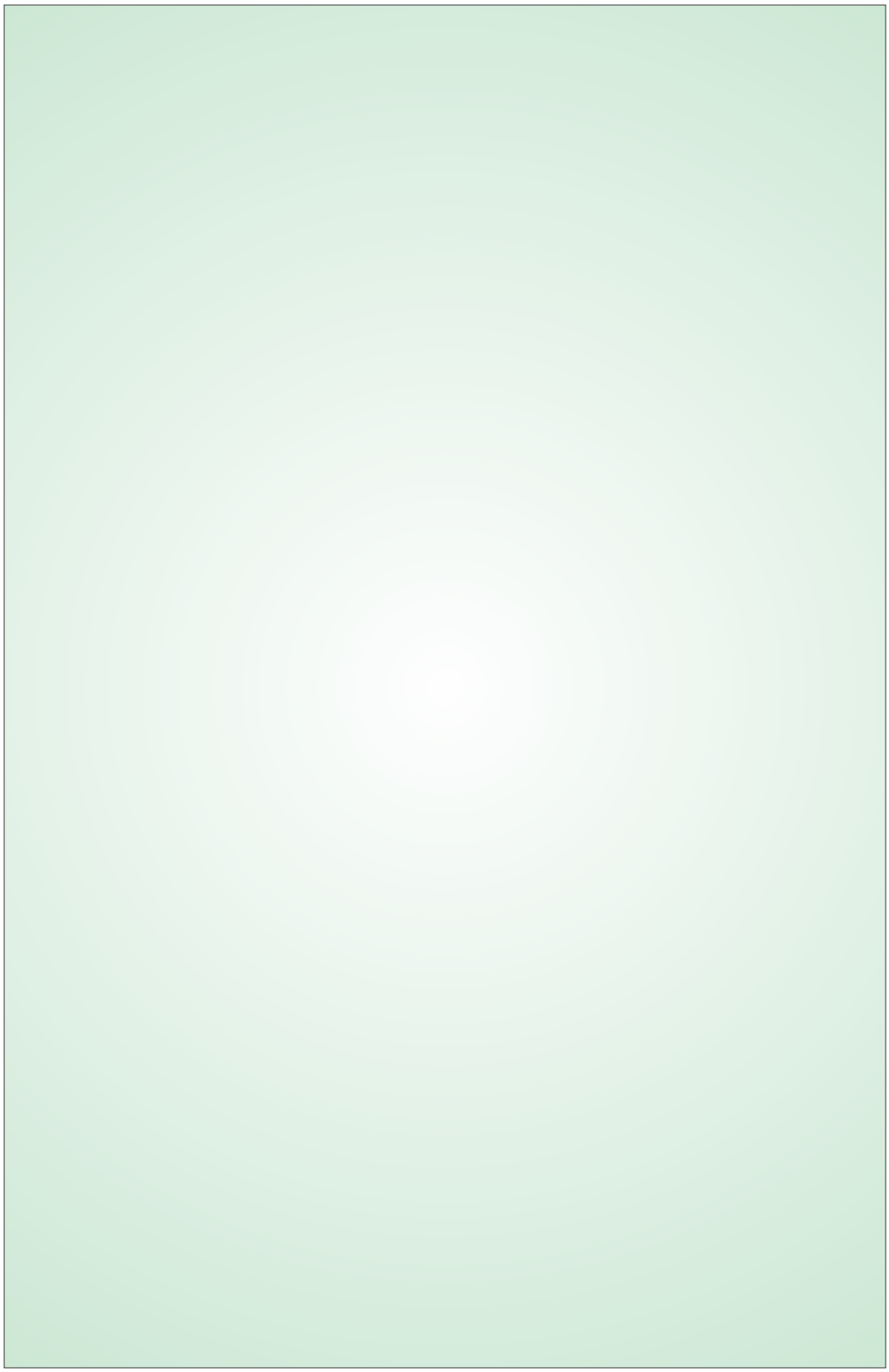
Antibiotic Prescription Guidebook

Antibiotic Stewardship Program

Government Medical College & Hospital
Chandigarh



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ABBREVIATIONS

1. AB = Acinetobacter baumannii
2. PA = Pseudomonas aeruginosa
3. MSSA = Methicillin Sensitive Staph.aureus
4. MRSA = Methicillin Resistant Staph.aureus
5. CA-MRSA = Community Associated MRSA.
6. VRE = Vancomycin Resistant Enterococci
7. VRSA =Vancomycin Resistant Staph.aureus
8. ESBL = Extended Spectrum Beta Lactamases
9. MDR = Multi Drug Resistant
10. Piptazo = Piperacillin+Tazobactam
11. Ampisulb = Ampicillin+Sulbactum
12. CAI = Community Acquired Infections
13. HAI = Hospital Acquired Infections
14. NI = Nosocomial Infections
15. CLSI = Clinical Laboratory Standards Institute
16. EUCAST= European Committee on Antimicrobial Susceptibility Testing
17. CEFO SULB = Cefoparazone + Sulbactum

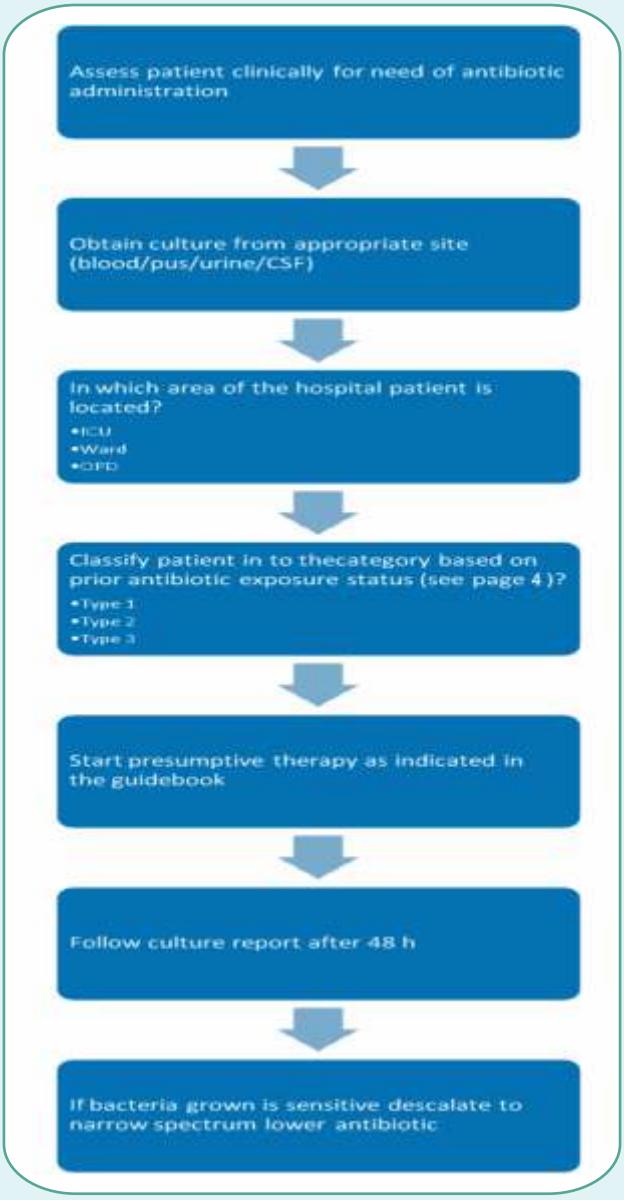
Why this Guidebook?

