



**Bharati Vidyapeeth University Medical College  
Hospital & Research Centre, Pune**

**Antimicrobial Policy  
and  
Antimicrobial Stewardship Program**

**2021-2022  
Version - 7.0**



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## **1. Introduction -**

Over the last 60 years antibiotics have been widely used to treat infectious diseases. Their indiscriminate use has led to resistance developing to almost all known antibiotics. Antimicrobial resistance has become widespread not only in hospitals but also in the community.

A rational antibiotic policy and antimicrobial stewardship is a must for all hospitals and is mandated by the Ministry of Health and Family Welfare through its document “National Policy for Containment of Antimicrobial Resistance, India”. The purpose of this document is to provide a guide for rational antibiotic use at Bharati Hospital based on local patterns of antimicrobial sensitivity.

### **DEFINITIONS**

**Antimicrobial agent (Antibiotic):** Any agent, which has a potential for or is used with an intention of affecting microbial growth inside or on the human body. This includes antibacterial, antifungal, antiviral and anti-parasite agents.

**Antimicrobial Stewardship:** A set of coordinated activities that includes appropriate selection of antimicrobial agent, dosing, route and duration of antimicrobial therapy. The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms and the emergence of resistance.

**Surgical Antibiotic Prophylaxis/Prophylactic anti-microbial agents:** Administration of an antibiotic or antimicrobial agent prior to the commencement of a surgical procedure and appropriate re-administration of the agent during prolonged surgery.

**Empiric Antibiotic/Antimicrobial therapy:** This is an early institution of antimicrobial therapy pending the results of culture and / or other relevant investigation and clinical response, in patients who have an illness and in whom there is an expectation of an infectious cause, the treatment being directed against the most likely microbial agent(s) in that particular episode.

**Organism directed Antimicrobial Therapy:** Usage of antimicrobial agent against infection by specific microorganisms which have been confirmed by culture of appropriate samples.

### **References:**

1. National treatment guidelines for antimicrobial use in infectious disease, version 1 (2016)
2. ICMR , Treatment guidelines for antimicrobial use in common syndromes, 2019 2<sup>nd</sup> edition
3. Antimicrobial Stewardship Programmes in low and middle income countries 2019
4. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. NICE guideline 2015
5. IDSA : New Antibiotic Stewardship Guidelines Focus on Practical Advice for Implementation 2016

## **2. Clinical Pathway**

1. Resident of respective department will assess patient for symptoms and signs of infection, including laboratory evidence of infection.
2. He/she will document appropriately on the culture requisition form.
  - suspected cause/site of infection,
  - possibly community (CA)/hospital acquired(HA) ○
  - patient type (types 1-3 described below)
3. Appropriate site cultures and blood cultures will be sent according to HICC protocol.
4. Antibiotic will be chosen according to antibiotic guide after informing lecturer on call and checking for allergy risks.
5. Any deviation from the policy will be documented along with the reason for deviation.
6. Some antibiotics will be part of the restricted formulary and use of these “ALERT” antibiotics will require infectious disease/ critical care (ICU/PICU/NICU) consult. These include;  
Carbapenems, Colistin, Linezolid, Teicoplanin, Vancomycin, Echinocandins,  
Voriconazole, Amphotericin B
7. Clinical response will be followed.
8. Once culture reports are available (Day 2 – Day 4) antibiotic is to be de-escalated (if possible) and duration of therapy is to be specified if not already done so.
9. Antibiotic prescription should have a record of the day and expected duration of antibiotics in the left-hand margin of the drug chart, eg D4/7
10. Infection control team will fill antibiotic audit form and conduct regular department wise audits.
11. Findings of the audit will drive improvement in antibiotic use.

