Gompf's Antibiotics Redux

A Pocket Tool for the Medical Student, or Resident on the Infectious Diseases Clinical Rotation
or
Just about anyone who could use a pocket antibiotic tool

By

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ANTIBIOTIC PEARLS

1. Penicillins generally cover Gram +s, anaerobes, certain Gram –s depending on the antibiotic.

2. Cephalosporins generally cover Gram +s (EXCEPT Enterococcus!), Gram –s, few or NO anaerobes. ONLY ceftazidime/cefepime cover Pseudomonas. They do not cover SPACEK/SPICE* Gram negatives reliably; ceftriaxone/cefepime may be fine in less serious infections.

3. Aztreonam, a monobactam, covers ONLY Gram –s, incl. Pseudomonas. Reserve for beta lactam-allergic patients.

4. Aminoglycosides generally cover Gram +s (except tobramycin) & Gram –s, NO anaerobes, some Mycobacteria.

5. Quinolones cover Gram –s best (except moxifloxacin, best for respiratory Gram +s & anaerobes), some Mycobacteria.

6. Sulfas generally cover some Gram +s/MRSA, Nocardia, Listeria, Pneumocystis, most Gram –s except Pseudomonas.

7. Clindamycin generally covers Gram +s, incl anaerobes except Clostridia, like anaerobic/microaerophilic Strep/Peptostrep, Actinomyces (better for infections above the diaphragm).

8. Metronidazole generally covers Gram— anaerobes like Bacteroides, Prevotella, Clostridia; +/- Peptostrep (better for infections below the diaphragm).

9. Carbapenems are Big Gun Beta Lactams & Expensive. Use sparingly. Ertapenem covers most organisms except Pseudomonas. Imipenem, meropenem, & doripenem include Pseudomonas. Resistance in one carbapenem doesn't predict resistance in others.

10. Keys to Antibiotics for Resistant Gram +s: Vancomycin, teichoplanin (Europe) cover all but vancomycin-resistant Gram +s; daptomycin, linezolid, quinupristin-dalfopristin are VERY EXPENSIVE ($100+ a day) & generally reserved for vancomycin-resistant Gram +s. Vancomycin is bacteriCIDAL, except bacterioSTATIC in Enterococcus. Daptomycin & quin-dalfo are CIDAL. Linezolid & tigecycline are bacteriostatic, NOT the right choice for bacteremia unless no other options are possible, and best not as monotherapy. Tigecycline is associated with higher mortality than comparators for FDA-approved indications in after-market review of pooled clinical trials.

Shameless plug:

Visit www.gompfsidpearls.net for more regularly updated ID clinical tools & links I find useful in practice. :}

Do's & DON'Ts

1. ***Don't use an antibiotic if you don't need to.***
   1. If a bacterial infection is not high in the differential and the patient is not clinically toxic, forgo antibiotics. They are poor antipyretics.
2. ***Persistent fevers require work-up, not more antibiotics.***
   2. If you are treating with broad antibiotics and fevers persist, stop them; they aren't helping anyway.
      - Look for undrained foci of infection/pus → drain it.
      - Look for non-infectious cause → treat it.
      - True FUO in a rapidly deteriorating patient may warrant empiric anti-TB therapy → Call ID.
3. ***DO use an oral antibiotic when you can; use one narrow antibiotic when you can; stop antibiotics when you can.***
      - Antibiotics are not cheap; switch to PO when reasonable.
      - Two antibiotics don't usually prevent resistance better than one, and neither do broad spectrum drugs. More drugs = more resistance opportunities. Yet multi-drug synergy *is* desirable in:
      - Pseudomonas sepsis/SIRS: May consider antipseudomonal PCN + 1 dose 5mg/kg IV amino-glycoside.
      - Rifampin + vancomycin/tetracyclines/TMP-SMX/etc for some S. aureus infections – NEVER rifampin alone →RAPID resistance
      - TB/Atypical mycobacteria: *NEVER* use 1 drug in *active* TB
      - Cryptococcosis: 5-flucytosine + amphoB
      - Molds, Fusarium: voriconazole + an echinocandin (caspofungin has most data) or lipid-based amphotericin OR lipid-based amphotericin + caspofun-gin/echinocandin
      - DON't treat viral infections (or noninfectious syndromes) with antibiotics beyond the point at which you have ruled out bacterial infection.
      - NEVER give Rifampin alone! Rapid high-level resistance occurs. Use in combina-tions.