The antibiotics are effective, safe and relatively inexpensive drugs for treatment of bacterial infections and saving millions of lives. However, the ubiquity and unregulated use has led to misuse of antibiotics. As predicted by Alexander Fleming in his Nobel Prize lecture, bacterial resistance has appeared and is growing fast.

This guidebook has been formulated to encourage the rationale use of antibiotic therapy by healthcare professionals of this hospital. The guidebook balances the need of prescribing an effective antibiotic while minimizing the emergence of resistant organisms.

The antibiotics recommended for different areas and health conditions are based on the in-vitro susceptibility of organisms isolated in the Microbiology laboratory over last 6 months.

How to use this guidebook?



PATIENT RISK STRATIFICATION

For each infection,3 patients types have been described:

TYPE 1: Patient at risk for Community acquired infections

TYPE 2: Patients at risk for HealthCare Associated Infections (HCAI) caused by for example, Extended Spectrum Beta-Lactamase (ESBL) producing Enterobacteriaceae.

TYPE 3: Patient at risk for Nosocomial Infection (NI) caused by for example, Multidrug Resistant (MDR) Pseudomonas, Acinetobacter, MRSA , VRE etc.

The choice of antimicrobial may need to be modified in the following situations:

1. Hypersensitivity to first choice antimicrobial
2. Recent antimicrobial therapy or preceding cultures indicating presence of resistant organisms.
3. In pregnant or lactating patients.
4. In renal or hepatic failure.
5. Where significant drug interactions may occur.

The drug susceptibility mentioned in the protocol is based on Disc diffusion method of CLSI-2018 (Clinical and Laboratory Standard Institute) guidelines, not on MIC values.

For each recommendation, most common pathogens according to their percentages of isolation have been mentioned followed by the most susceptible three to four antibiotics.

Intensive Care Unit

Blood Stream Infections (BSIs) Antibiotic Protocol: ICU *(valid upto 2020)*

ICU MICROBIOLOGY DATA ***(Total no. of isolates = 132)***

Most Common Pathogens	%	Antibiotics Susceptibility
Acinetobacter(n=42)	*32%*	*Meropenem (71%) / Ciprofloxacin (57%) / Tobramycin (43 %) / Ampisulb(29 %)*
Staph.aureus(n=30)	*22%*	*Linezolid (100%) / Gentamicin (80%) / Chloramphenicol(=ciprofloxacin=cotrimoxazole) (60%)/Doxycycline(40%)*
Klebsiella(n=24)	*18%*	*Meropenem (75%) / Amikacin(=tetracycline) (50%) / Piptazo (=Amoxyclav)(25%)*
Enterococcus(n=24)	*18%*	*Vancomycin (=Linezolid) (100%)/Tetracycline(50 %)/ciprofloxacin(=Gentamicin)(17%)*
Pseudomonas(n=6)	*5%*	*Meropenem (=Piptazo=Ciprofloxacin=Aztreonam) (100%)*
E.coli(n=6)	*5%*	*Amikacin(100%)*

Patient Type 1 (CAI)	Patient Type 2 (HAI)	Patient Type 3 (NI)
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with no or few co-morbid conditions	*Patient old (>65 years) with few co-morbidities.*	*Patient old (>65 years) + multiple co-morbidities. (Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency)*
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
Ampicillin-sulbactam/ Amoxi-Clavulanate	Piptazo ± Amikacin/Ciprofloxacin ±	Colistin+Imipenem/Meropenem+Piper

Ceftriaxone Ciprofloxacin	Vancomycin/ Teicoplanin. (Note:vancomycin to be used only in the confirmed cases of MRSA)	acillin- Tazobactam+Amikacin+Sulbactam ± Vancomycin or teicoplanin
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Susceptible bugs: Continue the treatment	ESBL +ve Klebsiella / E.coli: Continue treatment with monotherapy(Group 1 carbapenem is preferable,Avoid usind broad spectrum anti-Pseudomonal drugs)	Susceptible PA/AB /MRSA: Continue treatment as monotherapy
Step down "De-Escalate "	***Step down "De-Escalate "***	***Step down"De-Escalate "***
Continue monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patients type 1	ESBL Positive Enterobacteriaceae, De-Escalate and treat as Patients Type 2
Consider Escalation	***Consider Escalation***	***Consider Escalation***
1.ESBL +ve Enterobacteriaceae/MRSA:Escalate and treat as patient type 2 including Salmonella. 2.PA and AB: Escalate and treat as patient type 3.	1.PA/AB: Escalate and treat as Patient Type 3 2. MRSA add Vancomycin or Teicoplanin	1.MDR-PA or AB: Continue Colistin + Imipenem + Sulbactam 2.VRE/VRSA:Escalate to Linezolid/Daptomycin.

ICU

Urinary Tract Infections (UTI) Antibiotic Protocols: ICU *(valid upto 2020)*

ICU MICROBIOLOGY DATA ***(Total no. of isolates =174)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**
Enterococcus (n=60)	*34%*	*Linezolid(=Vancomycin) (80 %)/ Nitrofurantoin(=Penicillin***) (70 %)/Tetracycline(50%)*
E.coli(n=54)	*31%*	*Nitrofurantoin(78%)/ Amikacin(56%)/ Meropenem(44%)/ Piptazo(33%)*
Klebsiella(n=24)	*14%*	*Norfloxacin(=Meropenem=Amikacin= Cotrimoxazole) (25%)*
Acinetobacter(n=24)	*14%*	*Ampisulb(75%)*
Pseudomonas(n=6)	*3%*	*Amikacin(= Meropenem=Piptazo= Ceftazidime= Aztreonam=Ciprofloxacin*) (100%)*
Staph.aureus(n=6)	*3%*	*Nitrofurantoin(=Linezolid=Gentamicin) (100%)*

Patient Type 1 (CAI)	**Patient Type 2 (HAI)**	**Patient Type 3 (NI)**
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions	*Patient old with multiple co-morbidities.*	*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
Ampicillin/sulbactam Ticarcillin/clavulanic acid/CefSul	Ertapenem or Amikacin	Imipenem / Meropenem ± Amikacin

Ciprofloxacin/Norfloxacin/Ofloxacin Nitrofurantoin Cefuroxime Ertapenem	or Piptazo or Cefo/Sul (No Tigecycline**)	
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Non ESBL Enterobacteriaceae, use susceptible antibiotic	ESBL +ve Enterobacteriaceae, Continue treatment based on antibiotic sensitivity	Susceptible Pseudomonas/ Acinetobacter: Continue with Impenem (or Meropenem) ± Levofloxacin/Amikacin CA-MRSA/Enterococcus: Add Vancomycin or Linezolid
Step down "De-Escalate "	***Step down "De-Escalate "***	***Step down "De-Escalate "***
Continue monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patients type 1	ESBL Positive Enterobacteriaceae, De-Escalate and treat as Patients Type 2
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve: Escalate and treat as Patient Type 2	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR - PA: Escalate to a Combination therapy, Colistin+Imipenem+Sulbactam

*Avoid Ciprofloxacin and Levofloxacin since they have potent antipseudomonal activity
**Tigecycline does not get excreted in urine, therefore it is not a treatment of choice for UTI due to ESBL producing E coli.
***Enterococci susceptible to penicillin are predictably susceptible to ampicillin, amoxicillin, ampicillin-sulbactam, amoxicillin-clavulanate, and piperacillin-tazobactam for non–E-lactamase-producing enterococci.