### 3. Antimicrobial Stewardship

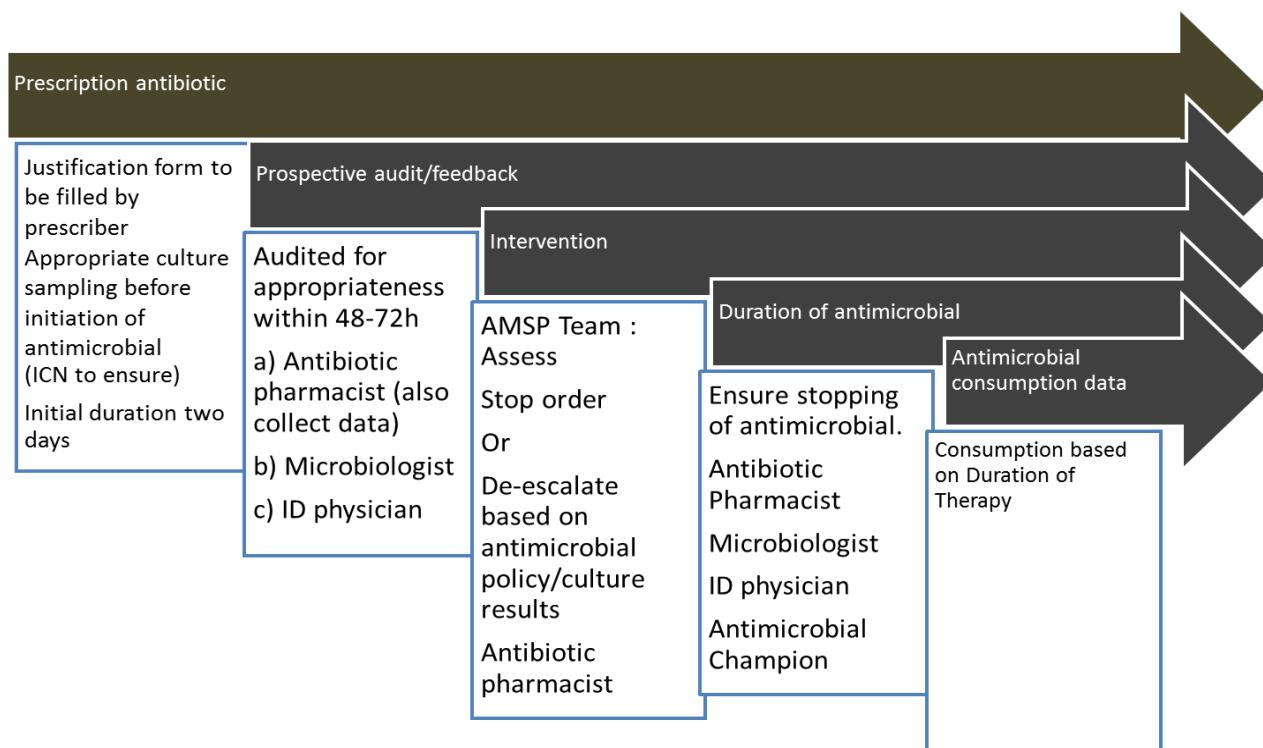


- A set of coordinated strategies to improve the use of antimicrobials

#### Goal

- Enhancing patient health outcomes
- Reducing resistance to antibiotics
- Decreasing unnecessary costs

#### Workflow of Antimicrobial stewardship





## Metrics used in AMSP



- Days of therapy
- Cost metrics
- Average length of stay
- Mortality rate
- Acceptance of intervention
- Resistance pattern
- Comparison of HAI with ABX consumption rate

#### **4. List of Restricted Antimicrobials**

These will not be prescribed without obtaining concurrence of HoD/HoU ;

- 1. Piperacillin tazobactam**
- 2. Carbapenems**
- 3. Linezolid**
- 4. Vancomycin**
- 5. Teicoplanin**
- 6. Daptomycin**
- 7. Tigecycline**
- 8. Echinocandins : Caspofungin, Micafungin**

**Common antimicrobial resistant organisms :**

##### **Extended spectrum beta-lactamase producers (ESBL)**

These are Gram negative organisms (GNB) like *E coli* & *Klebsiella*, which are resistant to the penicillins; first-, second and third-generation cephalosporins; In addition, the plasmids bearing genes-encoding ESBLs frequently also carry genes encoding resistance to other antimicrobial agents, such as aminoglycosides, trimethoprim, sulphonamides, tetracyclines and chloramphenicol. They remain susceptible to beta lactam- beta lactamase inhibitor combinations and carbapenems.

##### **Amp C beta lactamases**

These are inducible beta lactamases produced by certain organisms after exposure to cephalosporins. The organisms are resistant to the penicillins; first-, second- and third-generation cephalosporins and beta-lactam-beta lactamase inhibitor combinations. They may remain susceptible to cefepime and carbapenems. Seen in *Serratia*, *Pseudomonas*, *Proteus*, *Citrobacter* and *Enterobacter* spp.

##### **Carbapenemase producers:**

These are Gram negative organisms resistant to the Carbapenems and almost all beta-lactam antibiotics except monobactams. Colistin and polymyxins are currently used for these organisms.

##### **Methicillin Resistant Staphylococcus aureus (MRSA)**

These are resistant to all beta lactam antibiotics (Penicillins, BL-BLI, Cephalosporins, monobactams and Carbapenems.)

##### **Vancomycin Resistant Enterococcus (VRE) :**

These isolates are resistant to Vancomycin, Teicoplanin but susceptible to linezolid.

**MDR (Multi-drug resistance):**

Isolates resistant to representatives of three or more classes of antimicrobial agents,