4. ***Always monitor for antibiotic adverse effects.***
      1. Antibiotics are a double-edged sword. Respect them.
      2. Watch for hypersensitivity/bone marrow suppression/interstitial nephri-tis/hepatotoxicity/drug fever with beta lactams, acute tubular necrosis/irreversible ototoxicity with aminoglycosides, & Clostridium difficile with almost all of them.
      3. Watch for yeast overgrowth/Candidemia with prolonged/multiple antibiotic thera-py.
      4. C. diff. is easy to miss in 2 situations:
         - Colostomies – stumps/small bowel can be infected with C.diff.!
         - Spinal cord injured patients – unexplained abdominal distension & leukocytosis are a clue
      5. RIFAMPIN REDUCES EFFECTIVENESS OF ORALCONTRACEPTIVES! Tell female patients to *add barrier contraception until the next new pill pack* after fin-ishing antibiotics.

Antifungal coverage in general:

Fluconazole = Cryptococcus, Candida EXCEPT Candida krusei/glabrata
Itraconazole = Candida, Histoplasma, Crypto, Aspergillus
Voriconazole = Candida, Histo, Crypto, Aspergillus, Fusarium, NOT Mucor/Rhizopus
Posaconazole /isuvaconazole = same as vori, + Mucor/Rhizopus
Caspofungin/Micafungin/Anidulafungin (enchinocandins) = Candida, Aspergillus, NOT Fusarium/Mucor/Rhizopus, SOME Crypto
Amphotericin = all, +/- Fusarium, NOT Candida lusitaniae/guillermondi, NOT Scedosporium (Pseudallescheria)
Fusarium: Vori 6mg/kg IV Q24H or 300mg PO x 1 d, then 4mg/kg/d IV or 200mg PO BID + Ampho B 1.2 mg/kg/d or ABLC 5mg/kg/d
Mucor: Ampho B 1.5mg/kg/d or liposomal ampho B or ABLC 5mg/kg/d + posaconazole/isuvaconazole; NOT other azoles/enchinocandins

DON'T USE Ampho + itra/keto = ANTAGONISTIC.

5FC increases penetration of above drugs.

BacteriCIDAL vs. BacterioSTATIC
A consideration in choosing treatments for serious infection like sepsis or bacteremia of meningitis, pneumonia, endocarditis, osteomyelitis, neutropenic fever. A "cidal" drug kills quickly; a "static" drug slows or stops replication and/or toxic production.

Beta lactams are CIDAL and penetrate tissues and inflamed meninges well. They are preferable in serious infection, including bacteremia, endovascular infection, CNS infection, and streptococcal cellulitis. Their microbial action is time-dependent, meaning that they are most effective the longer the concentration of drug in the affected site remains above the MIC of the bacteria. Thus, they can be dosed by continuous or extended infusion, which may also facilitate home infusion. (Google Johns Hopkins Continuous Antibiotic Infusion for their helpful guide; most drug databases don't offer alternative dosing recommendations.) Some are also stable enough to be given 3 times a week after hemodialysis.

SPICE/SPACEK are mnemonics for bacteria that are often beta lactam resistant or prone to developing it:

SPACEK
Serratia
Pseudomonas/indole + Proteus
Acinetobacter
Citrobacter
Enterobacter/**E**.coli
Klebsiella

SPICE
Serratia
Pseudomonas
Indole + Proteus
Citrobacter
Enterobacter/E.coli

These organisms may all demonstrate resistance to commonly prescribed beta lactams and may require carbapenem* treatment. The SPACE organisms may produce inducible chromosome-based broad-spectrum beta lactamases as part of the Enterobacteriacae group, and resistance/failure may be induced during beta lactam treatment, even though they initially test susceptible. E. coli and Klebsiella are the most common extended spectrum beta lactamase (ESBL) producers, so many labs screen those isolates if MIC for ceftazidime is >/= 2 microG/mL. Just remember that most Enterobacter should be suspect for ESBLs, & may require carbapenem treatment. Remember that **Klebsiella** also has a constitutive (or inherent) chromosome-based beta lactamase that confers resistance to ampicillin/ticarcillin, so these drugs are never a good choice for this bacterium. Preferred treatment in serious infection is a carbapenem.

