Clinical significance with empirical therapy of Common Bacteria

Prof. Dr. Ripon Barua

MBBS, M.Phil (Microbiology), FCPS (Medicine)

MPH (Epidemiology), MMEd, BCS (health)

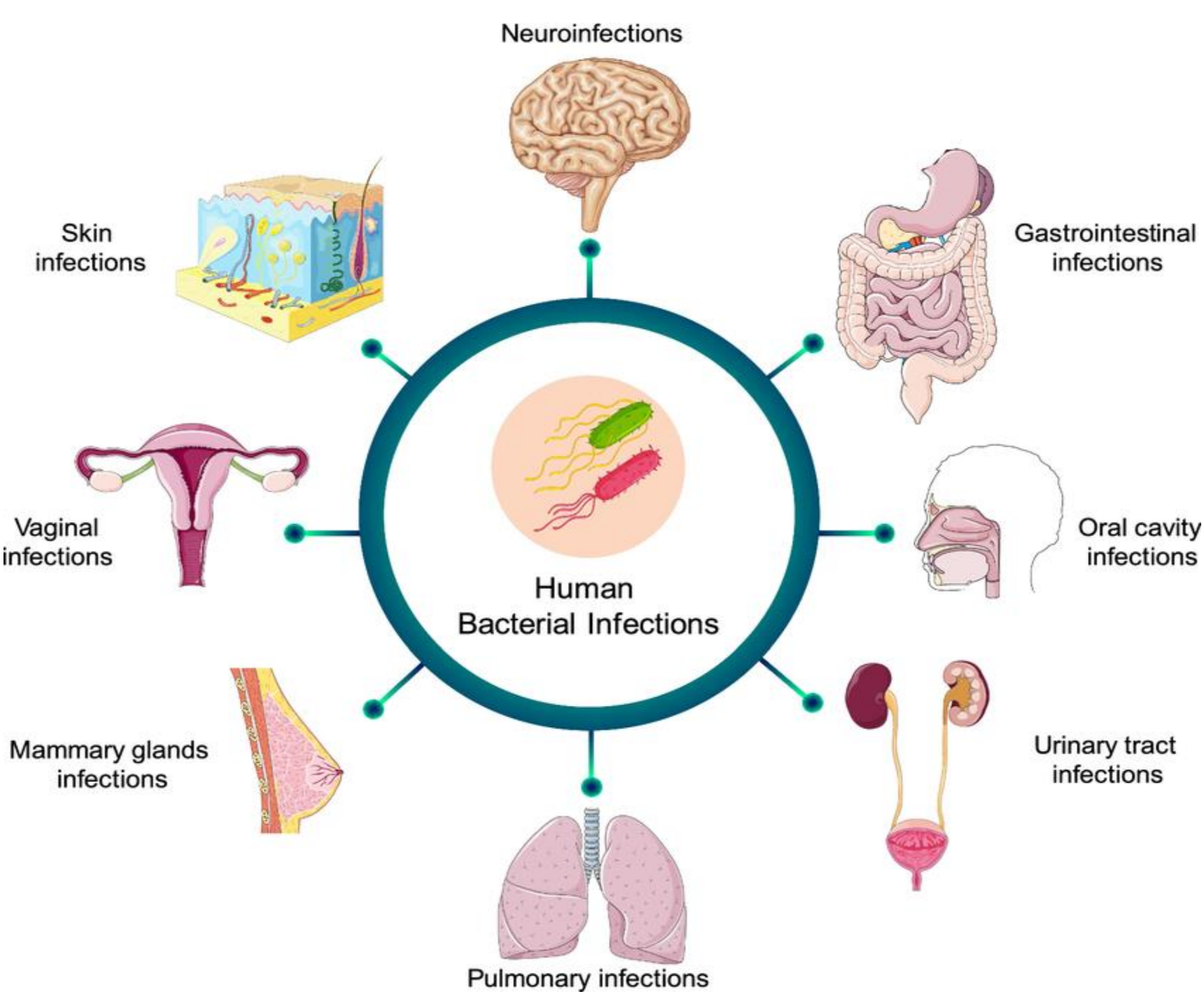
Professor of Microbiology (cc)

Chittagong Medical College, Chattogram 4203, Bangladesh.

Cell Phone and WhatsApp: +8801629881825

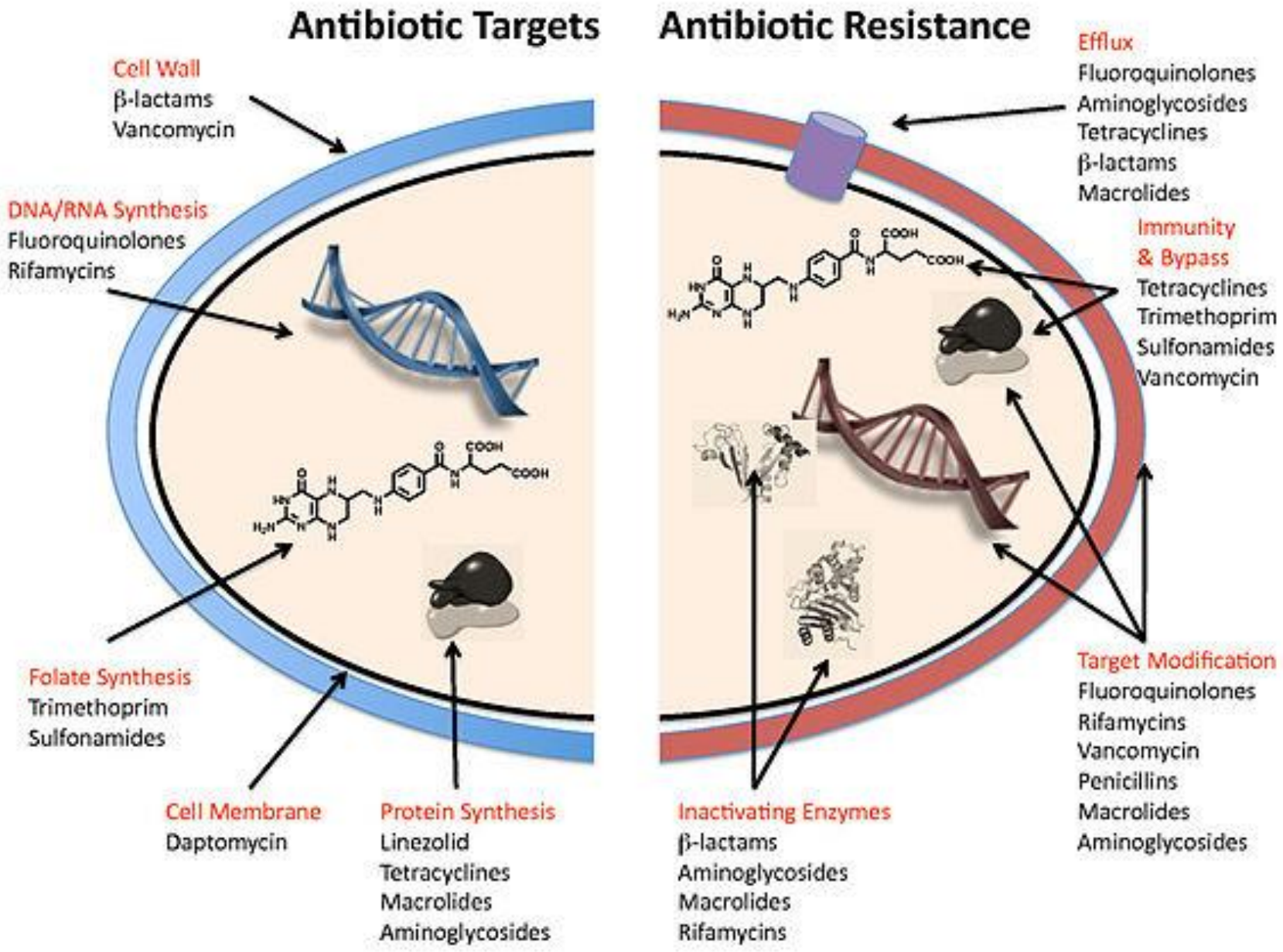
E-mail: riponbarua38cmc@gmail.com

ORCID: **https://orcid.org/0000-0001-9898-7306**


Neuroinfections
Skin infections
Gastrointestinal infections
Vaginal infections
Oral cavity infections
Human Bacterial Infections
Mammary glands infections
Urinary tract infections
Pulmonary infections