ICU

Skin and Soft Tissue Infections (SSTI) Antibiotic Protocol: ICU *(valid upto 2020)*

ICU MICROBIOLOGY DATA ***(Total no. of isolates = 1128)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**
Pseudomonas (n=408)	*36%*	*Ciprofloxacin(83%)/ Meropenem(60%)/ Aztreonam(56%)*
Acinetobacter (n=348)	*31%*	*Ampisulb **(43%) / Tobramycin (19%) / Meropenem (14%)*
Klebsiella(n=204)	*18%*	*Tetracycline (71%) / Amikacin (47%)/ Meropenem(41%)*
E.coli (n=114)	*10%*	*Meropenem (91%) / Amikacin(Piptazo) (79%) / Tetracycline (64%)*
Staph.aureus(n=42)	*4%*	*Doxycycline(100%)/ Linezolid(86%)/ Gentamicin(=Cotrimoxazole)(57%)/ Chloramphenicol(43%)*
Enterococcus(n=12)	*1%*	*Vancomycin(=Penicillin=Linezolid) (100%)/ Ciprofloxacin(=Gentamicin= Erythromycin)(50%)*

Patient Type 1 (CAI)	**Patient Type 2 (HAI)**	**Patient Type 3 (NI)**
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions	*Patient old with multiple co-morbidities.*	*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***

PRESUMPTIVE THERAPY	PRESUMPTIVE THERAPY	PRESUMPTIVE THERAPY
MSSA SSTI: Nafcillin/ Oxacillin/ Dicloxacillin/ Amoxicillin-clavulanate Cefazolin/ Cephalexin Clindamycin Doxycycline/ Minocycline TMP-SMZ **MRSA SSTI:** Vancomycin Linezolid* Clindamycin	Ertapenem (or Tigecycline*** alone)/CefSul ± Vancomycin or Teicoplanin or Linezolid	Vancomycin (or Teicoplanin) + Imipenem (or Meropenem)
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	
MSSA: Continue treatment	ESBL +ve Enterobacteriaceae Continue treatment with monotherapy	Enterococcus / PA / AB Detected: Continue the treatment.
Step down "De-Escalate "	***Step down "De-Escalate "***	
MSSA: Continue Monotherapy	ESBL -ve Enterobacteriacease: De escalate and treat as patient type 1 Enterococcus use Tigecycline/ Vancomycin	ESBL +ve Enterobacteriaceae De-Escalate to Patient type 2 Enterococcus: De-escalate to Tigecycline/ Vancomycin
Consider Escalation	***Consider Escalation***	
ESBL +ve Enterobacteriaceae: Treat as Patients Type 2 MRSA: Add Vancomycin or Teicoplanin	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR PA /AB: Escalate to Colistin+Imipenem+Sulbactam combination

*Linezolid is a reserved drug for inpatients

**Sulbactam has anti Acinetobacter activity

***Tigecycline should not be used in Pseudomonas and Proteus infection

Pneumonia Antibiotic Protocol: ICU *(valid upto 2020)*

ICU MICROBIOLOGY DATA ***(Total no. of isolates = 978)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**		
Pseudomonas(n=408)	*42%*	*Meropenem(=Ciprofloxacin) (62%)/ Aztreonam(56%)/ Piptazo(53%) /Amikacin(43%)*		
Acinetobacter (n=372)	*38%*	*Ampisulb(39%)/ Tobramycin(23%)/ Meropenem (16%)/Amikacin(6%)*		
Klebsiella(n=198)	*20%*	*Tetracycline(67%)/ Amikacin (45%)/ Meropenem(36%)/Piptazo(27%)*		
Patient Type 1 (CAI)		**Patient Type 2 (HAI)**		**Patient Type 3 (NI)**
No contact with health care system		*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive*		*Long hospitalization and or invasive procedures*
No prior antibiotic treatment		*Recent antibiotic therapy*		*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions		*Patient old with multiple co-morbidities.*		*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture		***Send Sample for Culture***		***Send Sample for Culture***
PRESUMPTIVE THERAPY		**PRESUMPTIVE THERAPY**		**PRESUMPTIVE THERAPY**
Macrolide (Clarithromycin/ Erythromycin) Respiratory Fluoroquinolone (Moxifloxacin, Gemifloxacin or Levofloxacin*) Cefotaxime, Ceftriaxone Ampicillin-sulbactam or Amoxi-clav Ertapenem		Imipenem/PipTaz / Tigecycline ± Vancomycin/Teicoplanin ± Amikacin		Colistin+Imipenem+Sulbactam

After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Non ESBL Enterobacteriaceae, Continue treatment with Macrolide or Fluoroquinolone	ESBL Positive Enterobacteriaceae, Continue treatment	MDR Pseudomonas/ Acinetobacter: Continue treatment
Step down "De-Esclate "	***Step down "De-Esclate "***	***Step down"De-Esclate "***
Use monotherapy	Non ESBL Enterobacteriaceae: De-Escalate & Treat as patients type 1	Susceptible PA / AB: Imipenem, Meropenem, Pip/Taz plus either Ciprofloxacin or Levofloxacin, ***or*** B-lactam plus Aminoglycoside and Azithromycin, ***or*** B-lactam plus Aminoglycoside and an antipneumococcal fluoroquinolone CA-MRSA: Add Vancomycin or Linezolid ESBL+ve Enterobacteriaceae De-Escalate to patient type 2
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve Klebsiella Treat as Patients Type 2	Pseudomonas/Acinetobacter: Escalate and treat as Patient Type 3	MDR: PA-AB: Use triple drug combination of Colistin+imipenem + Sulbactam / Rifampicin