*Note that carbapenems and the monobactam, aztreonam *are* beta lactams, as they all have a beta lactam ring. This may be confusing initially when you read about beta-lactam resistance and recommendations to use a beta lactam (carbapenem); many references gloss over this, and clinically we often use carbapenems as if they're a completely different animal.

Which antibiotics are bacteriostatic?

In sepsis, restore **V**olume with a **L**iter of **ST**AT **NML** (normal) saline.

Vancomycin in Enterococcus; cidal for all other GPCs
Linezolid
Sulfas/trimethoprim
Tetracyclines/**T**igecycline
(at)
Nitrofurantoin
"MLS antibiotic group" – clindamycin, macrolides (the streptogramins are bactericidal)

Everything else is bactericidal & probably better for sepsis and serious infections!
Note bene: Clindamycin is used as an adjunct for Staph or Strep toxic shock, severe streptococcal cellulitis or suspected necrotizing infection; it halts protein synthesis—i.e stops production of toxins that mediate severe inflammation, necrosis, and toxic shock. Many Staphylococcus aureus strains carry inducible clindamycin resistance genes, so I suggest having susceptibilities available before relying on clindamycin alone for this pathogen. You can also use linezolid, doxycycline/minocycline/tigecycline for toxin-inhibition in severe Staph infection.

THE CLASSES (not an exhaustive list)

Penicillins – beta lactams are CIDAL, good tissue penetration

DRUG	COVERAGE	USES	TOXICITY	Cerebral Spinal Fluid (CSF)
penicillin G $ CIDAL	Group A Strep (no resistance) Strep viridans Neisseria Capnocytophagia Actinomyces Fusobacterium Clostridia perfringens/tetani Pasteurella Treponema/ Leptospirosis NOT Staph aureus (resistant)	Skin/soft tissue (SST) or mouth infections	Hypersensitivity Stevens Johnson Interstitial nephritis Seizures (if high level) Bone marrow suppression C.difficile	YES if inflamed
AminoPCN $$ amoxicillin* ampicillin* amox/clavu amp/sulbact CIDAL	Add to the above: Listeria MSSA Most Pneumococcus Proteus Hemophilus influ. (beta lactamase negative) Salmonella/Shigella Anaerobes ** Klebsiella are intrinsically resistant to amp/amox* (clavulanate/sulbactam don't add much activity)	Otitis media Sinusitis SST Meningitis in elderly	Above	
CarboxyPCN $$ ticarcillin/ clavulanate piperacillin piperacillin/tazobactam CIDAL	Adds to the above: Pseudomonas Enterobacters Stenotrophomonas (ticar) Gut anaerobes MSSA Pip & Pip/tazo more potent for GNRs	Adds to above: Gut/ surgical infections Nosocomial pneumonia Prostate Osteomyel-itis	Above	

Cephalosporins – Think of progressive broadening of spectrum from Gram + to Gram - with each generation. Beta lactams are CIDAL.

DRUG	COVERAGE	USES	TOXICITY	CSF
1st Generation $$ cefalothin cefazolin CIDAL	GPC, E. coli, Proteus, Klebsiella NOT Enterococci	SSTI Uncomplicated/Non-diabetic Osteomyelitis PreOP prophylaxis	Hypersens-itivity Bone marrow suppression Diarrhea C.difficile	POOR