Characteristics	Genus	Representative Diseases
I. Rigid, thick-walled cells		
A. Free-living (extracellular bacteria)		
1. Gram-positive		
a. Cocci	*Streptococcus*	Pneumonia, pharyngitis, cellulitis
	Staphylococcus	Abscess of skin and other organs
b. Spore-forming rods		
(1) Aerobic	*Bacillus*	Anthrax
(2) Anaerobic	*Clostridium*	Tetanus, gas gangrene, botulism
c. Non–spore-forming rods		
(1) Nonfilamentous	*Corynebacterium*	Diphtheria
	Listeria	Meningitis
(2) Filamentous	*Actinomyces*	Actinomycosis
	Nocardia	Nocardiosis
2. Gram-negative		
a. Cocci	*Neisseria*	Gonorrhea, meningitis
b. Rods		
(1) Facultative		
(a) Straight		
(i) Respiratory organisms	*Haemophilus*	Meningitis
	Bordetella	Whooping cough
	Legionella	Pneumonia
(ii) Zoonotic organisms	*Brucella*	Brucellosis
	Francisella	Tularemia
	Pasteurella	Cellulitis
	Yersinia	Plague
(iii) Enteric and related organisms	*Escherichia*	Urinary tract infection, diarrhea
	Enterobacter	Urinary tract infection
	Serratia	Pneumonia
	Klebsiella	Pneumonia, urinary tract infection
	Salmonella	Enterocolitis, typhoid fever
	Shigella	Enterocolitis
	Proteus	Urinary tract infection
(b) Curved	*Campylobacter*	Enterocolitis
	Helicobacter	Gastritis, peptic ulcer
	Vibrio	Cholera
(2) Aerobic	*Pseudomonas*	Pneumonia, urinary tract infection
(3) Anaerobic	*Bacteroides*	Peritonitis
3. Acid-fast	*Mycobacterium*	Tuberculosis, leprosy
B. Non–free-living (obligate intracellular parasites)	*Rickettsia*	Rocky Mountain spotted fever, typhus, Q fever
	Chlamydia	Urethritis, trachoma, psittacosis
II. Flexible, thin-walled cells (spirochetes)	*Treponema*	Syphilis
	Borrelia	Lyme disease
	Leptospira	Leptospirosis
III. Wall-less cells	*Mycoplasma*	Pneumonia

INHIBIT		CLASIFICATION		ANTIBIOTICS			
Cell Wall Synthesis	Beta Lactams	Penicillins		*Penicinillase – Sensible*			
			Natural Penicillins (narrow spectrum)	Penicillin G: Na, K, Procainic, Benzathine (IV, IM) Penicillin V: VO			
			Aminopenicillins (broad spectrum)	Ampicillin Amoxicillin			
			Penicinillase – Resistant (very narrow spectrum)				
			Nafcillin	Oxacillin	Dicloxacillin		
			Antipseudomonal (extended spectrum)				
			Carboxipenicillins	Ticarcillin Carbenicillin			
			Ureidopenicillins	Piperacillin Azlocillin Mezlocillin			
		Cephalosporins	1° Generation	Cefazolin	Cephalexine	Cephapirin	
				Cefadroxil	Cephadrine	Cephalotin	
			2° Generation	Cefuroxime	Cefamandole	Cefprozil	
				Cefoxitin	Cefonicid	Cefmetazole	
				Cefotetan	Cefaclor		
			3° Generation	Cefoperazone	Ceftriaxone	Ceftazidime	
				Cefpodoxime	Ceftizoxime	Cefotaxime	
				Cefdinir	Ceftibuten	Cefixime	
				Cefditoren			
			4° Generation	Cefepime	Cefpirome *		
			5° Generation	Ceftaroline			
		Carbapenems		Meropenem	Ertapenem	Doripenem	Imipenem + Cylastatine
		Monobactams		Aztreonam			
		**** *Beta-lactamase inhib.*		Sulbactam	Tazobactam	Clavulanic Acid	
	No lactam	*Glycopeptides*		Vancomycin	Bacitracin		
				Teicoplanin	Polymyxin B		
Protein Synthesis		*30S*	*Amino-glycosides*	Gentamycin	Neomycin	Streptomycin	
				Amikacin	Tobramycin		
			Tetracyclins	Doxycycline	Demeclocylin *	Minocycline	
				Tetracyclin	Tigecyclin		
		50S	*Oxazolidonones*	Linezolid			
			Streptogramins	Quinupristin/Dalfopristin			
			Cloramphenicol				
			Macrolides	Erythromycin	Azithromycin	Clarithromycin	
			Lincosamides	Clindamycin	Lincomycin		
DNA topoisomerases		*Fluorquinolones*		Ciprofloxacin	Norfloxacin	Levofloxacin	Ofloxacin
				Sparfloxacin	Moxifloxacin	Gemifloxacin	Enofloxacin
		Quinolones		Nalidixic Acid			
Folic Acid Synthesis		*Sulfonamides*		Sulfamethoxazole (SMX)	Ag Sulfadiazine	Sulfasalazine	Sulfisoxazole
		DHFR inhibitors		Trimethroprim (TMP)	Pirymethamine		
DNA (damage)		*Metronidazole*					
mRNA synth.		*Rifampim*					


Antibiotic Targets
Antibiotic Resistance
Cell Wall
β-lactams
Vancomycin
DNA/RNA Synthesis
Fluoroquinolones
Rifamycins
Folate Synthesis
Trimethoprim
Sulfonamides
Cell Membrane
Daptomycin
Protein Synthesis
Linezolid
Tetracyclines
Macrolides
Aminoglycosides
Efflux
Fluoroquinolones
Aminoglycosides
Tetracyclines
β-lactams
Macrolides
Immunity
& Bypass
Tetracyclines
Trimethoprim
Sulfonamides
Vancomycin
Target Modification
Fluoroquinolones
Rifamycins
Vancomycin
Penicillins
Macrolides
Aminoglycosides
Inactivating Enzymes
β-lactams
Aminoglycosides
Macrolides
Rifamycins

How Antibiotic Resistance Spreads

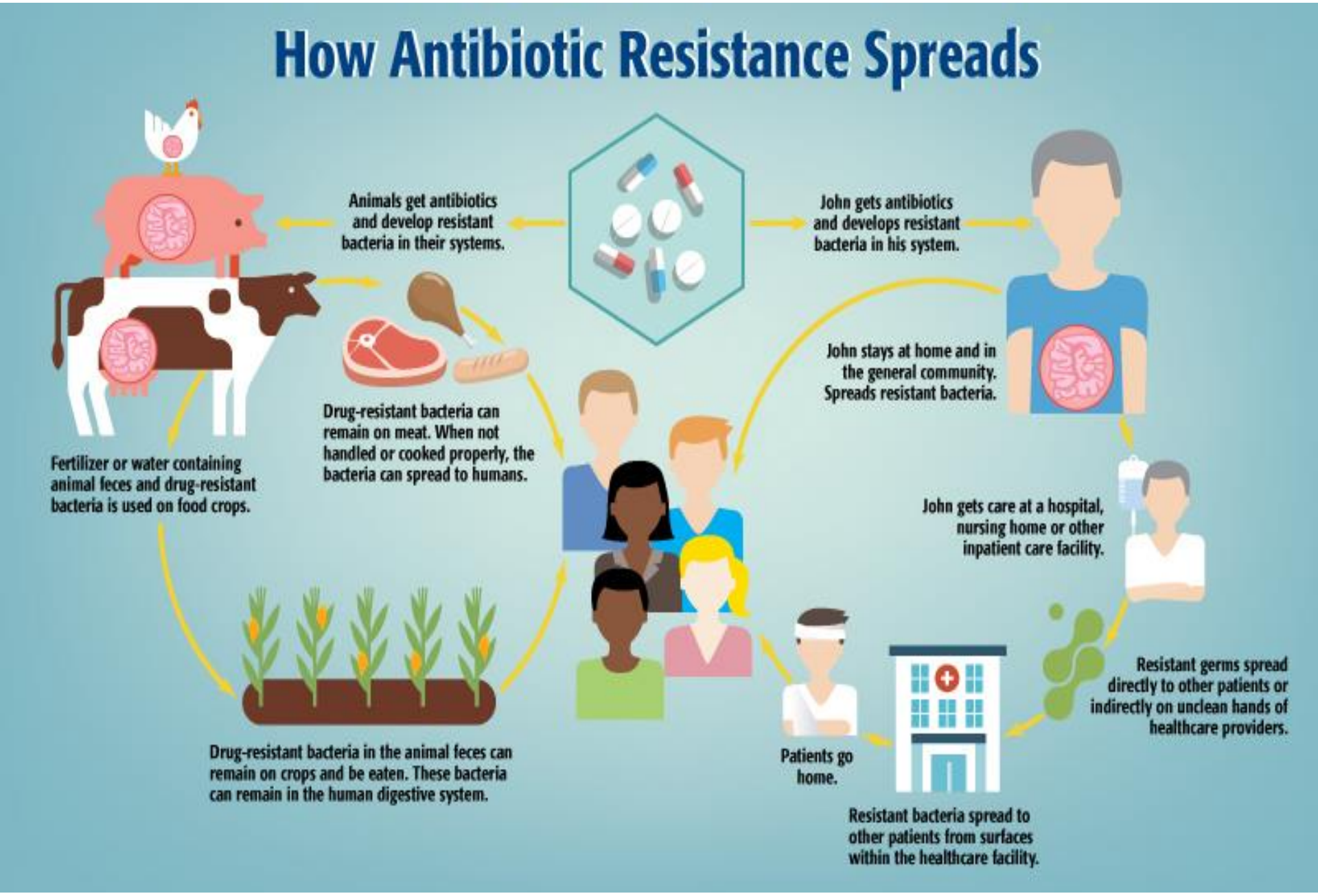


Table 3G-1. Test for Detecting Methicillin (Oxacillin) Resistance in *Staphylococcus aureus*[a] and *Staphylococcus lugdunensis*