*Avoid Levofloxacin since it has potent antipseudomonal activity

NOTES

Wards

Blood Stream Infections (BSIs) Antibiotic Protocol: WARDS *(valid upto 2020)*

WARDS MICROBIOLOGY DATA ***(Total no. of isolates=402)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**		
Staph.aureus(n=180)	*45%*	*Linezolid (100%) / Chloramphenicol (70%) / Doxycycline (59%)/ Ciprofloxacin(25 %)*		
Enterococcus(n=96)	*24%*	*Linezolid (100%) / Vancomycin (98%) / Tetracycline (73%) / Ciprofloxacin (72%)*		
Klebsiella(n=42)	*10%*	*Tetracycline (50%) / Meropenem (12%)*		
E.coli(n=36)	*9%*	*Amikacin (100%)/Meropenem (=piptaz) (83 %)Tetracycline (50 %)*		
Psudomonas(n=30)	*7%*	*Amikacin(=Ciprofloxacin=Meropenem) (50 %)/Piptazo(=Aztreonam=Ceftazidime) (33 %)*		
Acinetobacter(n=18)	*4%*	*Ampisulb(=Tobramycin)(67 %)/ Meropenem(33 %)*		
Patient Type 1 (CAI)		**Patient Type 2 (HAI)**		**Patient Type 3 (NI)**
No contact with health care system		*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*		*Long hospitalization and or invasive procedures*
No prior antibiotic treatment		*Recent antibiotic therapy*		*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions		*Patient old with few co-morbidities.*		*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture		***Send Sample for Culture***		***Send Sample for Culture***

PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
1.Oral: Cefixime/ Cefpodoxime or Ofloxacin or Amoxicillin-Clavulanate 2.IV/IM:Ceftriaxone/ Cefotaxime or Amoxicillin-clavulanate or Ciprofloxacin	1.Oral:Cefixime/ Cefpodoxime or Ofloxacin/Ciprofloxacin or Amoxicillin-clavulanate or Azithromycin 2. IV/IM:Meropenem or Piperacillin-Tazobactam+Amikacin	Imipenem (or Meropenem) ± Vancomycin or Teicoplanin/Piptazo+Amikacin
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Susceptible bugs: Continue the treatment	ESBL +ve Klebsiella / E.coli: Continue treatment with monotherapy	PA/AB /MRSA: Continue treatment as monotherapy
Step down "De-Escalate "	***Step down "De-Escalate "***	***Step down "De-Escalate "***
Use monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patients type 1	ESBL Positive Enterobacteriaceae, De-Escalate and treat as Patients Type 2
Consider Escalation	***Consider Escalation***	***consider Escalation***
ESBL +ve Enterobacteriaceae including Salmonella: Escalate and treat as patient type 2	1.PA/AB: Escalate and treat as Patient Type 3 2.MRSA: Escalate to Vancomycin/Teicoplanin	1.MDR-PA or AB: Continue 3 Drug combination, Colistin + Imipenem + Sulbactam 2.VRE/VRSA:Escalate to Linezolid/Daptomycin

WARDS

Complicated Urinary Tract Infections (cUTI) Antibiotic Protocol: WARDS *(valid upto 2020)*

WARDS MICROBIOLOGY DATA ***(Total no. of isolates = 1284)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**
E. coli(n=822)	*64%*	*Nitrofurantoin (90%) / Meropenem (87%) / Amikacin (83%) / Piptazo (79%)*
Klebsiella (n=150)	*12%*	*Meropenem (64%)/ Amikacin(=Piptazo) (56%) / Nitrofurantoin (44%) / Cotrimoxazole (36%)*
Enterococcus(n=144)	*11%*	*Linezolid(96%)/ Nitrofurantoin(=Vancomycin) (92%)/Tetracycline(50%)/ Gentamicin(42%)*
Acinetobacter(n=72)	*6%*	*Meropenem(=Norfloxacin) (33%)/ Ampisulb(17%)/ Gentamicin(8%)*
Staph.aureus(n=60)	*5%*	*Gentamicin(100%)/ Linezolid(=Nitrofurantoin, Norfloxacin)(90%)/ Ciprofloxacin(=Cotrimoxazole) (60%)*
Pseudomonas(n=36)	*3%*	*Amikacin(= Imipenem= Piptazo= Ceftazidime= Aztreonam= Ciprofloxacin) (100%)*

Patient Type 1 (CAI)	**Patient Type 2 (HAI)**	**Patient Type 3 (NI)**
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions	*Patient old with multiple co-morbidities.*	*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*

Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
1.Oral:Ciprofloxacin*/Norfloxacin or Cefuroxime/Cefixime or Amoxicillin-Clavulanate 2.IV/IM:Ceftriaxone or Ofloxacin or Meropenem	1.Oral:Ciprofloxacin/Norfloxacin or Nitrofurantoin or Amoxicillin-Clavulanate 2.IV/IM: Meropenem or Piptazo+Amikacin	Meropenem or Piptazo ± Amikacin
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Non ESBL Enterobacteriaceae, use susceptible antibiotic	ESBL Positive Enterobacteriaceae, Continue treatment with monotherapy	Susceptible Pseudomonas/ Acinetobacter: Continue with Impenem (or Meropenem) ± Levofloxacin/Amikacin CA-MRSA/Enterococcus: Add Vancomycin or Linezolid
Step down "De-Escalate "	***Step down "De-Escalate "***	***Step down "De-Escalate "***
Continue monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patient type 1	ESBL +ve Enterobacteriaceae, De-Escalate to patient type 2
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve: Escalate and treat as Patient Type 2	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR - PA: Escalate to a Combination therapy, Colistin+Imipenem+Sulbactam

*Avoid Ciprofloxacin and Levofloxacin since they have potent antipseudomonal activity

Skin and Soft Tissue Infections (SSTI) Antibiotic Protocol: WARDS *(valid upto 2020)*

WARDS MICROBIOLOGY DATA ***(Total no. of isolates = 5466)***

Most Common Pathogens		**Antibiotics Susceptibility**		
Staph.aureus(n=1860)	*34%*	*Linezolid(99%)/ Doxycycline(98%)/ Chloramphenicol(93%)/ Cotrimoxazole(88%)*		
E.coli(n=1056)	*19%*	*Meropenem(75%)/ Amikacin(68%)/ Piptazo(55%)/Tetracycline(35 %)*		
Pseudomonas(n=810)	*15%*	*Meropenem(90%)/ Piptazo(82%)/ Ciprofloxacin(79%)/Aztreonam(77%)*		
Klebsiella (n=762)	*14%*	*Meropenem(61%) / Tetracycline(=Amikacin)(57%)/ Piptazo(55%)/Ciprofloxacin(46 %)*		
Acinetobacter(n=690)	*13%*	*Ampisulb(43%)/ Tobramycin(40%)/ Meropenem (32%)/Amikacin(17%)*		
Enterococcus (n=288)	*5%*	*Linezolid(100%)/ Vancomycin (92%)/ Penicillin*(56%) / Gentamicin (50%)*		
Patient Type 1 (CAI)		**Patient Type 2 (HAI)**		**Patient Type 3 (NI)**
No contact with health care system		*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*		*Long hospitalization and or invasive procedures*
No prior antibiotic treatment		*Recent antibiotic therapy*		*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions		*Patient old with multiple co-morbidities.*		*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture		***Send Sample for Culture***		***Send Sample for Culture***
PRESUMPTIVE THERAPY		**PRESUMPTIVE THERAPY**		**PRESUMPTIVE THERAPY**
MSSA SSTI: Nafcillin/ Oxacillin/ Dicloxacillin/ Amoxicillin-clavulanate Cephalexin / Cefadroxil / Cefuroxime Doxycycline/ Minocycline TMP-SMZ		Ertapenem / CefSul / PipTaz / Tigecycline ± Amikacin ± Vancomycin/Teicoplanin		Vancomycin (or Teicoplanin) + Imipenem (or Meropenem)