2nd Generation $$ cefuroxime (IV/PO) cefaclor (PO) Cefamycins: cefoxitin (IV) cefotetan (IV)	GPC Pneumococc-us Neisseria Some GNR except Pseudomonas Cefamycins add an-aerobes NOT Enterococci	Community acquired pneumonia (CAP) meningitis OM/sinusitis Gonorrhea	Hypersens-itivity RASH/Stevens Johnson w/ cefaclor High INR/PT w/ cefoxitin/ cefotetan Bone marrow suppression C.difficile	YES if inflamed
3rd Generation $$ ceftriaxone (QD dosing) cefotaxime ceftazidime CIDAL	Above, plus Pseudo-monas for ceftazidime	Meningitis CAP Most community-acquired infections Gonorrhea Pyelonephritis	Above	
4th Generation $$ cefepime CIDAL	Above, plus Pseudo-monas Resists beta lac-tamases/ESBLs Less freq dosing than ceftazidime NOT Enterococci	Above, plus neutro-penic fever	Above	
Anti-MRSA $$$ ceftaroline CIDAL	Similar to 3rd genera-tion, plus MRSA, VISA/VRSAVRE faecalis (NOT E. faecium), pneumo-cocc-us, beta-lactamase + H.flu/ Moraxella	Complicated SSTI, CAP (NOT MRSA-insufficient data)	Above	

Advanced-generation ceftolazane-tazobactam ceftazidime-avibactam CIDAL	NOT Enterococci or Staphylococci ceftolaz-taz covers GNRs incl Pseudomonas, ESBLs, NOT carbapenems caz-avi covers KPC+ carbapenemase (1st line agent) caz-avi covers GNRs incl Pseudomonas, adds coverage for ceftaz-R, ESBLs, some ampC-R, some carbapenemases (NOT metallobetalactamase)	Complicated UTI/pyelo Complicated intraabdominal infection caz-avi adds HAP	Above Nausea, diarrhea, headache, fever, renal insufficiency (ceftolazane-t)	ceftazidime – YES if inflamed (NOT avibactam) ceftoazane – UNKNOWN

Monobactam

DRUG	COVERAGE	USES	TOXICITY	CSF
aztreonam $$ CIDAL	GNRs only	GNR infections NOT a replacement for all aminoglycoside uses (no synergy for GPC, NO Enterococcal coverage)	Low	YES if inflamed [Modal J et al. AAC. 1986;29:281-3.]

Carbapenems (Reserved for Multidrug Resistant Organisms – MDRO)

DRUG	COVERAGE	USES	TOXICITY	CSF
imipenem/ cilastin meropenem meropenem-vaboractam $$$	Gram +s EXCEPT MRSA Gram –s EXCEPT Stenotroph-omonas/Burkholderia ESBL+& "SPICE" GNR Anaerobes (incl Cutibacteirum) Listeria Pneumococcus Nocardia asteroides (NOT brasiliensis) Legionella Mycobacterium avium +/- Enterococcus mero-vaboractam adds *car-bapenemase+ Klebsiella pneu-monia (KPC)*, class A carbap-R Enterobacteraciae (NOT metal-lobetalactamase/OXA carbap-R, NOT carbap-R Pseudomo-nas/Acinetobacter)	Resistant GNR infections Serious gut infections Necrotizing pancreatitis	IV/IM Hypersensit-ivity (~10% cross-allergy with beta lactams) Seizures (if renal insuffi-ciency or high levels used) with imipenem Candida over-growth/ infections C.difficile Encephalo-pathy	YES
doripenem $$$ CIDAL	Above, possibly lower MICs to Pseudomonas & Acinetobacter	Above	Above	
ertapenem $$$ CIDAL	Above, without Pseudomonas coverage	Postpartum uterine infec-tions Postsurgical Abdominal infections (not Pseudomo-nas)	Above	