Test	Detecting *mecA*-Mediated Resistance Using Cefoxitin[b]		Detecting *mecA*-Mediated Resistance Using Oxacillin	Detecting *mecA*-mediated Resistance Using Oxacillin Salt Agar for *S. aureus* Only
Test method	Disk diffusion	Broth microdilution	Broth microdilution and agar dilution	Agar dilution for *S. aureus*
Medium	MHA	CAMHB	CAMHB with 2% NaCl (broth microdilution) MHA with 2% NaCl (agar dilution)	MHA with 4% NaCl
Antimicrobial concentration	30-µg cefoxitin disk	4 µg/mL cefoxitin	2 µg/mL oxacillin	6 µg/mL oxacillin
Inoculum	Standard disk diffusion procedure	Standard broth microdilution procedure	Standard broth microdilution procedure or standard agar dilution procedure	Colony suspension to obtain 0.5 McFarland turbidity Using a 1-µL loop that was dipped in the suspension, spot an area 10-15 mm in diameter. Alternatively, using a swab dipped in the suspension and the excess liquid expressed, spot a similar area or streak an entire quadrant.
Incubation conditions	33 to 35°C; ambient air[c]			
Incubation length	16-18 hours	16-20 hours	24 hours (may be reported after 18 hours, if resistant)	24 hours; read with transmitted light
Results	≤ 21 mm = positive for *mecA*-mediated resistance ≥ 22 mm = negative for *mecA*-mediated resistance	≥ 8 µg/mL = positive for *mecA*-mediated resistance ≤ 4 µg/mL = negative for *mecA*-mediated resistance	≥4 µg/mL = positive for *mecA*-mediated resistance ≤ 2 µg/mL = negative for *mecA*-mediated resistance	Examine carefully with transmitted light for > 1 colony or light film of growth. > 1 colony = positive for *mecA*-mediated resistance

Table 3G-2. Test for Detecting Methicillin (Oxacillin) Resistance in *Staphylococcus* spp. Except *Staphylococcus aureus*[a] and *Staphylococcus lugdunensis*

Test	Detecting *mecA*-Mediated Resistance Using Cefoxitin[b]	Detecting *mecA*-Mediated Resistance Using Oxacillin	
Test method	Disk diffusion	Disk diffusion	Broth microdilution and agar dilution
Organism group	*Staphylococcus* spp. except: *S. aureus* (refer to Table 3G-1) *S. lugdunensis* (refer to Table 3G-1) *S. pseudintermedius* (not recommended) *S. schleiferi* (not recommended)	Testing is only indicated for the species listed below: *S. epidermidis* *S. pseudintermedius* *S. schleiferi*	*Staphylococcus* spp. except: *S. aureus* (refer to Table 3G-1) *S. lugdunensis* (refer to Table 3G-1)
Medium	MHA	MHA	CAMHB with 2% NaCl (broth microdilution) MHA with 2% NaCl (agar dilution)
Antimicrobial concentration	30 µg cefoxitin disk	1-µg oxacillin disk	0.5 µg/mL oxacillin
Inoculum	Standard disk diffusion procedure	Standard disk diffusion procedure	Standard broth microdilution procedure or standard agar dilution procedure
Incubation conditions	33 to 35°C; ambient air[c]		
Incubation length	24 hours (may be reported after 18 hours, if resistant)	16-18 hours	24 hours (may be reported after 18 hours, if resistant)
Results	≤ 24 mm = positive for *mecA*-mediated resistance ≥ 25 mm = negative for *mecA*-mediated resistance	≤ 17 mm = positive for *mecA*-mediated resistance ≥ 18 mm = negative for *mecA*-mediated resistance	≥ 1 µg/mL = positive for *mecA*-mediated resistance ≤ 0.5 µg/mL = negative for *mecA*-mediated resistance

Fig. 1: Cefoxitin Sensitive Isolate

Staphylococcus aureus

MIC for

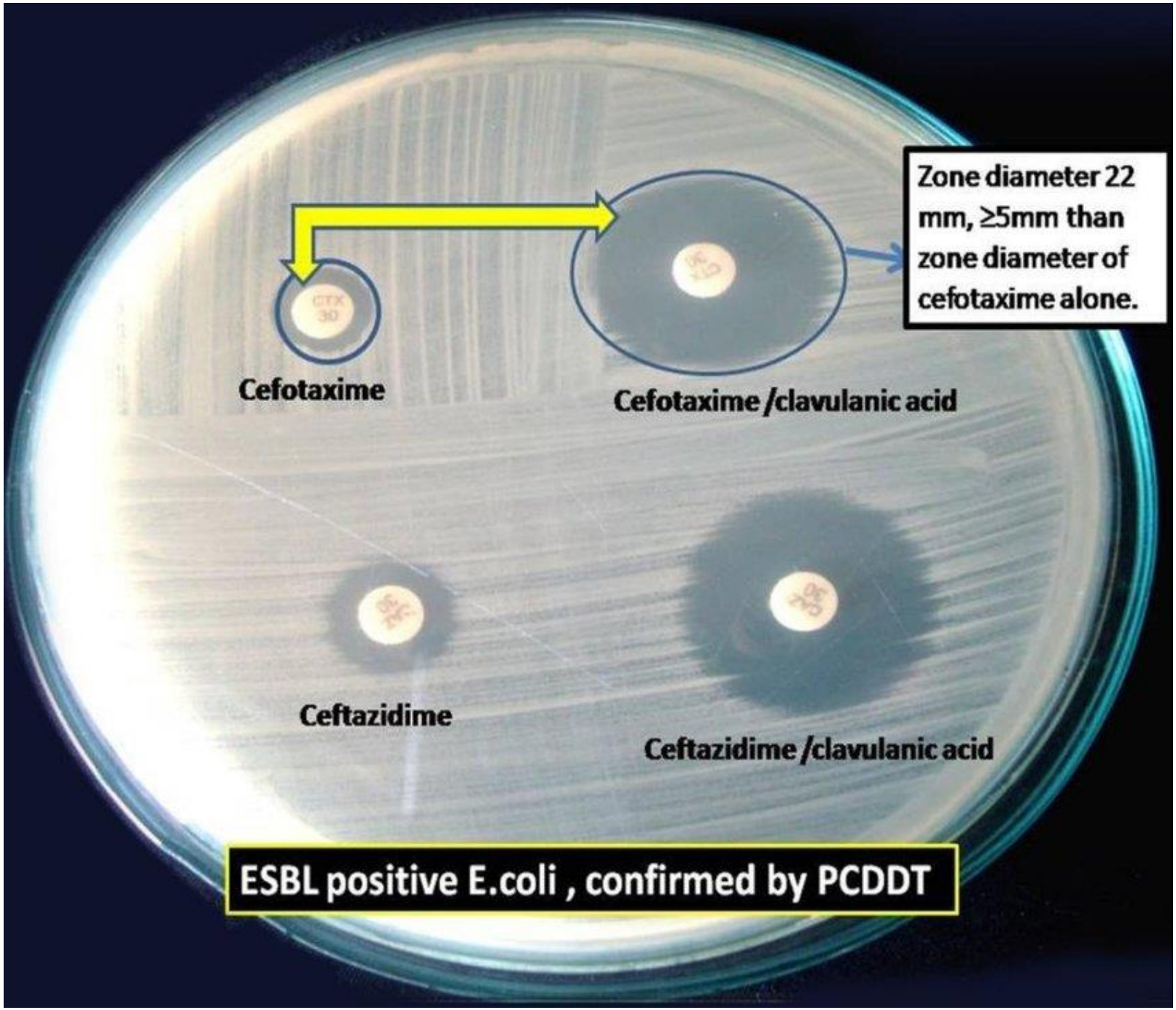
VSSA =≤ 2mcg/mL,
hVISA=<4mcg/mL,
VISA=2-4 mcg/mL,
VRSA=≥16mcg/mL

Table 3A. (Continued)