MRSA SSTI: Vancomycin / Linezolid / Clindamycin / Daptomycin / Doxycycline/ Minocycline / TMP-SMZ		
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
MSSA / E.coli : Continue treatment	ESBL +ve Enterobacteriaceae: Continue treatment with monotherapy	Non MDR PA : Imipenem (or Meropenem); MRSA: Vancomycin monotherapy
Step down"De-Escalate "	***Step down "De-Escalate "***	***Step down "De-Escalate "***
Continue Monotherapy	ESBL -ve Enterobacteriaceae / MSSA: De escalate and treat as patient type 1 Enterococcus: Shift to Tigecycline/ Vancomycin	ESBL Positive Enterobacteriaceae/ Enterococcus: De-escalate to Tigecycline/ Vancomycin/ Teicoplanin MRSA: Monotherapy with Vancomycin/ Teicoplanin MSSA: Monotherapy
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve Enterobacteriaceae: Treat as Patients Type 2 MRSA Enterococcus: Replace with Vancomycin or Teicoplanin	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR PA /AB: Escalate to Colistin+Imipenem+Sulbactam combination; Add Vanco in case of MRSA

*Enterococci susceptible to penicillin are predictably susceptible to ampicillin, amoxicillin, ampicillin-sulbactam, amoxicillin-clavulanate, and piperacillin-tazobactam for non–Beta-lactamase-producing enterococci.

NOTES

OPD

Blood Stream Infections (BSI) Antibiotic Protocol: OPD *(valid upto 2020)*

OPD MICROBIOLOGY DATA ***(Total no. of isolates = 20)***

Most Common Pathogens	**%**	**Antibiotics Susceptibility**	**%**	
S typhi (n=20)		*Ceftriaxone (=Cefixime=Cefipime=Azithromycin=Ampicillin=Chloramphenicol=Cotrimoxazole=Tetracycline=Tigecycline=Meropenem) (100%)*		
Patient Type 1 (CAI)		**Patient Type 2 (HAI)**		**Patient Type 3 (NI)**
No contact with health care system		*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*		*Long hospitalization and or invasive procedures*
No prior antibiotic treatment		*Recent antibiotic therapy*		*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions		*Patient old with multiple co-morbidities.*		*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture		***Send Sample for Culture***		***Send Sample for Culture***
PRESUMPTIVE THERAPY		**PRESUMPTIVE THERAPY**		**PRESUMPTIVE THERAPY**
Ampicillin/ Ampicillin-sulbactam/ Amoxi-Clavulanate Ceftriaxone/ Cefixime Ciprofloxacin*		Ceftriaxone		Ceftriaxone ± Amikacin or Ciprofloxacin
After Culture Report		***After Culture Report***		***After Culture Report***
Continue Treatment		***Continue Treatment***		***Continue Treatment***
Susceptible pathogens: Continue treatment		Continue monotherapy		Susceptible bugs: Continue treatment

Stop "De-Escalate "	***Stop "De-Escalate "***	***Stop "De-Escalate "***
Susceptible pathogens: Continue monotherapy	Non ESBL Enterobacteriaceae: Treat as Patient type 1	ESBL +ve Enterobacteriaceae: De-Escalate to Ertapenem, Non ESBL De-Escalate to Cefixime or Ceftriaxone
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL+ Salmonella or Enterobacteriaceae Escalate to Ertapenem or Tigecycline	ESBL +ve: Escalate to Ertapenem or Tigecycline	AB / PA: Continue Imipenem or Meropenem ± Amikacin

**The % susceptibility of Tigecycline has been started since June 2008 and data will be available in the next edition of SGRH guidelines
*Avoid Ciprofloxacin since it has potent antipseudomonal activity
Reference: SGRH Guidelines for Empirical Antibiotic Therapy

OPD

Complicated Urinary Tract Infections (cUTI) Antibiotic Protocol: OPD *(valid upto 2020)*

OPD MICROBIOLOGY DATA *(Total no. of isolates = 210)*

Most Common Pathogens	%	Antibiotics Susceptibility
E coli (n=150)	*71%*	*Piptazo (100%)/Amikacin (=Nitrofurantoin) (82%)/Imipenem (=Meropenem) (84%)/Cefipime (52%)*
Klebsiella(n=36)	*17%*	*Piptazo(=)Amikacin=Imipenem=Cotrimoxazole) (100%)/ Ciprofloxacin(=Nitrofurantoin=Norfloxacin) Cefipime (87%)*
Enterococcus(n=24)	*11%*	*Vancomycin (=Amoxyclav=Cefotaxime (=Nitrofurantoin=Linezolid)(100%)/ Penicillin(75%)/ Gentamicin(=Tetracycline) (50 %)/ Ciproflaxacin(25%)*

Patient Type 1 (CAI)	Patient Type 2 (HAI)	Patient Type 3 (NI)
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions	*Patient old with multiple co-morbidities.*	*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
Ampicillin/sulbactam Ticarcillin/clavulanic acid/CefSul Ciprofloxacin*/Norfloxacin/Ofloxacin Nitrofurantoin	Amikacin / Ertapenem (No Tigecycline**)	Amikacin / Ertapenem

Cefuroxime		
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
Non ESBL Enterobacteriaceae, use susceptible antibiotic as monotherapy	ESBL Positive Enterobacteriaceae, Continue treatment with monotherapy	Susceptible bugs: Continue with monotherapy Enterococcus: Shift to Vancomycin
Stop "De-Escalate "	***Stop "De-Escalate "***	***Stop "De-Escalate "***
Continue monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patient type 1	ESBL -ve Enterobacteriaceae, De-Escalate to patient type 1
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve: Escalate and treat as Patient Type 2	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR - PA: Escalate to a Combination therapy, Colistin+Imipenem+Sulbactam

*Avoid Ciprofloxacin and Levofloxacin since they have potent antipseudomonal activity
**Tigecycline does not get excreted in urine, therefore it is not a treatment of choice for UTI due to ESBL producing E coli.