Aminoglycosides

DRUG	COVERAGE	USES	TOXICITY/ MISC	CSF

gentamicin streptomycin spectinomycin tobramycin amikacin liposomal amikacin $-$$$ CIDAL	Gent: GPCs & GNRs incl Pseudomonas Tobra/Amik: GNRs incl Pseudomonas Amik: Mtb, NTM Strepto -Yersinia -MDR Mtb Gent/Strept -Tularemia Spectino -Gonorrhea	Synergy with beta lactams for GPC/Pseudomonas infections Usually not used alone except for UTIs	IV/Aerosol Acute tubular necrosis (reversible) Ototoxicity/ Vestibular toxicity (irreversible) When possible: -stop after 3-5 d -use once-daily dosing -avoid in elderly Liposomal amik – hypersensitivity pneumonitis, hemoptysis, bronchospasm, exacerbation of lung disease Neuromuscular blockade (may exacerbate myasthenia gravis & paralytic agents)	NO-UNKNOWN
fosfomycin $$ CIDAL	Enterococcus GNRs	Simple cystitis in women Off-label q3days for complicated or MDR GNRs, VRE if susceptible	PO only Above, significant diarrhea	
plazomicin $$ CIDAL	GNRs incl MDR/KPC/metalobetalact/CRE GNRs,variable Pseudomonas (use only if known susceptible), NOT Steno, Acinetobacter	Complicated UTI/pyelo	IV only Above Limited data	

Sulfonamides/Sulfas

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF

trimethoprim-sulfamethoxazole co-trimoxazole $ STATIC for Staph	Staph. aureus (incl MRSA) Legionella Stenotroph-omonas Listeria Pneumo-cystis Nocardia Burkhold-eria cepacia Yersinia Francisella tu-larensis Some common coliforms	UTI MRSA SSTI Specific agents at left	IV/PO RASH/Stevens John-son Elevated creatinine or K+(competes with Cr for tubular secre-tion, blocks K+ excre-tion) Kernicterus in neo-nates C.difficile Sun sensitivity	YES

Macrolides/Lincosamides (Macrolide-Lincosamide-Streptrogramin B class, or MSL—all bind 50s ribosome subunit & share resistance genes)

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
Macrolides erythromycin clarithromycin azithromycin $$ STATIC	Pneumo-coccus MSStaph. aureus (not MRSA) Legionella Listeria Neisseria meningi-tis Hemophilus Moraxella Mycoplasma Chlamydia Actinomyces Atypical mycobac-teria	LRTI/ bronchitis Sinusitis Dental/ oral infections Atypical myco-bac-teria (incl MAC prophy in HIV)	IV/PO Nausea/ vomiting Abdominal cramps/ diarrhea (Lowest with Azithro) C.difficile Ototoxicity with chronic use Rare association with cardiovascular mortality with QTc prolongation, low Mg++/K+. Interactions: Ery/Clari induce P450! Neuromuscular blockade with Ery (may exacerbate myasthenia gravis & paralytic agents)	POOR

<u>Lincosamides</u> clindamycin $$ STATIC	CIDAL for Group A streptococc-us, MSStaph. aureus (MRSA, but watch for inducible *erm* resistance. Clue is resistance to erythromycin) Pneumo-coccus Inhibits toxic pro-teins in severe Strep A & S. aure-us/ necrotizing fasciit-is. Oral anaerobes: Gram + such as Peptostrepto-coccus, Fusobac-ter-ium, Prevotella, Actinomyces, & Clostridial spp other than Clos-tridium difficile Gram – such as Bacteroides (may not cover in up to 25% of cases or strains with MIC >/= 8 mcg/mL) Babesiosis	Severe SSTI, necrotizing fasciitis, MRSA *"Infections above the diaphragm"* Head and neck/dental infections Lung abscess/ aspiration pneumonia (tip: no teeth = no oral anaerobes) Bacterial vagi-nosis Babesiosis Toxoplasma in HIV	IV/PO <u>C.difficile!!</u> (>30% develop it on a week of clinda) Watch for hepati-tis/obstructive jaundice Neuromus-cular blockade (may exacerbate myas-thenia gravis & paralytic agents)	POOR except for Toxo-plasmosis in HIV

Nitrofuran

DRUG	COVERAGE	USES	TOXICITY/MISC	CNS
nitrofurantoin $ CIDAL	Gram –s EXCEPT Pseudomonas, Proteus, and Enterococcus incl susceptible VRE Multiple sites of action, inhibits synthesis of DNA, RNA, proteins, cell wall – higher resistance barrier than most antibiotics	UTI/Cystitis ONLY reaches therapeutic level in URINE	PO only Nausea/ vomiting C.difficile	NONE