Test	Criteria for Performance of ESBL Test		ESBL Test	
Test method	Disk diffusion	Broth microdilution	Disk diffusion	Broth microdilution
Medium	MHA	CAMHB	MHA	CAMHB
Antimicrobial concentration	For *K. pneumoniae*, *K. oxytoca*, and *E. coli*: Cefpodoxime 10 µg or Ceftazidime 30 µg or Aztreonam 30 µg or Cefotaxime 30 µg or Ceftriaxone 30 µg For *P. mirabilis*: Cefpodoxime 10 µg or Ceftazidime 30 µg or Cefotaxime 30 µg (Testing more than one antimicrobial agent improves the sensitivity of ESBL detection.)	For *K. pneumoniae*, *K. oxytoca*, and *E. coli*: Cefpodoxime 4 µg/mL or Ceftazidime 1 µg/mL or Aztreonam 1 µg/mL or Cefotaxime 1 µg/mL or Ceftriaxone 1 µg/mL For *P. mirabilis*: Cefpodoxime 1 µg/mL or Ceftazidime 1 µg/mL or Cefotaxime 1 µg/mL (Testing more than one antimicrobial agent improves the sensitivity of ESBL detection.)	Ceftazidime 30 µg Ceftazidime-clavulanate[a] 30/10 µg and Cefotaxime 30 µg Cefotaxime-clavulanate 30/10 µg (Testing necessitates using both cefotaxime and ceftazidime, alone and in combination with clavulanate.)	Ceftazidime 0.25-128 µg/mL Ceftazidime-clavulanate 0.25/4-128/4 µg/mL and Cefotaxime 0.25-64 µg/mL Cefotaxime-clavulanate 0.25/4-64/4 µg/mL (Testing necessitates using both cefotaxime and ceftazidime, alone and in combination with clavulanate.)
Inoculum	Standard disk diffusion procedure	Standard broth dilution procedure	Standard disk diffusion procedure	Standard broth dilution procedure
Incubation conditions	35°C±2°C; ambient air	35°C±2°C; ambient air	35°C±2°C; ambient air	35°C±2°C; ambient air
Incubation length	16-18 hours	16-20 hours	16-18 hours	16-20 hours

Table 3A. (Continued)

Test	Criteria for Performance of ESBL Test		ESBL Test	
Test method	Disk diffusion	Broth microdilution	Disk diffusion	Broth microdilution
Results	For *K. pneumoniae*, *K. oxytoca*, and *E. coli*:	Growth at or above the concentrations listed may indicate ESBL production (ie, for *E. coli*, *K. pneumoniae*, and *K. oxytoca*, MIC ≥8 µg/mL for cefpodoxime or MIC ≥2 µg/mL for ceftazidime, aztreonam, cefotaxime, or ceftriaxone; and for *P. mirabilis*, MIC ≥2 µg/mL for cefpodoxime, ceftazidime, or cefotaxime).	A ≥5-mm increase in a zone diameter for either antimicrobial agent tested in combination with clavulanate vs the zone diameter of the agent when tested alone = ESBL (eg, ceftazidime zone = 16; ceftazidime-clavulanate zone = 21).	A ≥3 2-fold concentration decrease in an MIC for either antimicrobial agent tested in combination with clavulanate vs the MIC of the agent when tested alone = ESBL (eg, ceftazidime MIC = 8 µg/mL; ceftazidime-clavulanate MIC = 1 µg/mL).
	Cefpodoxime zone ≤17 mm Ceftazidime zone ≤22 mm Aztreonam zone ≤27 mm Cefotaxime zone ≤27 mm Ceftriaxone zone ≤25 mm			
	For *P. mirabilis*:			
	Cefpodoxime zone ≤22 mm Ceftazidime zone ≤22 mm Cefotaxime zone ≤27 mm			
	Zones above may indicate ESBL production.			


Zone diameter 22 mm, ≥5mm than zone diameter of cefotaxime alone.
Cefotaxime
Cefotaxime /clavulanic acid
Ceftazidime
Ceftazidime /clavulanic acid
ESBL positive E.coli , confirmed by PCDDT

Staphylococcus aureus MSSA/MRSA

Site of Isolation with clinical significance

CSF : Skin contaminant, Pathogen in CNS shunts

Blood: Skin contaminant, Pathogen in soft tissue, bone, abscess, IV line infection,

Sputum: Colonizer, pathogen rare; only following viral infection,

Urine: Colonizer, Not a uropathogen rarely due to overwhelming bacteremia

Wound: Colonizer and pathogen in abscess

Therapy; **MSSA**: cefazolin, nafcillin, oxacillin, flucloxacillin,

Therapy; **HA-MRSA**: Ceftaroline, Daptomycin, Linezolid, Vancomycin, Tigecycline, Minocycline, Telavancin, Quinopristin/Dalfopristin (All IV)

Therapy; **CA-MRSA** oral : Minocycline, doxycycline, Co-trimoxazole, Clindamycin

Therapy; **VISA/VRSA**: Linezolid (IV/PO), Daptomycin (IV), Telavancin (IV)

Staphylococcus aureus MSSA/MRSA… Comments

Non-continuous or low-grade blood culture positivity (1/4) usually indicates skin contamination, continuous high grade blood culture positivity (3/4-4/4) usually indicates intravascular infection, osteomyelitis, or abscess

Staphylococcus epidermidis MSSE/MRSE CoNS, S.lugdunensis

Site of Isolation with clinical significance

CSF : Skin contaminant, Pathogen in CNS shunts

Blood: Skin contaminant, Pathogen from IV lines, Implants, Prosthetic valves endocarditis, rarely SBE)

Sputum: Colonizer

Urine: Colonizer

Wound: Colonizer and pathogen (infected foreign body drainage)

Therapy; **MSSE**: nafcillin, oxacillin

Therapy; **MRSE**: Linezolid, Daptomycin, Vancomycin, Quinopristin/Dalfopristin, Minocycline (All IV)

Staphylococcus epidermidis MSSE/MRSE CoNS, S.lugdunensis … Comments

Usually non-pathogenic in absence of prosthetic or implanted materials, common cause of prosthetic valve endocarditis (PVE), rare cause of Subacute bacterial endocarditis (SBE)

S. lugdunensis is CoNS but often misidentified as S.aureus due to clumping factor. But it is pan sensitive to antibiotics

Staphylococcus saprophyticus

Site of Isolation with clinical significance

CSF : Non-pathogen

Blood: Non-pathogen

Sputum: Non-pathogen

Wound: Non-pathogen

Urine: Pathogen (Cystitis)

S.saprophyticus UTI is associated with urinary "fishy odor" (like bacterial vaginosis, alkaline pH, and microscopic hematuria, novobiocin resistant (CoNS)

Preferred Therapy: Amoxycillin (PO), Co-trimoxazole (PO), Nitrofurantoin (PO)

Alternate Therapy: Any quinolone (PO), any 1st generation cephalosporin

Streptococcus pyogenes

Site of Isolation with clinical significance

CSF : Skin contaminant

Blood: Pathogen

Sputum: Pathogen rare cause of CAP

Urine: Non-pathogen

Wound: Colonizer, Pathogen (cellulitis)

Throat: Colonizer, Pathogen (Pharyngitis)

Preferred Therapy: Amoxycillin (PO), Any beta lactam (IV/PO)

Alternate Therapy: Penicillin (PO), Clindamycin (for elimination)

Streptococcus agalactiae (GBS)

Site of Isolation with clinical significance

CSF : Pathogen

Blood: Pathogen (from urine source, skin)

Sputum: Non-pathogen

Urine: Pathogen (in Diabetics, elderly)

Wound: Colonizer, Pathogen (Diabetic foot infections)

Throat: Pathogen (Pharyngitis) Colonizer, Pathogen

CNS: Neonatal meningitis

Preferred Therapy: Any 1st, 2nd, 3rd gen cephalosporin (IV/PO),
CNS: Ceftriaxone(IV), Penicillin (IV)
SBE: Ceftriaxone(IV), Penicillin (IV), Vancomycin

Alternate Therapy: SBE: Meropenem (IV), Ertapenem (IV), linezolid (IV/PO)

Aminoglycosides and tetracyclines are ineffective

Viridans Streptococcus

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: skin contaminant, Pathogen (SBE)

Sputum: Non-Pathogen

Urine: Non-Pathogen

Wound: Non-Pathogen

Throat: Non-Pathogen

Preferred Therapy: Ceftriaxone (IV), Any 1st, 2nd, 3rd gen cephalosporin (IV/PO)

Alternate Therapy: Amoxycillin, Meropenem, Ertapenem, Vancomycin (IV)

Viridans Streptococcus … Comments

1. Low grade blood culture positivity (1/4) indicates contamination during venepuncture

2. Continuous high-grade blood culture positivity (3/4-4/4) indicates SBE until proven otherwise

3. S. anginosus, S.constellatus prone to invasive disease, bacteremia and abscess formation

Streptococcus pneumoniae

Site of Isolation with clinical significance

CSF : Pathogen (ABM)

Blood: Pathogen (from respiratory tract source)

Sputum: Colonizer, Pathogen

Urine: Non-Pathogen

Wound: Pathogen (cellulitis in SLE patient)

Throat: Non-Pathogen

Therapy;**MDRSP**- Respiratory quinolone (IV/PO), Telithromycin (PO), Ertapenem, Meropenem(IV), Cefepime(IV), Linezolid(IV/PO), Vancomycin (IV)

Penicillin resistant S.pneumoniae (**PRSP**) are still sensitive to full dose/ high dose Beta lactams.