**XDR (Extensive drug resistance):**

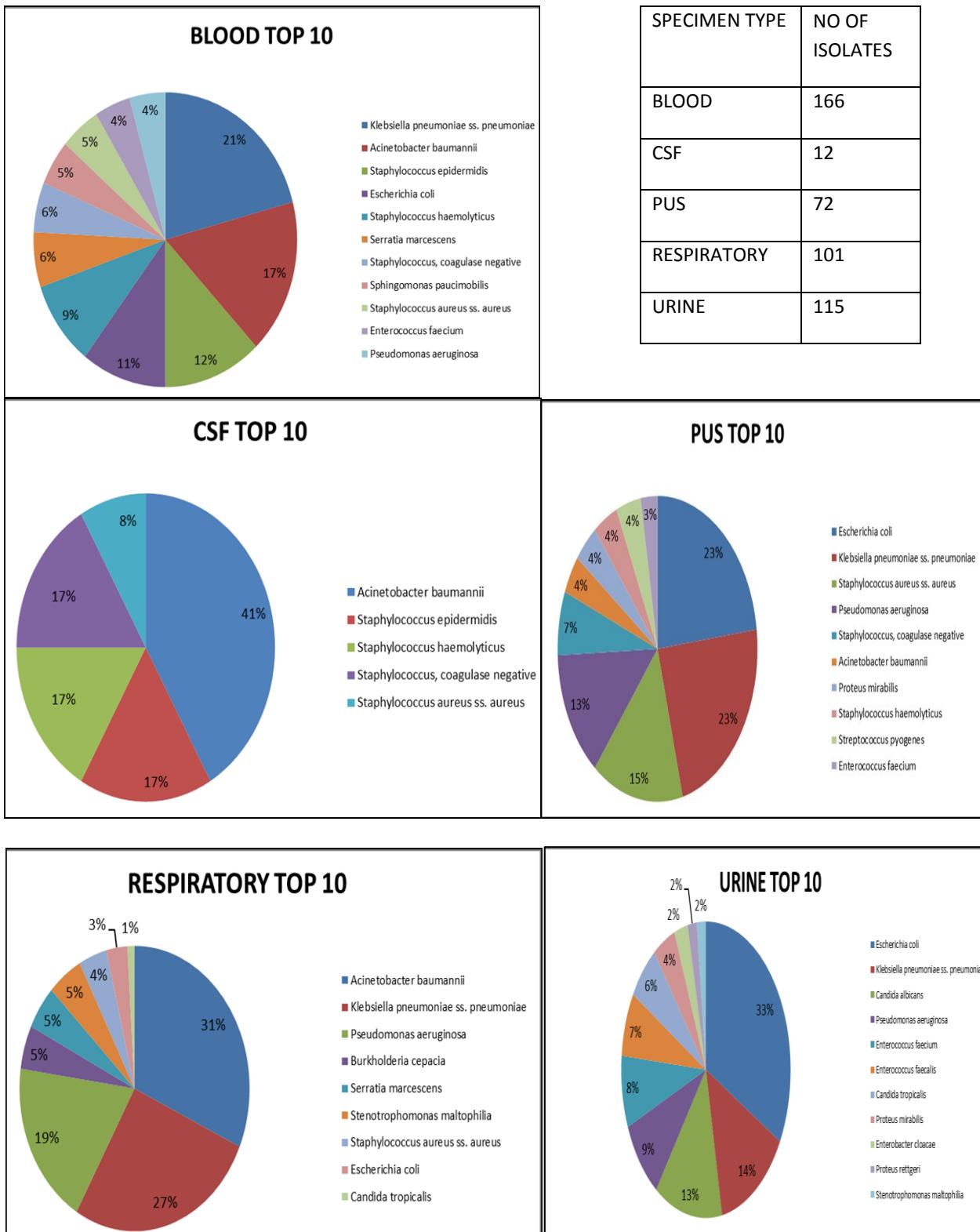
Isolates resistant to all but one or two classes

**PDR (Pan drug resistance):**

Isolates resistant to all classes of antimicrobial agents available

## 5. Organisms commonly isolated and antibiogram: Area wise

### Critical care unit



## Critical Care unit antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	NORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	COFRIMAZOLE	AMPIGILLIN	AVOXLULLIN/CLAVULANATE (CIVICEFUROXIME)	CEFTAZIDIME	CEFRIPIME	CEFKLAVINE	CRO (CEFTIRAXONE)	FOX (CEFOROXIME)	CEPOPERAZONE/SULBACTAM	PIPITAZ	AMIKACIN	GENTAMYCAN	DORIPENEM	ERTAPENEM	IMIPENEM	MEROPENEM	MINOCYCLINE	TRICYCCLINE	POSHOMYON	COLISTIN
ICU	BLOOD	Acinetobacter baumannii	31			7.7		39					7.7		3.8		19	7.7		7.7				7.7		85	89	
		Enterobacter cloacae	4	75			75	100		0	0		75		75		75	75	100	75		100	100	100	100	100		
		Escherichia coli	19	11			11	56	17	44	17		56		17		72	72	100	67		78	78	78	100	100		
		Klebsiella pneumoniae	38	47			39	47	0	39	33		44		33		50	47	64	53		50	50	50	44	97		
		Pseudomonas aeruginosa	8		100	100		0			100	100					88	88	100	100		100	100	100	0	13	100	
	CSF	Acinetobacter baumannii	5				0		0				0		0		0	0	0	0				0	0	100	80	
		Acinetobacter baumannii	3			0		33					0		0		0	0	0	0				0	0	67	100	
		Enterobacter cloacae	2	100			100	100		0	0		100		100		100	100	100	100		100	0	100	0	0	0	
		Escherichia coli	17	12			18	59	18	41	18		65		18		65	59	82	77		82	88	88	100	100		
		Klebsiella pneumoniae	17	24			12	41	0	12	12		12		12		12	12	41	47		12	12	12	47	94		
	PUS	Pseudomonas aeruginosa	10		22	20		0			56	50					50	50	50	40		50	40	40	0	0	100	
		Acinetobacter baumannii	32			100	3.2		26			0	3.1		0		9.4	3.2	0	3.1		100	3.2	3.2	100	78	100	
		Escherichia coli	3	33			33	33	33	33		67		33		67	67	67	67		67	67	67	100	100			
		Klebsiella pneumoniae	27	50			35	46	0	35	19		46		31		54	46	65	54		54	52	50	54	100		
	RESP	Pseudomonas aeruginosa	19		78	74					72	68					68	58	74	74		67	58	63	0	0	100	
		Enterobacter cloacae	3		33		0	67		0	0		33		33		33	33	33	33		33	33	0	33	33	100	
		Escherichia coli	38	0	33	11	33	79	58	33	55	17	100	57	33	21	100	71	71	92	71	87	86	54	97	97	100	
		Klebsiella pneumoniae	16	50	50	29	50	6.2	56	0	25	21	50	36	50	25	50	36	38	56	56	38	36	14	50	63	86	
		Pseudomonas aeruginosa	10		11	0	100				0	20					20	20	30	20		0	20	0	100	10	67	