OPD

Skin and Soft Tissue Infections (SSTI) Antibiotic Protocol: OPD *(valid upto 2020)*

WARDS MICROBIOLOGY DATA ***(Total no. of isolates = 582)***

Most Common Pathogens		**Antibiotics Susceptibility**		
Staph.aureus(n=336)	*58%*	*Linezolid(100%)/Chloramphenicol(98%)/ Cotrimoxazole(=Doxycycline)(95%)/ Gentamicin(89%)*		
E.coli(n=108)	*19%*	*Meropenem(=Piptazo)(100%)/ Amikacin(89%)/ Tetracycline(=Cefipime)(50%)/Cefotaxime(=Ceftazidime=Ciprofloxacin)(39%)*		
Klebsiella(n=66)	*11%*	*Meropenem(=Amikacin)(91%)/ Piptazo(82%)/ Cefipime(73%)/Ciprofloxacin(=Tetracycline)(64%)*		
Pseudomonas (n=36)	*6%*	*Meropenem(100%) / Ciprofloxacin(83%)/ Piptazo(=Aztreonam=Amikacin)(67%)/Ceftazidime(50%)*		
Acinetobacter(n=24)	*4%*	*Ampisulb(=Ciprofloxacin=Ceftazidime=Amikacin=Tobramycin=Meropenem)(50%)*		
Enterococcus (n=12)	*m*	*Linezolid(=Penicillin =Gentamicin=Vancomycin)(100%) / Erythromycin (50%)*		
Patient Type 1 (CAI)		**Patient Type 2 (HAI)**		**Patient Type 3 (NI)**
No contact with health care system		*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*		*Long hospitalization and or invasive procedures*
No prior antibiotic treatment		*Recent antibiotic therapy*		*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions		*Patient old with multiple co-morbidities.*		*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*

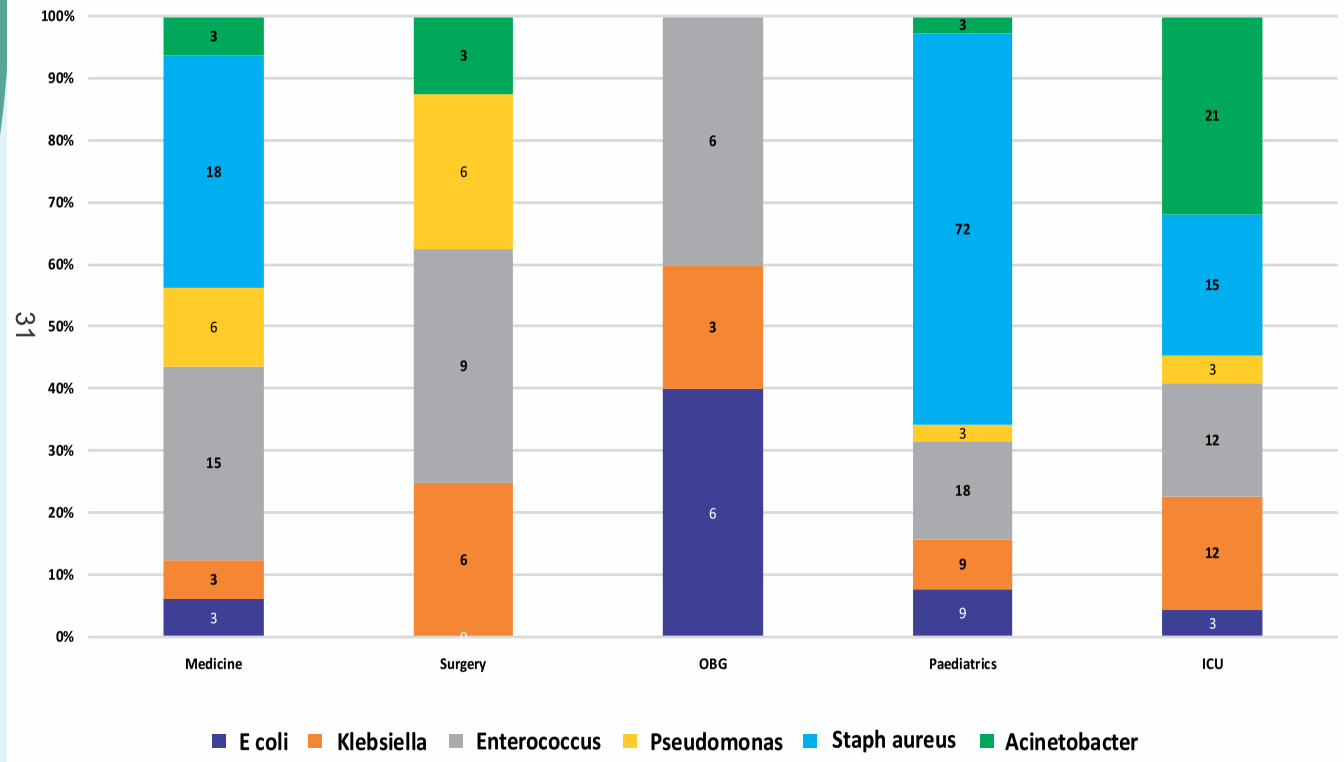
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
MSSA SSTI: Nafcillin/ Oxacillin/ Dicloxacillin/ Amoxicillin-clavulanate Cephalexin / Cefadroxil / Cefuroxime Doxycycline/ Minocycline TMP-SMZ **MRSA SSTI:** Vancomycin / Linezolid / Clindamycin / Daptomycin / Doxycycline/ Minocycline / TMP-SMZ	Ertapenem / CefSul / PipTaz / Tigecycline ± Amikacin ± Vancomycin/Teicoplanin	Vancomycin (or Teicoplanin) + Imipenem (or Meropenem)
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
MSSA / E.coli : Continue treatment	ESBL +ve Enterobacteriaceae: Continue treatment with monotherapy	Non MDR PA : Imipenem (or Meropenem); MRSA: Vancomycin monotherapy
Step down"De-Escalate "	***Step down "De-Escalate "***	***Step down "De-Escalate "***
Continue Monotherapy	ESBL -ve Enterobacteriaceae / MSSA: De escalate and treat as patient type 1 Enterococcus: Shift to Tigecycline/ Vancomycin	ESBL Positive Enterobacteriaceae/ Enterococcus: De-escalate to Tigecycline/ Vancomycin/ Teicoplanin MRSA: Monotherapy with Vancomycin/ Teicoplanin MSSA: Monotherapy
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve Enterobacteriaceae: Treat as Patients Type 2 MRSA Enterococcus: Replace with Vancomycin or Teicoplanin	Pseudomonas +ve: Escalate and treat as Patient Type 3	MDR PA /AB: Escalate to Colistin+Imipenem+Sulbactam combination; Add Vanco in case of MRSA

*Enterococci susceptible to penicillin are predictably susceptible to ampicillin, amoxicillin, ampicillin-sulbactam, amoxicillin-clavulanate, and piperacillin-tazobactam for non–Beta-lactamase-producing enterococci.