Alternate Therapy: Doxycycline (IV/PO), any cephalosporin (IV/PO), Amoxy/Clauv (PO)

Streptococcus pneumoniae… Comments

If possible avoid macrolides as >30% are resistant .

20-30% are naturally resistant and 10-15% acquire macrolide resistant.

Neisseria meningitidis

Site of Isolation with clinical significance

CSF : Pathogen (ABM)

Blood: Pathogen

Sputum: Colonizer and Pathogen (only in closed populations e.g millitary recruits)

Urine: Colonizer, Pathogen (Urethritis rarely)

Wound: Non-Pathogen

Preferred Therapy: Amoxicillin (IV), Ampicillin (IV), Any 3rd Cephalosporin(IV) (Cefotaxime, Ceftriaxone)

Alternate Therapy: Chloramphemicol (IV/PO), Vancomycin, Cefepime, Meropenem

28.62 Treatment of bacterial meningitis of unknown cause (based on the British Infection Association Guideline 2016)*

1. Adults aged less than 60 years

- Cefotaxime 2 g IV 4 times daily *or*
- Ceftriaxone 2 g IV twice daily

2. Patients in whom penicillin-resistant pneumococcal infection is suspected, or in areas with a significant incidence of penicillin resistance in the community

As for (1) but add:

- Vancomycin 15–20 mg/kg IV twice daily *or*
- Rifampicin 600 mg IV or orally twice daily

3. Adults aged >60 years and those in whom *Listeria monocytogenes* infection is suspected (brainstem signs, immunosuppression, diabetic, alcohol misuser)

As for (1) but add:

- Ampicillin 2 g IV 6 times daily *or*
- Amoxicillin 2 g IV 6 times daily

4. Adults aged >60 years, or with risk factors in (3) above, in areas with a significant incidence of penicillin resistance in the community

As for (2) but add:

- Ampicillin 2 g IV 6 times daily *or*
- Amoxicillin 2 g IV 6 times daily

5. Patients with a clear history of anaphylaxis to β-lactams

- Chloramphenicol 25 mg/kg IV 4 times daily *plus*
- Vancomycin 15–20 mg/kg IV twice daily

If over the age of 60 years, add: co-trimoxazole 10–20 mg/kg (of the trimethoprim component) in four divided doses

6. Adjunctive treatment (see text)

- Dexamethasone 10 mg 4 times daily for 2–4 days

***N.B.** Antibiotic recommendations depend on local epidemiology of organisms and antibiotic resistance. Local guidance should always be sought.

British Infection Association Guideline in Journal of Infection 2016; 72:405–438.

28.63 Chemotherapy of bacterial meningitis when the cause is known (based on the British Infection Association Guideline 2016)[1]

Pathogen	Regimen of choice	Alternative agents
Neisseria meningitidis	Cefotaxime 2 g IV 4 times daily or ceftriaxone 2 g IV twice daily for 5—7 days	Benzylpenicillin 2.4 g IV 6 times daily *or* Chloramphenicol[2,3] 25 mg/kg 4 times daily for 5—7 days
Streptococcus pneumoniae (sensitive to β-lactams, MIC ≤0.06)	Cefotaxime 2 g IV 4 times daily or Ceftriaxone 2 g IV twice daily for 10—14 days	Chloramphenicol[2,3] 25mg/kg 4 times daily for 10—14 days
Strep. pneumoniae (resistant to β-lactams)	As for sensitive strains but add: Vancomycin 15—20 mg/kg IV twice daily *or* Rifampicin 600 mg IV twice daily for 14 days	Chloramphenicol[3] 25 mg/kg 4 times daily for 14 days
Haemophilus influenzae	Cefotaxime 2 g IV 4 times daily or Ceftriaxone 2 g IV twice daily for 10 days	Moxifloxacin 400 mg daily for 10 days
Listeria monocytogenes	Amoxicillin 2 g IV 6 times daily for 21 days	Co-trimoxazole 10—20 mg/kg (of the trimethoprim component) daily in four divided doses for 21 days
Streptococcus suis	Cefotaxime 2 g IV 4 times daily or Ceftriaxone 2 g IV twice daily for 10—14 days	Chloramphenicol[2,3] 25 mg/kg 4 times daily for 10—14 days

[1]**N.B.** Antibiotic recommendations depend on local epidemiology of organisms and antibiotic resistance. Local guidance should always be sought. [2]For patients with a history of anaphylaxis to β-lactam antibiotics. *British Infection Association Guideline in Journal of Infection 2016; 72:405—438.* [3]If the patient is recovering reduce the dose of chloramphenicol to 12.5 mg/kg to reduce the risk of dose-related anaemia. *From Erratum to reference in note 2.*
(MIC = minimum inhibitory concentration)

Neisseria meningitidis… comments

1. In ABM, do not decrease meningeal dose of Beta lactams as patient improves, since CSF penetration decreases as inflammation decreases

2. Chloramphenicol is excellent choice for penicillin allergic patients.

3. Oral quinolone (single dose) is preferred meningococcal prophylaxis. Alternate: Rifampicin for two days

Neisseria gonorrhoeae

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Pathogen (from from pharyngitis, proctitis,ABE)

Sputum: Non-Pathogen

Urine: Pathogen (Urethritis)

Wound: Non-Pathogen

Urethral discharge: Pathogen (GC proctitis)

Preferred Therapy: PSNG: Ceftriaxone (IV/IM), Any quinolone (IV/IM)
PRNG: Ceftriaxone (IV/IM)

Alternate Therapy: PSNG: Penicillin (IV/IM), Amoxycillin (PO),Doxycycline (IV/PO)
PRNG: Spectinomycin (IM), Any quinolone (PO), Any cephalosporin (IV/PO)

15.10 Treatment of uncomplicated anogenital gonorrhoea

Uncomplicated anogenital or pharyngeal infection

- Ceftriaxone 1 g IM as a single dose
- Ciprofloxacin 500 mg orally as a single dose[1,2]

Pregnancy and breastfeeding

- Ceftriaxone 1 g IM as a single dose
- Spectinomycin 2 g IM stat[3]

Disseminated gonorrhoea

- Ceftriaxone 1 g IM or IV once daily or
- Cefotaxime 1 g IV 3 times daily
- Switched to an oral alternative according to sensitivities after 48 hrs and continued for 7 days

[1]Contraindicated in pregnancy and breastfeeding. [2]Only where nucleic acid amplification test (NAAT) or culture-based sensitivity testing shows sensitivity at all sites. [3]Not routinely available. (IM = intramuscular; IV = intravenous)

Neisseria gonorrhoeae… comments

1. Cause of "culture negative" right sided ABE, may be cultured from synovial fluid/blood in disseminated GC infection(arthritis-dermatitis syndrome)

2. Spectinomycin is ineffective against pharyngeal GC/incubating syphilis.

3. GC strains from Hawai have increased Quinolone resistance; use cefexime or ceftriaxone

4. Treat possible Chlamydia co-infection and sexual partners.

Escherichia coli

Site of Isolation with clinical significance

CSF : Pathogen (ABM)

Blood: Pathogen (from GI or GU source)

Sputum: Pathogen rarely (CAP, VAP)

Urine: uropathogen (CAB, Cystitis, pyelonephritis)

Wound: pathogen (cellulitis), Stool : Colonizer and Pathogen

Preferred Therapy; Cephalosporines 2nd, 3rd gen (IV/PO), Any Quinolone (IV/PO), Ceftriaxone (IV), Nitrofurantoin (PO- AUC or CAB)

Alternate Therapy; Aztronam (IV), gentamicin (IV), Co-trimoxazole (IV/PO)

18.46 Antibiotic regimens for urinary tract infection in adults[1]

Scenario	Drug	Regimen	Duration
Cystitis			
First choices	Trimethoprim	200 mg twice daily	3 days
	Nitrofurantoin	50 mg 4 times daily	
Second choices[1]	Cefalexin	250 mg 4 times daily	
	Ciprofloxacin	250 mg twice daily	
	Pivmecillinam	400 mg 3 times daily	
In pregnancy	Nitrofurantoin	50 mg 4 times daily	7 days
	Cefalexin	250 mg 4 times daily	
Prophylactic therapy			
First choice	Trimethoprim	100 mg at night	Continuous
Second choice[1]	Nitrofurantoin	50 mg at night	
Pyelonephritis			
First choices	Cefalexin	1 g 4 times daily	14 days
	Ciprofloxacin	500 mg twice daily	7 days
Second choices	Gentamicin[2]	Adjust dose according to renal function and serum levels	14 days
	Cefuroxime	750–1500 mg 3 times daily	
Epididymo-orchitis			
Young men	Ciprofloxacin	100 mg twice daily	14 days
Older men	Ciprofloxacin	500 mg twice daily	
Acute prostatitis			
First choice	Ciprofloxacin	500 mg twice daily	14 days
Second choice	Trimethoprim	200 mg twice daily	