Restricted, do not use empirically, unless justified

Will not work for empiric use

Will work for empiric use

Will work for empiric use, but do not use restricted antimicrobials

Antimicrobial not indicated/not tested

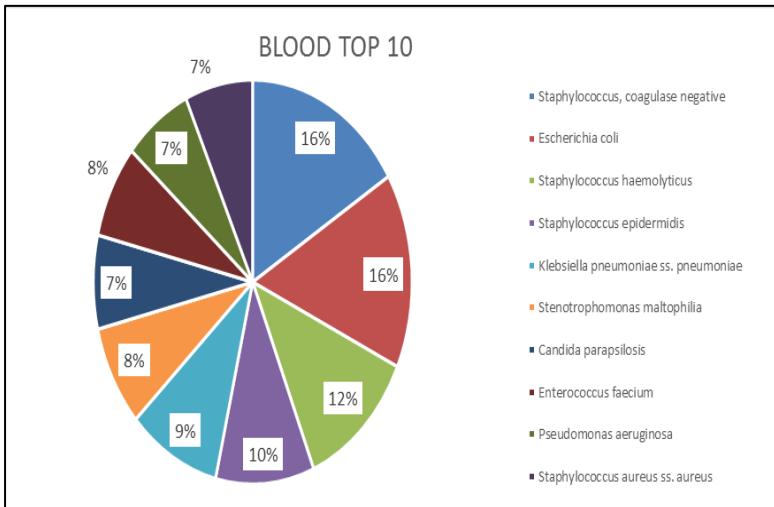
## Critical Care unit antibiogram

### SENSITIVITY GRAM POSITIVE ORGANISM 2020 - ICU

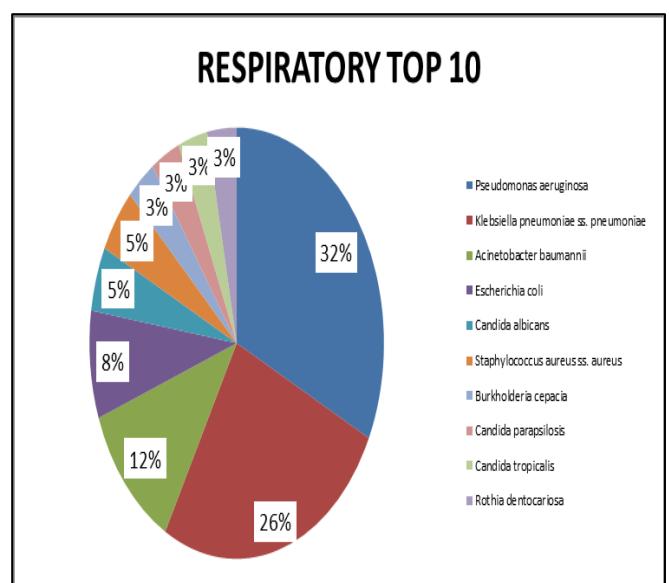
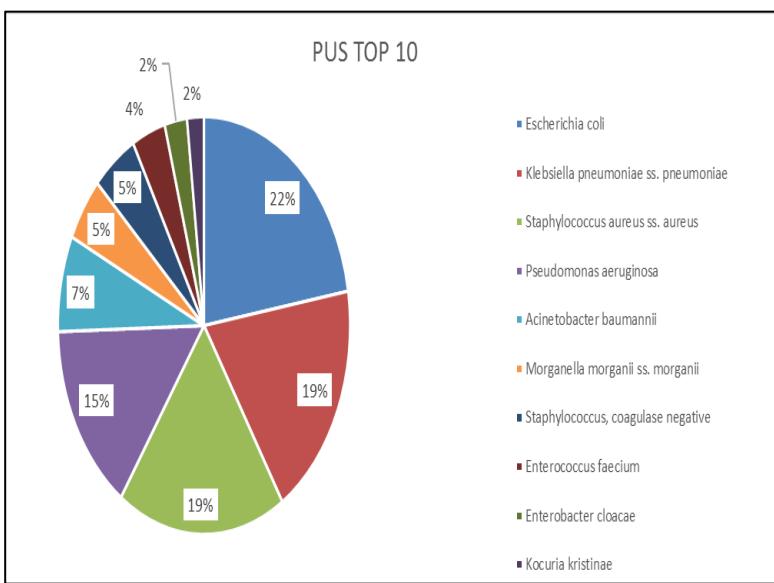
Location	Specimen type	organism	No. of patient	COTRIMOXAZOLE	NITROFURANTOIN	PENICILLIN	OXACILLIN	CIPROFLOXACIN	LEVOFLOXACIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	TEICOPLANIN	VANCOMYCIN
ICU	BLOOD	Enterococcus faecium	8			0		0	0	0			50	13	100	100		100	100
		Staphylococcus aureus	9	71		29	86	14	14	43	86	86		86	100	100	100	100	100
		CoNS	10	100		60	60	60	60	20	40	100		80	100	100	80	100	100
		Staphylococcus epidermidis	22	57		0	4.8	19	19	9.5	52	62		57	100	100	100	86	91
	CSF	Staphylococcus aureus	1	100		0	0	0	0	0	0	100		100	100	100	100	100	100
		CoNS	2	100		0	0	100	100	0	100	100		100	100	100	100	100	100
		Staphylococcus epidermidis	2	50		0	50	100	100	100	100	100		100	100	100	100	100	100
	PUS	Enterococcus faecium	2			0		0	0	0			0	50	100	100	50	50	50
		Staphylococcus aureus	11	55		9.1	27	9.1	9.1	27	55	55		82	100	100	100	100	100
		CoNS	5	50		0	40	50	50	25	50	75		100	100	100	100	100	100
		Staphylococcus epidermidis	1	100		0	0	0	0	0	0	0		0	100	100	100	100	100
	RESP	Staphylococcus aureus	4	75		0	50	0	0	25	75	100		100	100	100	100	100	100
	URINE	Enterococcus faecium	9		11	0		0	0	0			11	44	100	100	56	56	56
		Staphylococcus aureus	1	100	100	0	100	0	0	100	100	100		100	100	100	100	100	100
		Staphylococcus epidermidis	1	100	100	0	100	100	100	0	100	100		100	100	100	100	100	100