OPD

Department-wise Distribution of Organisms

Blood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Surgery
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ICU
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18
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9
6
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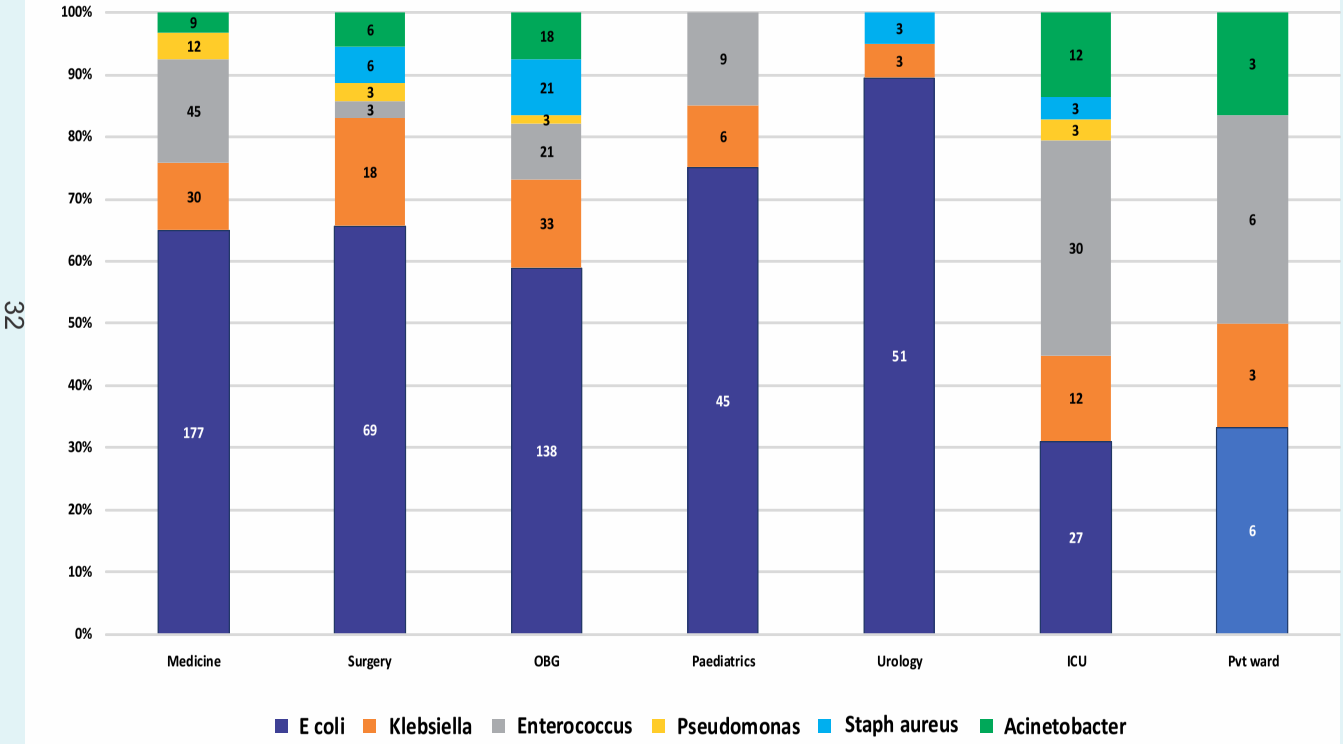
3
6
3
72
3
18
9
9
21
15
3
12
12
3
E coli
Klebsiella
Enterococcus
Pseudomonas
Staph aureus
Acinetobacter

Urine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Surgery
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Urology
ICU
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18
69
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21
3
21
33
138
9
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45
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3
51
12
3
30
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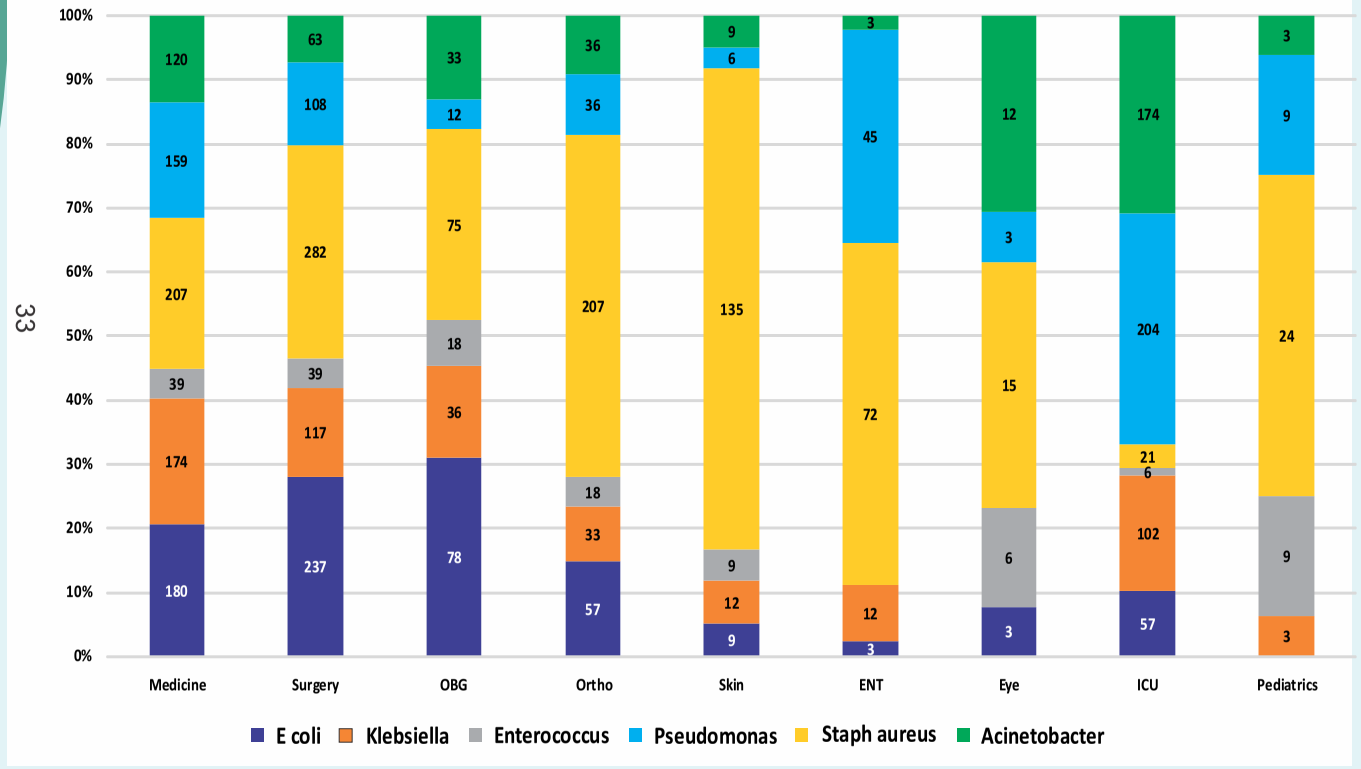
27
3
6
3
6
3
E coli
Klebsiella
Enterococcus
Pseudomonas
Staph aureus
Acinetobacter