Quinolones (Resistance is rising due to overuse)

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
"Gram negative" Quinolones ciprofloxacin levofloxacin norfloxacin $-$$ CIDAL	Gram –s including Pseudomonas Levo covers pneumococcus well "Atypical" pneumonia: Mycoplasma, Chlamydia, Moraxella Some mycobacteria/TB	UTI/GU infection Intraabdomi-nal infections Endometritis Hospital-associated lung infections Levo best for acute sinusitis/ CAP Norflox: UTI only	IV/PO (Norflox PO) *IV=PO (bioequivalent)* Dizziness/CNS Diarrhea Hypo-/hyperglycemia Sun sensitivity May exacerbate myasthenia gravis & paralytic agents (inhibits GABA receptors) May prolong QTc (watch for palpitations/syncope) Rare spontaneous tendon rupture (watch for pain at tendon sites) C.difficile	YES, HIGH DOSE
"Gram positive or Respiratory" Quinolone moxifloxacin $$ CIDAL	Pneumococcus, Streptococci, Staphylococcus (NOT MRSA) Legionella Gut anaerobes Atypical myco-bac/TB	CAP/community-associated respiratory infections Acute sinusitis Intraabdom-inal infections SSTI	IV/PO *IV=PO (bioequivalent)* Above	UNKNOWN
"Gram positive or SSTI" Quinolone delafloxacin $$ CIDAL	Streptococci, Staphylococcus (NOT MRSA) Legionella Gut anaerobes Atypical myco-bac/TB	SSTI	IV/PO *IV=PO (bioequivalent)* Above	UNKNOWN

Nitroimidazole

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
metronidazole $$ CIDAL	Gram – anaerobes incl. Bacteroides fragilis and all Clostridia Entamoeba coli	*"Infections below the diaphragm"* Intraabdominal abscess, peritonitis, diverticulitis, etc Endometritis/ Bacterial vaginosis Clostridium difficile colitis Amebic liver abscess/	IV/PO Disulfiram-like reaction (vomiting) if ethanol consumed within 3 days of therapy Aseptic meningitis/ neuropathies, rare	YES

		dysentery NOT to be given alone for lung abscess/ENT infections		

Tetracyclines/Glycylcycline

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
Tetracyclines Minocycline Doxycycline $ STATIC	**MRSA**/MSSA Pneumococcus E. coli Legionella N. meningitidis Hemophilus Moraxella Mycoplasma Chlamydia Brucella Actinomyces Rickettsia Vibrio Some anaerobes	SSTI CAP, esp under age 40 Dog/cat bite prophy as alterna-tive to amox/clav	IV/PO Discoloration of permanent teeth in children Pseudotumor cerebri, esp mino-cycline! (watch for headache) Sun sensitivity C.difficile Inhibit lipopolysa-ccharide-induced proinflam-matory products	YES
Glycylcycline tigecycline >** $$ eravacycline* omadacycline sarecycline (acne only) STATIC	Above, plus St. epidermidis Enterococci Corynebacter-ium N. gonorrhea ESBL + E.coli/Klebs Stenotrophomonas Acinetobacter Salmonella B. fragilis/ anaerobes C.difficile NOT Pseudomonas or Proteus *eravacycline adds ESBL, carbap-R Acinetobacter	SSTI Intraabdom-inal infections CAP/HAP Severe C.difficile Y alveolar, soft tissue, bile/gut entry Poor bone/joint, CNS ** Bacteriostatic - NOT for serious infections; > **Increased mortality** vs. comparators in after-market re-view of pooled clinical trials, incl in FDA-approved indications.	IV only Above 20% tige, 6.5% erava - nausea, vomiting Inhibit lipopolysac-charide-induced proinflammatory products */** Ampicillin/ Amoxicillin CIDAL-preferred in VRE that is amp-susceptible.	UNKNOWN