Escherichia coli ….Comments

1. It is very common pathogen usually from GI/GU source

2. Many strains are resistant to 1st gen cephalosporins

3. MDR/ESBL positve Esch coli are treated with a carbapenem.

4. Esco coli Carbapenem resistant strains are susceptible to Tigecycline, Colistin, Polymyxin B, Ceftazidim/Avibactam, Nitrofurantoin, Fosfomycin (UTI)

Preferred Therapy for CRE: 1. Tigecycline 2.Minocycline 3. Ceftazidim/Avibactam 4. Meropenem/Vaborbactam, 5. Imipenem/Relebactam 6. Aztronam/Avibactam

Alternate Therapy for CRE: 1. Colistin 2. Aztreonam, 3. Plazomicin 4. Amikacin 5. Cefiderocol 6. Nitrofurantoin (UTI) 7. Fosfomycin (UTI)

Enterococcus faecium (VRE)

Site of Isolation with clinical significance

CSF : Non-pathogen, Except V-P shunts

Blood: Skin contaminant, Pathogen from GI/GU source, SBE)

Sputum: Colonizer

Urine: Colonizer, Pathogen (UTIs)

Wound: Colonizer, Non-pathogen

Therapy; Non-SBE: Linezolid (IV/PO), Quinopristin/Dalfopristin (IV), Doxycycline (IV/PO), Minocycline (IV/PO) Tigecycline (IV), Daptomycin (IV), Nitrofurantoin, Fosfomycin

Therapy; SBE: Linezolid (IV/PO), Quinopristin/Dalfopristin (IV), Daptomycin (IV),

16.96 Antimicrobial treatment of common causative organisms in infective endocarditis

Antimicrobial susceptibility	Antimicrobial	Dose	Duration	
			Native valve	Prosthetic valve
Streptococci				
Penicillin MIC ≤ 0.125 mg/L	Benzylpenicillin IV	1.2 g 6 times daily	4 weeks[1]	6 weeks
Penicillin MIC > 0.125, ≤ 0.5 mg/L	Benzylpenicillin IV and gentamicin IV	2.4 g 6 times daily	4 weeks	6 weeks
		1 mg/kg twice daily[2]	2 weeks	2 weeks
Penicillin MIC > 0.5 mg/L	Vancomycin IV and gentamicin IV	1 g twice daily[3]	4 weeks	6 weeks
		1 mg/kg twice daily[2]	4 weeks	6 weeks
Enterococci				
Amoxicillin MIC ≤ 4 mg/L and gentamicin MIC ≤ 128 mg/L	Amoxicillin IV and gentamicin IV[2]	2 g 6 times daily	4 weeks	6 weeks
		1 mg/kg twice daily[2]	4 weeks	6 weeks
Amoxicillin MIC > 4 mg/L and gentamicin MIC ≤ 128 mg/L	Vancomycin IV and gentamicin IV[2]	1 g twice daily[3]	4 weeks	6 weeks
		1 mg/kg twice daily[2]	4 weeks	6 weeks
Staphylococci – native valve				
Meticillin-sensitive	Flucloxacillin IV	2 g 4–6 times daily[4]	4 weeks	–
Meticillin-resistant, vancomycin MIC ≤ 2 mg/L, rifampicin-sensitive	Vancomycin IV	1 g twice daily[3]	4 weeks	–
	Rifampicin orally	300–600 mg twice daily	4 weeks	–
Staphylococci – prosthetic valve				
Meticillin-sensitive	Flucloxacillin IV	2 g 4–6 times daily	–	6 weeks
	and gentamicin IV	1 mg/kg twice daily[2]	–	6 weeks
	and rifampicin orally	300–600 mg twice daily	–	6 weeks
Meticillin-resistant, vancomycin MIC ≤ 2 mg/L, rifampicin-sensitive	Vancomycin IV	1 g twice daily[3]	–	6 weeks
	and rifampicin orally	300–600 mg twice daily	–	6 weeks

Enterococcus faecium (VRE) …Comments

1. Colonization is common; infection less common
2. Fecal carriage is intermittent but prolonged
3. Increased prevalence of E.fecalis VRE with Vanomycin IV us but not PO
4. Nitrofurantoin preferred for VRE Lower UTI & CAB

Enterococcus faecalis (VSE)

Site of Isolation with clinical significance

CSF : Non-pathogen, Except V-P shunts

Blood: Skin contaminant, Pathogen from GI/GU source, SBE)

Sputum: Non-pathogen

Urine: Colonizer, Pathogen (Cystitis, pyelonephritis)

Wound: Colonizer, Non-pathogen

Therapy; Non-SBE: Ampicillin, Amoxycillin, Meropenem, Pipercillin/Tazobactam, Linezolid (IV/PO), Tigecycline (IV), Daptomycin (IV), Nitrofurantoin, Fosfomycin

Therapy; SBE: Gentamicin+Ampicillin (IV), Meropenem, Linezolid (IV/PO), Pipercillin/Tazobactam

Enterococcus faecalis (VSE)…Comments

1. Sensitive to Ampicillin but not penicillin
2. Cause Endocarditis, hepatobilliary infections and UTI
3. Cefoperazone is the is the only cephalosporin with Anti VSE activity

Acinetobacter spp.

Site of Isolation with clinical significance

CSF : Contaminant from skin, Pathogen (ABM 2 to CNS shunts)

Blood: Pathogen (from IV line,lung, urine source)

Sputum: Colonizer, Pathogen (only with VAP outbreak)

Urine: Colonizer and uropathogen (CAB)

Wound: Colonizer (common skin and ulcer colonizer

Preferred Therapy; Minocycline (IV/PO), Carbapenem (IV), Ampicillin/Sublactam (IV), Tigecycline, Colistin (IV), Amikacin

Alternate Therapy; Cephalosporines 1st, 2nd, 3rd gen (IV) (Except Ceftazidim), Cefepime (IV), Aztreonam (IV), Fosfomycin (only cystitis/CAB)

Acinetobacter spp....Comments

1. Colonization is common and infection is uncommon, if possible avoid treating Acinetobacter.

2. Common colonizer of respiratory secretions or urine.

3. Occurs in outbreaks of VAP

4. Use meropenem for MDR susceptible isolates,

5. Colistin, Polymyxin B, Tigecycline, Minocycline or Doripenem usually effective.

Klebsiella pneumoniae, oxytoca

Site of Isolation with clinical significance

CSF : Pathogen (ABM)

Blood: Pathogen (from respiratory, GI, GU source)

Sputum: Colonizer, Pathogen (CAP/VAP)

Urine: Colonizer and uropathogen (CAB)

Wound: Colonizer and pathogen

Preferred Therapy; Tigecycline (IV), Carbapenem (IV)

Alternate Therapy; Cephalosporines 1st, 2nd, 3rd gen (IV) (Except Ceftazidim), Quinolone (IV/PO), Aztreonam (IV), Cefepime (IV)

17.41 Antibiotic treatment for community-acquired pneumonia (CAP)[1]

Low severity CAP (CURB-65 score 0–1)

- Amoxicillin 500 mg 3 times daily orally (or IV if necessary[2])

If patient is allergic to penicillin

- Doxycycline 200 mg loading dose then 100 mg/day orally *or* clarithromycin 500 mg twice daily orally

Moderate severity CAP (CURB-65 score 2)

- Amoxicillin 500 mg–1 g 3 times daily orally (or IV if oral medication not possible[2]) *or* benzylpenicillin 1.2 g 4 times daily IV
- *plus* clarithromycin 500 mg twice daily orally/IV

If patient is allergic to penicillin

- Doxycycline 200 mg loading dose then 100 mg/day orally *or* levofloxacin 500 mg/day orally

Severe CAP (CURB-65 score 3–5)

- Co-amoxiclav 1.2 g 3 times daily IV or cefuroxime 1.5 g 3 times daily IV *or* ceftriaxone 1–2 g daily IV
- *plus* clarithromycin 500 mg twice daily IV
- *or* benzylpenicillin 1.2 g 4 times daily IV *plus* levofloxacin 500 mg twice daily IV