Pus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Skin
ENT
Eye
ICU
Pediatrics
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159
207
39
174
180
63
108
282
39
117
237
33
12
75
18
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207
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57
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135
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3
45
72
12
3
12
3
15
6
3
174
204
21
6
102
57
3
9
24
9
3
E coli
Klebsiella
Enterococcus
Pseudomonas
Staph aureus
Acinetobacter

Drug Dosages*

Name of Antibiotic	Adult dose	Pediatric dose
Ampicillin-Sulbactam	IV: 1.5 to 3 g every 6 hours	IV: 100-300 mg ampicillin/kg/day divided every 6 hours
Amoxycillin-clavulanic acid	Oral: 500 mg amoxicillin every 8 hours	Oral: 20-40 mg amoxicillin/kg/day in divided doses every 8 h
Ceftriaxone	IV: 1 to 2 g every 12 to 24 hours	IV: 50-100 mg/kg/day divided every 12 to 24 hours
Ciprofloxacin	IV: 400 mg every 12 hours Oral: 500 mg every 12 hours	IV: 10 mg/kg/dose every 8 to 12 hours Oral: 10-20 mg/kg/dose every 8 to 12 hours
Piperacillin-Tazobactam	IV: 3.375-4.5 g every 6 hours	IV: 100 mg piperacillin/kg/dose every 8 hours
Amikacin	IM, IV: 5 to 7.5 mg/kg/dose every 8 hours	IM, IV: 15 to 20 mg/kg/dose every 24 hours
Vancomycin	IV: 15 to 20 mg/kg/dose every 8-12 h	IV: 60 mg/kg/day divided every 6 to 8 hours
Teicoplanin	Oral: 100 to 200 mg twice daily IV: 400 to 800 mg every 12 hours for 3 to 5 doses; followed by 6 to 12 mg/kg once daily	IV: 10 mg/kg every 12 hours for 3 doses, followed by 6 to 10 mg/kg once daily

Colistin (Colistin Base Activity(CBA)1 mg ==colistimethate sodium 30,000 units or 2.4 mg)	IM, IV: 2.5 to 5 mg CBA/kg/day divided every 6 to 12 hours	IM, IV: 2.5 to 5 mg CBA/kg/day divided every 6 to 12 hours
Meropenem	IV: 1.5 to 6 g daily divided every 8 hours	IV: 20 mg/kg/dose every 8 hours
Linezolid	Oral, IV: 600 mg every 12 hours	Oral, IV: 10 mg/kg/dose every 8 hours
Cefuroxime	Oral: 250 to 500 mg every 12 hours IV: 500 to 750 mg every 8 hours	Oral: 20 to 30 mg/kg/day divided twice daily IM, IV: 75 to 100 mg/kg/day divided in 3 doses
Nitrofurantoin	Oral: 50 to 100 mg every 6 hours	Oral: 5 to 7 mg/kg/day divided every 6 hours
Ofloxacin	Oral: 200 mg every 12 hours	-
Dicloxacillin	Oral: 125 to 250 mg every 6 hours	Oral: 25-50 mg/kg/day divided every 6 hours
Cloxacillin	IV: IV: 250 to 500 mg every 6 hours	IV: 25 to 50 mg/kg/day in divided doses every 6 hours
Cephazolin	IV: 1 to 1.5 g every 8 hours	IV: 50- 150 mg/kg/day divided every 8 hours
Cephalexin	Oral: 250 to 1,000 mg every 6 hours	Oral: 25-100 mg/kg/day divided every 6-12 hours

Clindamycin	IV: 600 to 2,700 mg daily in 2 to 4 divided doses Oral: 150 to 450 mg every 6 hours	IV: 20 to 40 mg/kg/day divided every 6 to 8 hours Oral: 8 to 20 mg/kg/day divided every 6 to 8 hours
Trimethoprim-Sulfamethoxazole	1 to 2 double-strength tablets every 12 to 24 hours	Oral: 6 to 12 mg TMP/kg/day in divided doses every 12 hours
Doxycycline	Oral: 100 to 200 mg/day in 1 to 2 divided dose	Oral, IV: 2.2 mg/kg/dose every 12 hours
Tigecycline	IV: Initial: 100 mg as a single dose; Maintenance dose: 50 mg every 12 hours	-
Erythromycin	Ora: Base: 250 to 500 mg every 6 to 12 hours	Oral: Base, ethylsuccinate, stearate: 30 to 50 mg/kg/day divided every 6 to 8 hours
Clarithromycin	Oral: 250 to 500 mg every 12 hours	Oral: 15 mg/kg/day divided every 12 hours
Cefotaxime	IV: 1 to 2 g every 8 hours	IV: 150 to 180 mg/kg/day in divided doses every 8 hours
Ceftriaxone	IV: 1 to 2 g every 12 to 24 hours	IV: 50-100 mg/kg/day divided every 12-24 hours
Cefixime	Oral: 400 mg daily divided every 12 to 24 hours	Oral: 8 mg/kg/day divided every 12 to 24 hours

Cefpodoxime	Oral: 100-200 mg every 12 hours	Oral: 5 mg/kg/dose every 12 hours
Cefadroxil	Oral: 1 g/day in single or 2 divided doses	Oral: 15 mg/kg/dose twice daily
Chloramphenicol	IV: 50 to 100 mg/kg/day in divided doses every 6 hours; maximum daily dose: 4 g/day	IV: 12.5 mg/kg/dose every 6 hour

* Doses given here are *general condition* doses. If doses are given as a range, doses in higher range may be used for more severe conditions. For specific conditions which may require higher (e.g. meningitis) or lower (e.g. renal failure) doses, refer to suitable recommendations. Pediatric doses given here are not for use in neonates. While calculating weight-based pediatric doses do not exceed the adult dose.

The Golden Rules of Antimicrobial Prescribing "MINDME"*.

M Microbiology guides therapy wherever possible
I Indications should be evidence based
N Narrowest spectrum required
D Dosage appropriate to the site and type of infection
M Minimise duration of therapy
E Ensure monotherapy in most cases

***Adapted from Antibiotic Expert Group.**
Therapeutic guidelines: antibiotic. Version 14.
Melbourne: Therapeutic Guidelines Limited; 2010.

GOOD PRACTICES

- Always take cultures of appropriate body fluid (blood, urine, CSF, pus) before starting antibiotics.
- Use the narrowest spectrum antibiotics possible.
- Do not start treatment with a third-generation cephalosporin or a carbapenem.
- Follow the hospital antibiotic policy to restrict the use of expensive, broad-spectrum antibiotics like imipenem or colistin.
- Trust the microbiology laboratory. Rely on the culture results.
- Do not to use antibiotics unnecessarily for long periods.
- Treat infection, not colonization.
- Prevent healthcare-associated infection, by following the infection control practices, particularly hand washing.

NOTES

Government Medical College & Hospital
Chandigarh