Glycopeptides, lipoglycopeptides

DRUG	COVERAGE	USES	TOXICITY/ MISC	CSF
vancomycin $ CIDAL except *STATIC for Enterococci*	Gram + cocci except VRE/VRSA *Most* Gram + rods (but see below) Corynebacterium Listeria C.diff (only PO) Increasing vancomycin MICs > 1 assoc with treatment failures ("MIC creep") **Instrinsic resistance in:** Leuconostoc Lactobacillus Propionobacterium Pediococcus Erysipelothrix Clostridia(non-diff.)	SSTI due to MRSA HAP/CAP due to MRSA Infections due to VRE	Vanc IV≠PO – PO not absorbed from gut Vanc requires a **central IV line**, due to phlebitis (which may cause fevers, unnecessary antibiotics/cultures/increased lengths of stay…) "Red man syndrome" with vanc (histamine release) if infused too rapidly—infuse over 1-2 hours Leukopenia Thrombocytopenia Rare interstitial necrosis Ototoxicity (abrupt, irreversible, usually elderly)	YES
dalbavancin $$$	MSSA, MRSA, Group A, B streptococci, Strep anginosus group	SSTI 1500mg IV x1 OR 1000mg IV then 500mg in 7 days	Nausea, headache, diarrhea "Red man syndrome" with vanc (histamine release) if infused too rapidly—infuse over 1-2 hours	
televancin $$$	MSSA, MRSA/VISA/VRSA, Group A, B streptococci, Strep anginosus group, VSEnterococcus	SSTI HAPneumonia due to MRSA/VISA	N/V, foamy urine QTc prolongation Mortality > with mod/sev renal impairment compared with vanco Possibly teratogenic—avoid in pregnancy unless maternal benefit exceeds fetal risk "Red man syndrome" with vanc (histamine release) if infused too rapidly—infuse over 1-2 hours Interferes with coag tests but not coagulation	
oritavancin	MSSA, MRSA, Group A, B, C streptococcus,	SSTI 1200mg IV x1, over	Headache, N/V "Red man syndrome" with	

$$$ CIDAL including *Enterococci*	Streptococcus anginosus group, VSEnterococcus	3 hr	vanc (histamine release) if infused too rapidly—infuse over 1-2 hours Artificially prolong PT/INR for up to 12 hr (5.1); aPTT for up to 120 hours, and may prolong PT and INR for up to 12 hr and ACT for up to 24 hr—Use Factor Xa assay for coagulation testing Coadministration with warfarin may result in higher exposure of warfarin and increase risk for bleeding; monitor frequently for signs of bleeding	

Cyclic Lipopeptides

DRUG	COVER-AGE	USES	TOXICITY/ MISC	CSF
daptomycin $$$$ CIDAL	All Gram + cocci incl. Vanc-/Amp-resistant* Entero-coccus MRSA/VRSA	SSTI Bacteremia Osteomyelitis, Joint infections May be active in biofilms (which usually inactivate antibiotics)	IV only Nausea/vomiting Rhabdomyolysis & associated renal insufficiency (weekly creatinine, CPK) Rare asthmatic pul-monary eosinophilia NOT for primary pneumonia because it is inactivated in alveolar fluid, BUT seems effective in embolic lung infec-tion/septic emboli due to Gram +s, since the infection is more parenchymal. *Ampicillin/ Amoxicillin (CIDAL) preferred in VRE that is amp-susceptible.	UN-KNOWN

Streptogramins

DRUG	COVER-AGE	USES	TOXICITY/ MISC	CSF
quinupristin-dalfopristin $$$$ CIDAL	Vanc-/Amp-resistant* Enteroco-ccus faecium MSSA Group A Strep NOT Entero-co-ccus fae-calis or MRSA	SSTI/non-MRSA Bacteremia Endocarditis due to VRE faecium Extremely limited use.	IV only Needs **central IV line due to frequent pain, phlebitis, fever** >30+% **Myalgias/ Arthralgia**s Nausea/ Vomiting/ Diarrhea *Ampicillin/ Amoxicillin (CIDAL) preferred in VRE that is amp-susceptible.	UNKNOWN