If *Legionella* is strongly suspected

- Consider adding levofloxacin 500 mg twice daily IV

17.44 Antibiotics for adults aged 18 years and over with hospital-acquired pneumonia

Antibiotic
First-choice oral antibiotic for non-severe symptoms or signs and not at higher risk of resistance[1]
Co-amoxiclav
Alternative oral antibiotics for non-severe symptoms or signs and not at higher risk of resistance, if penicillin allergy or if co-amoxiclav unsuitable[2]
Options include: Doxycycline Cefalexin (caution in penicillin allergy) Co-trimoxazole Levofloxacin (only if switching from IV levofloxacin with specialist advice; consider safety issues)
First-choice IV antibiotics if severe symptoms or signs (e.g. of sepsis) or at higher risk of resistance. Review IV antibiotics by 48 hrs and consider switching to oral antibiotics as above for a total of 5 days then review[2]
Options include: Piperacillin with tazobactam Ceftazidime Ceftriaxone Cefuroxime Meropenem Ceftazidime with avibactam Levofloxacin (consider safety issues)
Antibiotics to be added if suspected or confirmed MRSA infection (dual therapy with an IV antibiotic listed above)
Vancomycin Teicoplanin Linezolid (if vancomycin cannot be used; specialist advice only)

*Klebsiella pneumoniae, oxytoca….*Comments

1. Co-trimoxazole may be ineffective in systemic infection.

2. Antipseudomonal penicillins have limited activity

3. Klebsiella is usually susceptible to carbapenems.

4. CRE are susceptible to Tigecycline, Colistin, Polymyxin B, Ceftazidim/avibactam, fosfomycin

5. NDM -1 metallo beta lactamases are are carbapenem resistant and usually susceptible to Colistin, Tigecycline.

Pseudomonas aeruginosa

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Pathogen (from respiratory, GU source)

Sputum: Colonizer (usually), Pathogen (Rarely indicates VAP)

Urine: Colonizer and Pathogen (from urologic instrumentation)

Wound: Colonizer (almost always)

Stool : Non-pathogen

Preferred Therapy; Monotherapy: Ceftazidim, Meropenem (IV), Cefepime (IV)
Combination therapy: Meropenem (IV) plus either Cefepime (IV) or Amikacin

Alternate Therapy; Doripenem (IV) Amikacin (IV), Aztreonam (IV),Colistin (IV)

*Pseudomonas aeruginosa…*Comments

1. Colonization common ; infection uncommon, avoid treating Ps. aeroginusa in ventilated patients unless tracheobronchitis.

2. For serious systemic infection double therapy is preferred.

3. All double drug therapy are equally effective .

4. If MDR Ps aeroginusa is meropenem resistant, treat with Colistin, polymyxin B, Doripenem or Ceftazidim/avibactam

Burkholderia cepacia

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Pathogen (from IV line /UTI)

Sputum: Colonizer (usually), Not a cause of VAP)

Urine: Colonizer

Wound: Non-pathogen

Stool : Non-pathogen

Preferred Therapy; TMP-SMX (IV/PO), Minocycline (IV/PO), Meropenem (IV)

Alternate Therapy; Respiratory quinolone (IV/PO), Chloramphenicol, Cefepime (IV)

Burkholderia cepacia …Comments

1. Common Colonizer of ulcers, body fluids and wounds

2. Opportunistic pathogen in Cystic fibrosis/ bronchitectasis.

4. Resistant to aminoglycosides,colistin, and polymyxin B

Burkholderia pseudomallei

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Pathogen (from septicemic melioidosis)

Sputum: Pathogen (chronic cavitary penumonia)

Urine: Non-pathogen

Wound: Non-pathogen

Stool : Non-pathogen

Preferred Therapy; Imipenem (IV), Meropenem (IV), ceftazidim (IV), Doxycycline (IV/PO)

Alternate Therapy; TMP-SMX (IV/PO), Amoxicillin/Clavulanic acid (PO)

Burkholderia pseudomallei …Comments

1. Acute melioidosis (Septicemia/cavitary CAP) endemic in SE Asia

2. Chronic melioidosis resembles reactivation of TB but has lower lobe distribution. Prolonged latency until reactivation years later, slow response to effective therapy (1-2 weeks)

3. Prolonged therapy needed to prevent relapse >3 months

4. Oxidase positive resistant to penicillin, aminoglycosides and colistin.

Campylobacter jejuni

Site of Isolation with clinical significance

CSF : Non-pathogen

Blood: Pathogen (from GI source)

Sputum: Non-pathogen

Urine: Non-pathogen

Stool : Pathogen (Diarrhea)

Wound: Non-pathogen

Preferred Therapy; Erythromycin (PO), Doxycycline (IV/PO), Any quinolone (IV/PO),

Alternate Therapy; Azithromycin (PO), Clarithromycin XL(PO)

*Campylobacter jejuni…*Comments

1. Commonest cause of antibacterial diarrhea resistant TMP-SMX

2. Requires special media and environment and 42^0C incubation.

Enterobacter sp.

Site of Isolation with clinical significance

CSF : skin contaminant, pathogen (from NS procedure)

Blood: skin contaminant, pathogen (from IV line/UTI)

Sputum: Colonizer (Not pneumonia)

Urine: Colonizer, pathogen (from urologic instrumentation)

Stool : Non-Pathogen

Wound: Colonizer, pathogen (rarely in compromised host)

Preferred Therapy; Any carbapenem (IV)

Alternate Therapy; Any quinolone (IV/PO), Aztreonam (IV), Pipercillin/Tazobactam (IV), Cefepime (IV)

*Enterobacter spp. …*Comments

1. Not a cause of CAP or VAP

2. Common colonizer of Resp and UT

3. Enterobacter CRE usually susceptible to Tigecycline, Colistin, Polymyxin B, ceftazidim/avibactam, fosfomycin.

Haemophilus influenzae …

Site of Isolation with clinical significance

CSF : Pathogen (ABM)

Blood: pathogen (from respiratory tract or cardiac source))

Sputum: Colonizer , pathogen (CAP)

Urine: Non-Pathogen

Stool : Non-Pathogen

Wound: pathogen

Preferred Therapy; Any 2nd 3rd gen cephalosporin (IV/PO), any quinolone (IV/PO), Doxycycline (IV/PO)

Alternate Therapy; Chloraphenicol (IV), TMP-SMX (IV/PO), Azithromycin (PO), Ampicillin resistant strains- Meropenem (IV)Impipenem, Ertapenem, cefepime (IV), Aztreonam (IV)

*Haemophilus influenzae …. …*Comments

1. 1st gen cephalosporins, erythromycin and clraythromycin have limited ant H.influenzae activity. Doxycycline and azithromycin are better
2. Common colonizer of Resp tract
3. Rarely a cause of "culture negative" SBE

Serratia marcescenes

Site of Isolation with clinical significance

CSF : Pathogen (from NS procedures)

Blood: pathogen (from IV line or urinary source)

Sputum: Colonizer , pathogen (rarely in VAP)

Urine: Colonizer, pathogen (from urologic instrumentation)

Stool : Non-Pathogen

Wound: Colonizer, pathogen (rarel)

Preferred Therapy; any 3rd gen cephalosporin (IV/PO), Any quinolone (IV/PO), Cefepime (IV)

Alternate Therapy; Any carbapenem (IV), Gentamicin (IV) Aztreonam (IV), Pipercillin/Tazobactam (IV),

*Serratia marcescenes…*Comments

1. Enterobacteriaceae Associated with water source

2. Common colonizer of Resp secretions and urine in ICU. Serratia nosocomial pneumonia are rare.

3. Cause of septic arthritis, osteomyelitis and SBE (IV drug users)

4. Gentamicin has highest anti-serratia activity

Helicobacter pylori

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Non-Pathogen

Sputum: Non-Pathogen

Urine: Non-Pathogen

Stool : Non-Pathogen

Wound: Non-Pathogen

Preferred Therapy; PPI (PO) plus two antibiotics from Clarithromycin/ Amoxicillin/ Metronidazole (PO)

Alternate Therapy; Doxycycline (PO) plus Metronidazole (PO) plus Bismuth subsalicylate

Salmonella typhi, nontyphi

Site of Isolation with clinical significance

CSF : Non-Pathogen

Blood: Pathogen (from GI source)

Sputum: Non-pathogen

Urine: Pathogen (only with enteric fever)

Wound: Non-pathogen

Stool : Colonizer (Carrier)

Preferred Therapy; Any Quinolone (IV/PO), Any 3rd gen cephalosporin (IV) (Ceftraixone, Cefotaxime), Azithromycin

Alternate Therapy; Co-trimixazole (IV/PO)

Salmonella typhi, nontyphi... comments

1. Carrier state is best eliminated by Quinolone for 4 weeks

2. If drug therapy fails to eliminate carrier state, look for hepatic/bladder calculi for persistent focus

3. Many strains are resistant ampicillin, Chloramphenicol, Co-trimoxazole

Stenotrophomonas maltophilia

Site of Isolation with clinical significance

CSF : Colonizer, Pathogen(from NS procedure)

Blood: Skin contaminant, Pathogen (from IV line & GU source)

Sputum: Colonizer (not VAP)

Urine: Colonizer, Pathogen(from urologic instrumentation)

Wound: Colonizer, Pathogen(rarely in compromised persons)

