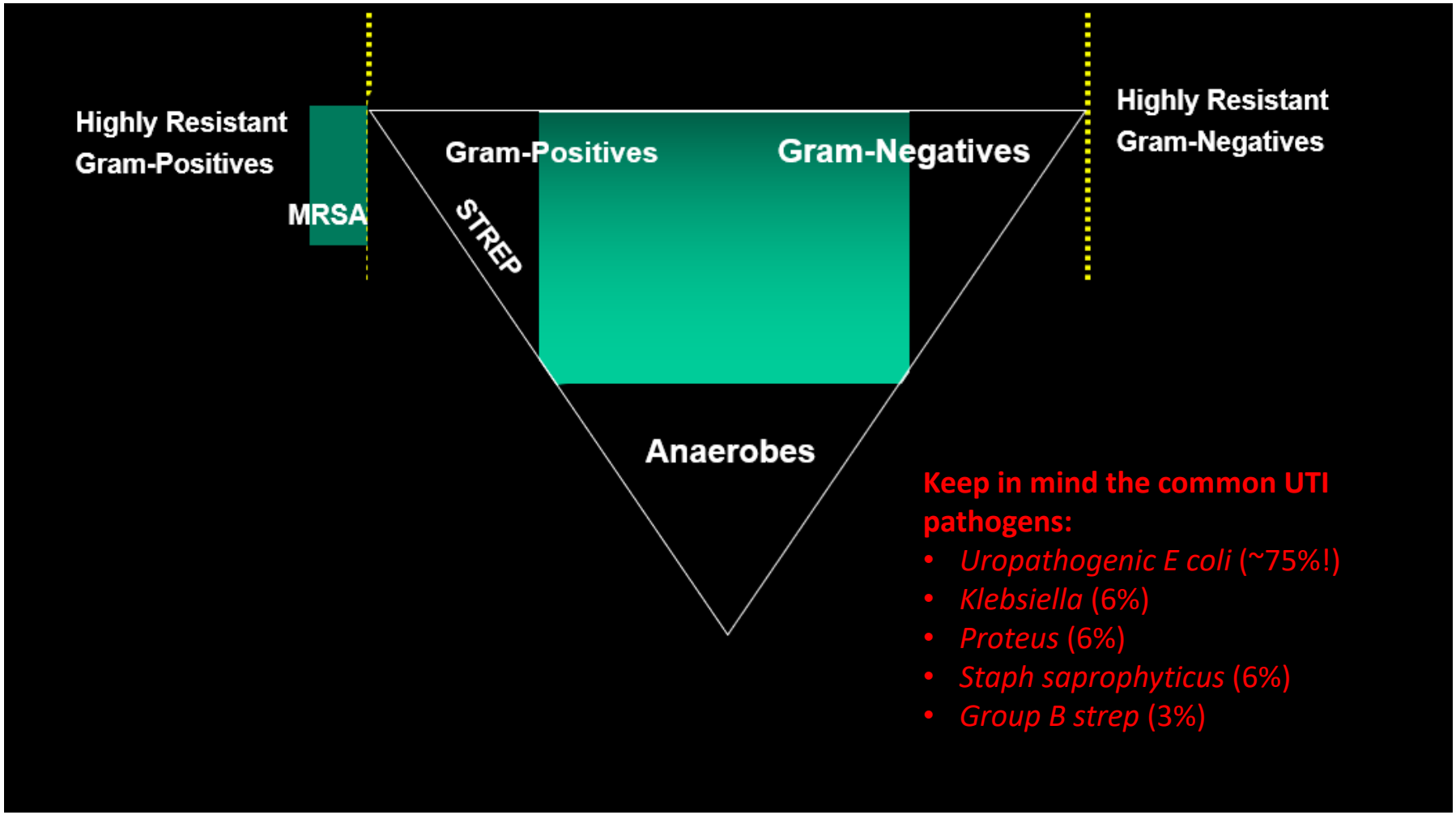
- Ceftriaxone
- Levofloxacin
- Doxycycline
- Nitrofurantoin

Empiric Cystitis Treatment:
3 First-Line Options

- Nitrofurantoin
  - Caution with use in elderly or GFR < 30
  - CAUTION IN UPPER TRACT DISEASE – Does not penetrate kidneys
- Fosfomycin
  - Expensive!
  - Typically not used for upper tract disease (though data here is evolving!)
- TMP/SMX