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- Will work for empiric use, but do not use restricted antimicrobials
- Antimicrobial not indicated/not tested

## MEDICINE (IPD)



SPECIMEN TYPE	TOTAL ISOLATES
BLOOD	160
PUS	161
RESPIRATORY	62
URINE	310



# Medicine (IPD) antibiogram

## SENSITIVITY GRAM NEGATIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	NORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURATON	COTRIMOXAZOLE	AMPICILLIN	AMOXILLIN/CLAVUNATE	CEPEPIME	CEFKIME	CEFOXITIN	CRO (CEFTRIAKONE)	CEFUXOXIME	CEFTAZIDIME	CEFOPERAZONE/SALBACTUM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTA PENEM	DORIPENEM	IMIPENEM	MEROPENEM	MINOCYCLINE	TIGECYCLINE	FOSFOMYCIN	COLISTIN
MED	BLOOD	Acinetobacter baumannii	7			29	71			29			14			29	29	29					29	29	71	100			
		Enterobacter cloacae	3	67		67	100		0	67			33	0		67	67	67	33	67	67	67	67	33	100				
		Escherichia coli	25	0		0	14		50	19	52	82		24	24	100	86	82	100	73	86	100	86	91	0	96	100		
		Klebsiella pneumoniae	15	53		20		40	0	40	47		13	13		47	40	67	53	47	47	47	47	47	87				
		Pseudomonas aeruginosa	11		70	73				55					50	64	55	64	64		70	73	73	0	100				
	CSF	Pseudomonas aeruginosa	1		100	100		100		100					100	100	100	100	100			100	100	100	100				
		Acinetobacter baumannii	12			18	36			27			9.1			36	20	100	18			27	27		100	100			
		Enterobacter cloacae	4	75		75	100		0	75			75	0		75	50	75	75	75		50	75	50	100				
		Escherichia coli	36	8.3		17	42	11	36	61			19	17		72	67	86	61	83	83	81	100	97					
		Klebsiella pneumoniae	30	30		20	37	0	27	37			23	20		40	30	57	40	43	40	47	40	73					
	PUS	Pseudomonas aeruginosa	24		46	46				58					55	54	54	67	71		55	50	54	0	96				
		Acinetobacter baumannii	7			29	43			29			0			29	29	100	29			29	29	100	100				
		Escherichia coli	5	0		20		40	40	40	80			40	40		60	60	100	100	80	100	100	100	100				
		Klebsiella pneumoniae	16	63		50	56	0	38	63			50	44		63	63	63	63	63	63	63	63	63					
	RESP	Pseudomonas aeruginosa	20		81	78				75					77	74	68	74	74		65	61	61	0	94				
		Acinetobacter baumannii	8		40	33		63		33			50		100	33	50	50	50		33	0	60	100	100				
		Enterobacter cloacae	7	0	0	17	0	0	57	0	50	0	0	29	0	0	50	43	57	86	57	33	0	17	86	100			
		Escherichia coli	131	6.7	29	14	17	74	52	6.7	43	48	14	64	27	24	39	62	57	83	65	79	79	50	43	95	96		
	URINE	Klebsiella pneumoniae	76	33	33	18	20	18	42	0	24	28	22	44	21	15	33	37	33	50	46	38	37	50	15	42	53	81	
		Pseudomonas aeruginosa	42		50	24	15			27					19	24	26	31	28		17	24	17	0	76				

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  Will work for empiric use  
  Will work for empiric use, but do not use restricted antimicrobials  
  Antimicrobial not indicated/not tested