Oxazolidinone

DRUG	COVER-AGE	USES	TOXICITY/ MISC	CSF
linezolid $$$$ STATIC except CIDAL for streptococci	All Gram + cocci incl. ** Vanc-/Amp-resistant* Entero-coccus MRSA/VRSA TB/Atypical myco-bacteria Binds 23S rRNA-blocks formation of 50s/70s ribosomal initiation complex	SSTI MRSA HAP/CAP due to MRSA Osteomyelitis/ Joint infections (very Y bone pene-tration) **NOT for bactere-mia without a well-defined and remov-al or draining focus, NOT for endovas-cular infections	*IV=PO (bioequivalent)* Nausea/ vomiting/ diarrhea Headache Thrombocytopenia/ Neutropenia after 7 days Peripheral/ Optic neuropathies with extended use Lactic acidosis (nausea, fatigue) **Serotonin syndrome:** Avoid high tyramine food/drink (> 100mg tyramine per meal). E.g. aged cheeses, dried/processed meats, ethanol, sauerkraut, soy sauce, or yeast ex-tract/supplements, fer-ments */**Ampicillin/Amoxicillin (CIDAL) preferred in VRE that is amp-susceptible. **Associated **with treat-ment failure in bactere-mia**, incl line & endovascu-lar infections.	GOOD Myrianthefs et al. Serum and CSF concentrations of linezolid in neurosurgery patients. AAC 2016. 50(12): 3971-6.
tedizolid $$$$ STATIC	All Gram + cocci incl. ** VRE, Amp-resistant* Entero-coccus, MRSA/VRSA Binds 50s riboso-mal subunit	SSTI	*IV=PO (bioequivalent)* 6 days tedizolid Qdaily = 10 days linezolid BID = higher lipid solubility/higher tissue levels Nausea/headache/diarrhea Lower thrombocytopenia than linezolid; similar neuropathic events; no longer term data **Serotonin syndrome:** Avoid high tyramine food/drink (> 100mg tyramine per meal). E.g. aged cheeses, dried/processed meats, ethanol, sauerkraut, soy sauce, or yeast ex-tract/supplements, fer-ments	NO DATA – suspect similar to linezolid

Colistin/Polymixin B (Reserved for multi-drug resistant organisms - MDRO)

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
colistin polymixin B colistimethate $$$ CIDAL	Gram - including Pseudomonas, Acinetobacter membrane disrup-tion, binds lipopoly-sacch-aride (LPS)/ Gram - endotoxin	Intraabdominal infections UTI/GU infections Pneumonia/ Hospital-associated respiratory infections Potent anti-LPS binding/ neutralizing activity	IV/Aerosol 30% Nephrotoxi-city! Peripheral/ Optic neuropa-thies Neuromusc-ular blockade (may exacerbate my-asthenia gravis & paralytic agents)	YES

Rifamycins

DRUG	COVERAGE	USES	TOXICITY/MISC	CSF
rifampin $-$$ Only rifampin is discussed here, in context of use outside of mycobacterial infections CIDAL	Very broad, incl Gram +/ Gram - , mycobacteria; use is *condition*-specific RAPID RESISTANCE if given alone – *Use in combinations* Inhibits DNA-dependent RNA polymerase	*Only* used alone as prophylaxis against Neisseria meningitidis (2 days), Hemophilus influenza b (4 days) in contacts/nasal carriage Combination treatment in serious S. aureus, Streptococcal infections Combination treatment of Legionella, Anthrax, Brucella, Bartonella, Anaplasma, Ehrlichia Combination treatment of tuberculous and non-tuberculous Mycobacteria	IV/PO Red urine, sweat, tears, saliva – hold soft contact use Nausea, abd pain Hepatotoxi-city (avoid ethanol & hepatotoxins), hyper-bilirubinemia Type I & Flu-like hypersensi-tivity Autoimmune reactions Many drug interactions – always check an updated reference	YES

References:

http://webedition.sanfordguide.com/

www.drugs.com

www.emedicine.medscape.com

www.epocrates.com

www.micromedix.com

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Thank YOU, dear Colleague, for your dedication to the Art and Science of Medicine. I hope that you find this tool of help in your care of the VIP at the center of our efforts:

The Patient.

Dr. G