Trimethoprim-Sulfamethoxazole

(i.e. “Bactrim” or “TMP-SMX”)



Keep in mind the common UTI pathogens:

- *Uropathogenic E coli* (~75%!)
- *Klebsiella* (6%)
- *Proteus* (6%)
- *Staph saprophyticus* (6%)
- *Group B strep* (3%)

Empiric Cystitis Treatment:
3 First-Line Options

- Nitrofurantoin
- Fosfomycin
- TMP/SMX
  - CAUTION with resistance >20%

Organism (% susceptible)	Nitrofurantoin [d]			Trimeth/sulfa		
	H	ML	NW	H	ML	NW
Acinetobacter baumannii/calcoaceticus complex [e]						
Citrobacter freundii complex [f]	97	96	98	92	92	80
Enterobacter cloacae complex [f]	59	63	68	91	84	88
Escherichia coli	99	96	96	71	70	79

Empiric Cystitis Treatment:
3 First-Line Options

- Nitrofurantoin
  - Caution in elderly or GFR < 30
  - CAUTION IN UPPER TRACT DISEASE – Does not penetrate kidneys
- Fosfomycin
  - Expensive!
  - Typically not used for upper tract disease (though data here is evolving!)
- TMP/SMX
  - CAUTION with resistance >20%

Audience Response Question

Cipro isn't on the list! Why do you think that is?

- Too much resistance
- Too expensive
- Too many side effects

Empiric Cystitis Treatment:
3 First-Line Options

- Nitrofurantoin
  - Caution in elderly or GFR < 30
  - CAUTION IN UPPER TRACT DISEASE – Does not penetrate kidneys
- Fosfomycin
  - Expensive!
  - Typically not used for upper tract disease (though data here is evolving!)
- TMP/SMX
  - CAUTION with resistance >20%

Audience Response Question

Cipro isn't on the list! Why do you think that is?

- Too much resistance
- Too expensive
- Too many side effects

Case 1: Urinary Tract Infection

1. For inpatient UTI in a patient without risk factors for resistance*, use ceftriaxone.
   → *Risk factors: recent urologic procedure, history of MDRO, etc.

1. For outpatient pyelonephritis, use ciprofloxacin or levofloxacin.
   → Excellent bioavailability and kidney penetration

3. For cystitis, use fosfomycin or nitrofurantoin.
   → AVOID fluoroquinolones unless no other options
   → AVOID empiric bactrim if local E coli resistance > 20%

A ceftriaxone-oriented approach

Can be used to teach additional infectious syndromes…

- Pneumonia
  - Part 1 = Outpatient CAP
  - Part 2 = Inpatient CAP
  - Part 3 = HAP
- Skin and Soft Tissue Infection
  - Part 1 = Inpatient Non-purulent cellulitis
  - Part 2 = Inpatient Purulent cellulitis
  - Part 3 = Outpatient Rx

Antibiotic Quick Reference

Syndrome	Route	First-Line Rx	Most Common Organisms
Bacterial Meningitis	IV	Ceftriaxone + Vanco ± Ampicillin	Strep pneumoniae, meningo-coccus, ± listeria monocytogenes
Sinusitis	PO	Amoxicillin-Clavulanate	Strep spp, oral anaerobes
Pneumonia	PO	Amoxicillin-Clavulanate + azithro, or Levofloxacin	*CAP:* Strep pneumoniae, M. catarrhalis, atypical organisms *HAP:* Consider PsA, MRSA
	IV	Ceftriaxone + Azithromycin	
Intra-abdominal (cholecystitis, diverticulitis)	PO	Ciprofloxacin + Metronidazole	GNRs, anaerobes. Occasionally enterococcus
	IV	Ceftriaxone + Metronidazole	
UTI	PO	Nitrofurantoin, Fosfomycin or Bactrim	E coli, Klebsiella, Proteus, Staph saprophyticus, Group B Strep
	IV	Ceftriaxone	
SSTI	PO	*Purulent*: TMP-SMX *Non-purulent*: Cephalexin	*Purulent:* MRSA, MSSA *Non-purulent:* Streptococcal spp
	IV	*Purulent*: Vanco *Non-purulent*: Cefazolin	

Thank you!

Alyssa Castillo, MD

ayc20@uw.edu