## Medicine (IPD) antibiogram

SENSITIVITY GRAM POSITIVE ORGANISM 2020

Specimen type	organism	No. of patient	COTRIVIAZOLE	NITROFURATIN	PENICILLIN	CIPROFLOXACIN	LEVOFLOXACIN	OXA CILLIN	ERYTHROMYCN	CUNDAMYCIN	GENFAMYCN	GENFAMYCN HIGH LEVEL	TETRACYCLINE	DAPTO/MCN	TIGECYCLINE	LINZOLID	VANCOMYN	TEGICILLIN
BLOOD	Enterococcus faecium	12		18.2	0	0	0		0			9.1	0		100	90.9	54.5	63.6
	Staphylococcus aureus	11	81.8	90.9	9.1	18.2	18.2	45.5	27.3	54.5	81.8		100	100	100	96	88	
	CoNS	26	64	96	28	48	48	47.8	28	43.5	92		80	100	100	100	81.2	
	Staphylococcus epidermid	16	56.2	100	12.5	43.8	50	37.5	31.2	56.2	75		75	100	100	100	100	
CSF	Staphylococcus aureus	1	100	100	100	100	100	100	100	100	100		100					
PUS	Enterococcus faecium	6		20	0	0	0		0			0	0		100	80	60	60
	Staphylococcus aureus	30	56.7	100	10	10	10	36.7	40	63.3	73.3		93.3	100	100	100	100	
	CoNS	8	50	100	0	25	25	0	0	0	100		50	100	100	100	100	
	Staphylococcus epidermid	3	66.7	100	33.3	100	100	66.7	33.3	33.3	66.7		100	100	100	100	100	
RESP	Staphylococcus aureus	3	66.7	100	0	0	0	33.3	0	33.3	66.7		100	100	100	100	100	
URINE	Enterococcus faecium	14		7.1	0	0	0		0			14.3	21.4		100	92.9	57.1	57.1
	Staphylococcus aureus	5	60	80	20	20	20	0	60	100	60		80	100	100	100	100	
	CoNS	4	100	75	0	50	50	66.7	25	25	75		50	100	100	100	100	
	Staphylococcus epidermid	1	0	100	0	100	100	100	0	100	100		100	100	100	100	100	