Stool : Non-pathogen

Preferred Therapy; Co-trimoxazole, Tigecycline, Minocycline, Ceftazidim/avibactam, Cefolozane/tazobactam (IV)

Alternate Therapy; Doxycycline (IV/PO), Respiratory quinolone (IV/PO)

Table 1

S. maltophilia-associated infections

Infection
Pneumonia
Acute exacerbations of chronic obstructive pulmonary disease
Bloodstream, bacteremia
Soft tissue and skin
Cellulitis/myositis
Osteomyelitis
Catheter-related bacteremia/septicemia
Meningitis
Endophthalmitis/keratitis/scleritis of the eye; dacryocystitis
Endocarditis
Urinary tract infection
Biliary sepsis

Stenotrophomonas maltophilia… comments

1. Common colonizers of wounds, urine and respiratory secretions

2. Potential pulmonary pathogen in bronchiectasis/cystic fibrosis

3. Resistant to carbapenems and aminoglycosides.

4. Susceptible to Chloramphenicol, Rifampicin, Colistin, Polymyxin B,

Clostridium difficile

Site of Isolation with clinical significance

CSF : Non-pathogen

Blood: Pathogen (rarely from GI source)

Sputum: Non-pathogen

Urine: Non-pathogen

Wound: Non-pathogen

Stool : Colonizer (normal fecal flora) Pathogen (diarrhea/colitis)

Preferred Therapy; Diarrhea: Vancomycin (PO), Nitazoxanide, Fidaxomicin
Colitis: Metronidazole (IV/PO), Tigecycline

Alternate Therapy; Diarrhea: Metronidazole (IV/PO),
Colitis: Nitazoxanide (PO)

Clostridium difficile... comments

1. **C.difficile diarrhea-** PO Vancomycin preferred. PO vancomycin is more effective then PO metronidazole. Nitazoxanide also highly effective

2. PO metronidazole not PO vancomycin increases prevalence of VRE.

3. **C.difficile colitis-** Use IV or PO metronidazole (IV vancomycin not effective). Nitazoxanide (PO) or Tigecycline also effective.

4. Diagnose **C.difficile diarrhea** by stool C.difficile **toxin assay** and **Colitis** Abdominal CT scan/colonoscopy

Bacteroides fragilis group

Site of Isolation with clinical significance

CSF : Pathogen (meningitis from S. stercoralis hyperinfection)

Blood: Pathogen (pelvic source)

Sputum: Non-pathogen

Urine: Non-pathogen, pathogen only from colonic fistula

Wound: Non-pathogen

Stool : Non-pathogen

Preferred Therapy; Tigecycline, pipercillin/Tazobactam, carbapenem

Alternate Therapy; Ampicillin/sublactam, Clindamycin, Metronidazole plus ceftriaxone or Levofloxacin

Bacteroides fragilis …. comments

1. Major anaerobe below diaphragm

2. Usually part of polymicrobial lower intra-abdominal and pelvic infections.

13.42 Treatment of brucellosis

Adults with non-localised disease

- Doxycycline 100 mg twice daily orally for 6 weeks *plus* gentamicin 5 mg/kg IV once daily for 7 days
  or
- Doxycycline 100 mg twice daily *plus* rifampicin 600–900 mg orally once daily for 6 weeks

Bone disease

- Doxycycline 100 mg twice daily *plus* rifampicin 600–900 mg once daily orally for 6 weeks *plus* gentamicin 5 mg/kg IV once daily for 7 days
  or
- Ciprofloxacin 750 mg twice daily orally *plus* rifampicin 600–900 mg orally once daily for 3 months

Neurobrucellosis

- Doxycycline 100 mg twice daily *plus* rifampicin 600–900 mg orally once daily for 6 weeks *plus* ceftriaxone 2 g IV twice daily until the cerebrospinal fluid is clear (though susceptibility should be confirmed because sensitivity to third-generation cephalosporins varies among strains)

Endocarditis

- Almost always needs surgical intervention
  plus
- Doxycycline 100 mg twice daily, rifampicin 600–900 mg orally once daily and co-trimoxazole 5 mg/kg of trimethoprim component for 6 months *plus* gentamicin 5 mg/kg IV once daily for 2–4 weeks

Pregnancy

- Rifampicin 600–900 mg orally once daily and co-trimoxazole 5 mg/kg of trimethoprim component for 4 weeks, but caution in last week of pregnancy due to displacement of bilirubin from albumin by drugs and risk of kernicterus to the fetus

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Prof. Muhammad Akram Hossain
Professor of Microbiology
Senior Consultant (Microbiology)
Apollo Imperial Hospital, Chattogram

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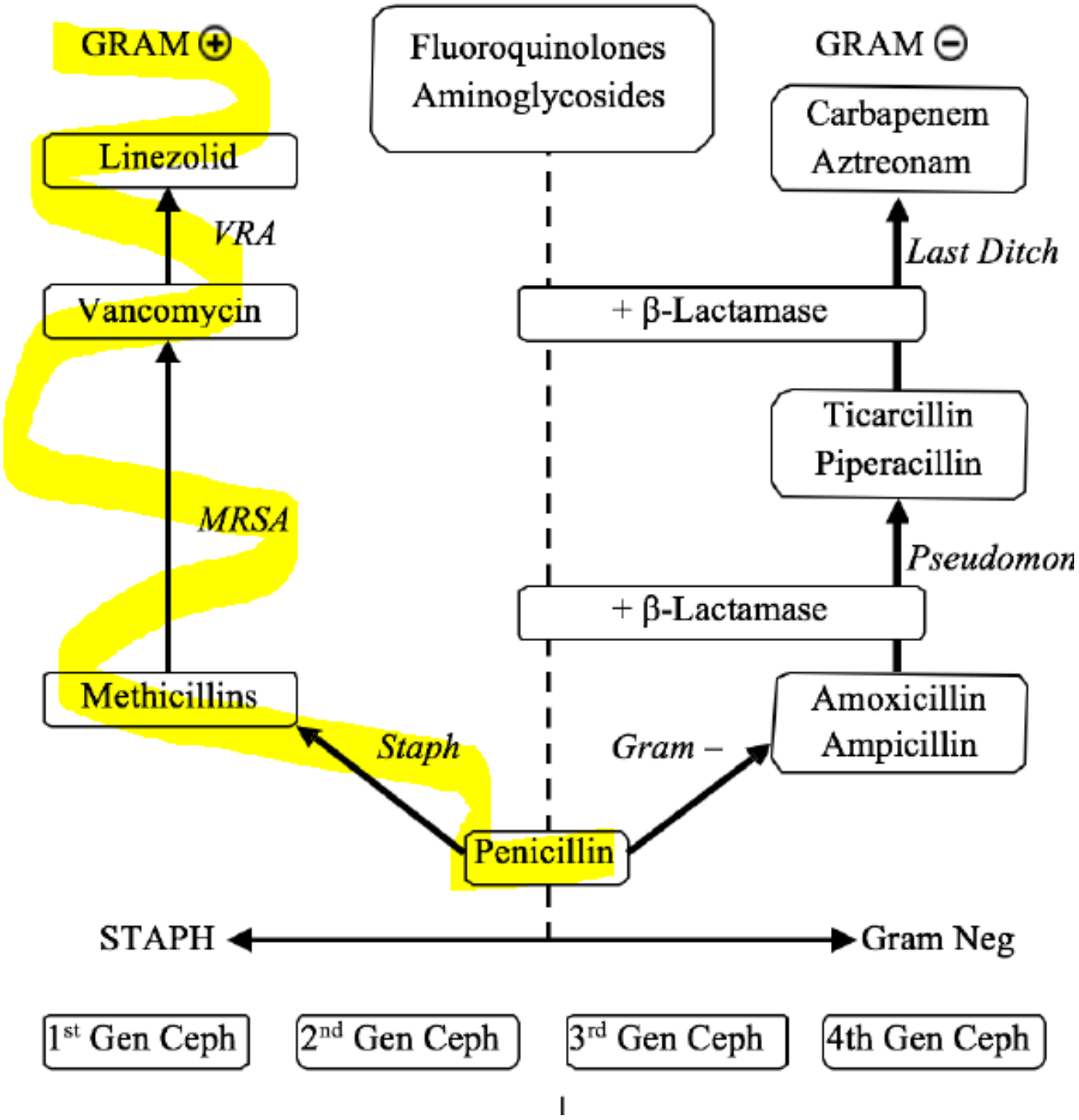
GRAM ⊕
Linezolid
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Vancomycin
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Methicillins
Staph
Fluoroquinolones
Aminoglycosides
Penicillin
Gram –
GRAM ⊖
Carbapenem
Aztreonam
Last Ditch
+ β-Lactamase
Ticarcillin
Piperacillin
Pseudomon
+ β-Lactamase
Amoxicillin
Ampicillin
STAPH
Gram Neg
1st Gen Ceph
2nd Gen Ceph
3rd Gen Ceph
4th Gen Ceph