Restricted, do not use empirically, unless justified

Will not work for empiric use

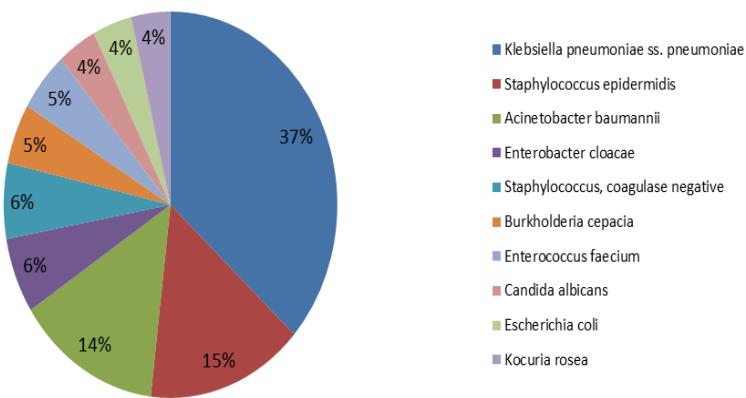
Will work for empiric use

Will work for empiric use, but do not use restricted antimicrobials

Antimicrobial not indicated/not tested

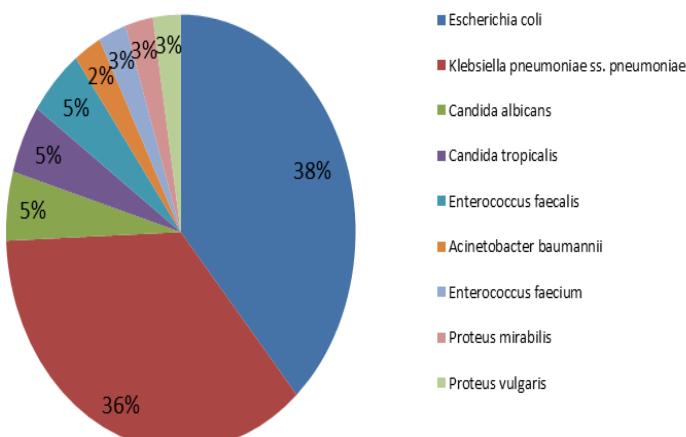
## NEONATAL INTENSIVE CARE UNIT

### BLOOD TOP 10

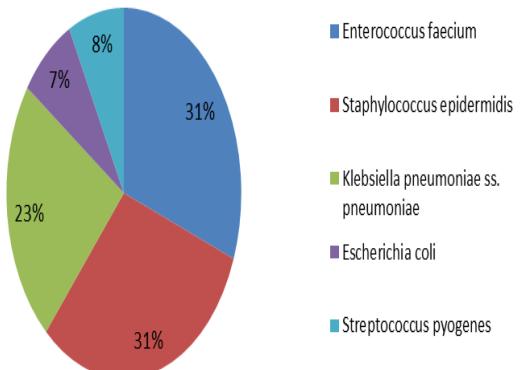


SPECIMEN TYPE	TOTAL ISOLATES
BLOOD	79
CSF	13
PUS	24
RESPIRATORY	13
URINE	39

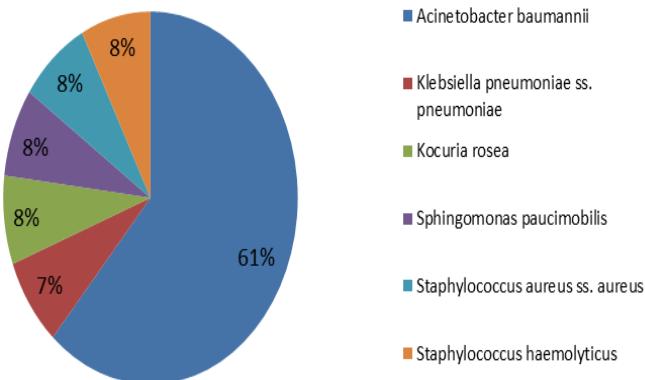
### URINE



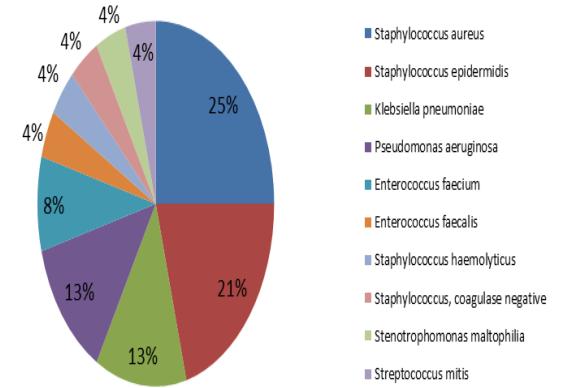
### CSF



### RESPIRATORY



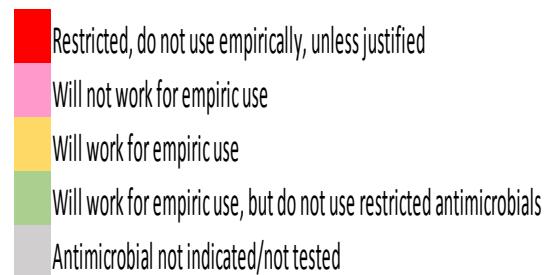
### PUS



# NICU antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020

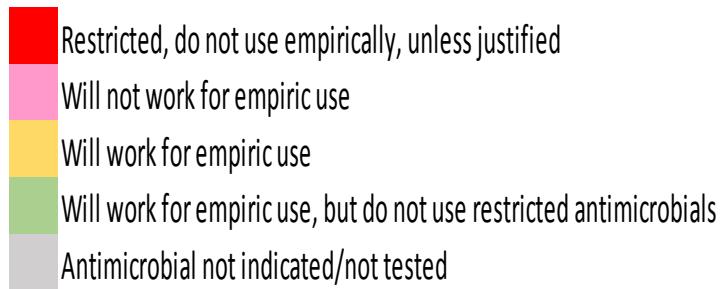
Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	NOREFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	COTRIMOXAZOLE	AMPICILLIN	AMOXICILLIN/CLAVUNATE	CEFPIME	CEFTAZIDIME	CEFOTAXIME	CEFUROXIME	CEFXIME	CEFORAPEZONE/SULBACTAM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTAPENEM	IMIPENEM	DORIPENEM	MEROPENEM	MINOCYCLINE	TIGECYCLINE	FOSFOMYCIN	COLISTIN
NICU	BLOOD	Acinetobacter baumannii	11				27.3		72.7			27.3			0		27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	100	100		
		Escherichia coli	3	0			0		100	100	100	100			100	100	100	100	100	100	100	100	100	100	100	100		
		Klebsiella pneumoniae	30	83.3			16.7		70	0	13.3	26.7			13.3	13.3		16.7	16.7	63.3	76.7	20	20	20	76.7	100		
		Pseudomonas aeruginosa	1			100	100				100	100					100	100	100	100	100	100	100	100	0	100		
	CSF	Escherichia coli	1	100			100		100	100	100	100			100	100	100	100	100	100	100	100	100	100	100	100		
		Klebsiella pneumoniae	3	100			0		66.7	0	33.3	33.3			0	0	33.3	33.3	66.7	66.7	33.3	33.3	33.3	100	100			
	PUS	Klebsiella pneumoniae	3	100			0		66.7	0	0	33.3			0	0	33.3	33.3	66.7	0	33.3	33.3	33.3	66.7	100			
		Pseudomonas aeruginosa	3			100	66.7		100		100	100			0		100	66.7	100	66.7	66.7	50	66.7	33.3	100			
	URINE	Acinetobacter baumannii	1			100			0						100		100	100	0	100			0	100		100		
		Escherichia coli	17	50	100	13.3	50		70.6	50	52.9	81.2	100	100	41.2	25	100	87.5	76.5	94.1	88.2	94.1	93.8	100	60	93.8	100	
		Klebsiella pneumoniae	14	100	100	30.8	0		71.4	0	28.6	38.5	0	0	21.4	30.8	0	30.8	28.6	78.6	64.3	28.6	30.8		38.5	84.6	100	



# NICU

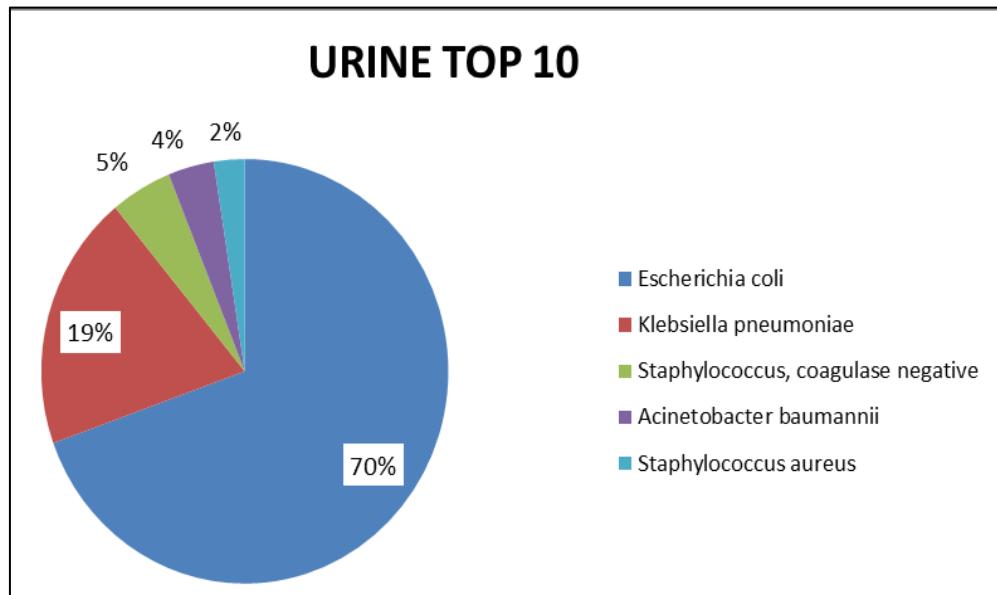
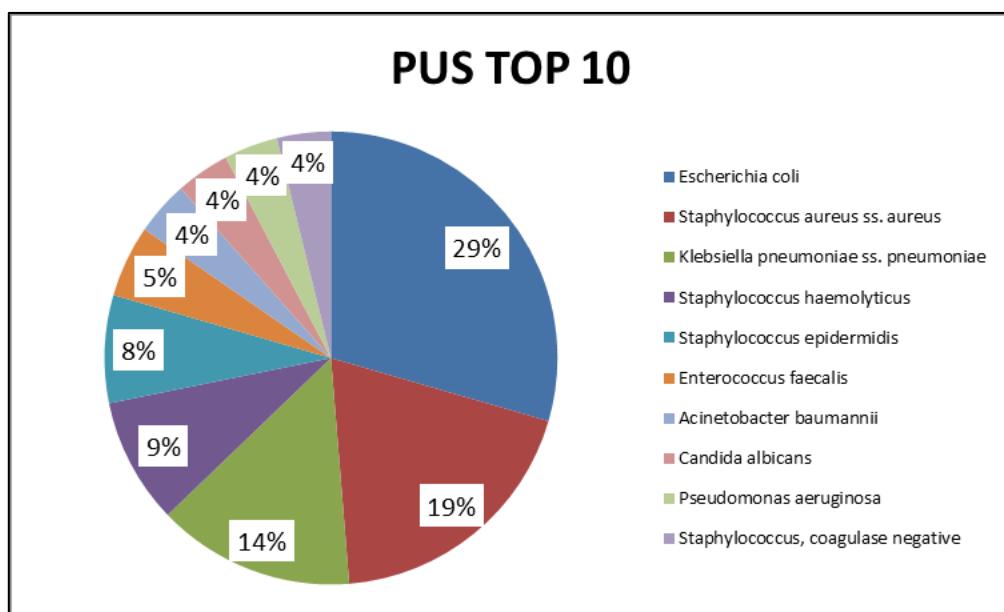
## SENSITIVITY GRAM POSITIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	SXT (COTRIMOXAZOLE)	NITROFURANTOIN	PENICILLIN	OXACILLIN	CIPROFLOXACIN	LEVOFLOXACIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	TEICOPLANIN	VANCOMYCIN
NICU	BLOOD	Staphylococcus aureus	2	50		0	50	0	0	50	50	100		100	100	100	100	100	
		CoNS	5	40		0	0	40	40	40	60	80		80	100	100	100	100	
		Staphylococcus epidermidis	12	33.3		0	0	8.3	8.3	8.3	8.3	33.3		91.7	100	100	100	100	
		Enterococcus faecium	4			0		0	0	0			0	50	100	100		100	
	CSF	Enterococcus faecium	5			0		0	0	0			0	40	100	100		100	
		Staphylococcus epidermidis	4	50		0	0	50	50	50	50	50		100	100	100	100	100	
	PUS	Enterococcus faecium	2			0		0	0	0			0	0	100	50		100	
		Staphylococcus aureus	6	83.3		0	16.7	16.7	16.7	50	66.7	66.7		83.3	100	100	100	100	
	URINE	Enterococcus faecium	1		0	0		0	0	0			0	0	100	100		100	



## Obstetrics and Gynaecology

SPECIMEN TYPE	TOTAL ISOLATES
PUS	78
URINE	82



## Obstetrics and Gynaecology Antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	NALADIXIC ACID	NORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	COTRIMOXAZOLE	AMPICILLIN	AMOX/CLAV	CEFPIME	CFM(CEFIXIME)	CEFOXITIN	CEFTRIAZONE	CEFUROXIME	CEFTAZIDIME	CEFO/SULBACTAM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTAPENEM	DORIPENEM	IMIPENEM	MEROPENEM	MINOCYCLINE	TIGECYCLINE	FOSFOMYCIN	COLISTIN
OBGY	PUS	Escherichia coli	23	17			35	87	65	22	70	78				26	26		87	78	96	83	91	91	91	100	100		
		Klebsiella pneumoniae	11	55			9.1	0	73	0	27	73			46	18		73	64	82	82	73	73	82	55	100			
	URINE	Acinetobacter baumannii	3				0		50				0			0			0	0		0			0	100			
		Escherichia coli	57	7.1	54	12	27	91	47	21	57	68	31	92	25	19	71	91	86	93	79	93	100	91	100	54	100	98	
		Klebsiella pneumoniae	16				38		69	75	50	56		38	31			75	69	94	81	81	81		56	100	100	94	



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- Antimicrobial not indicated/not tested

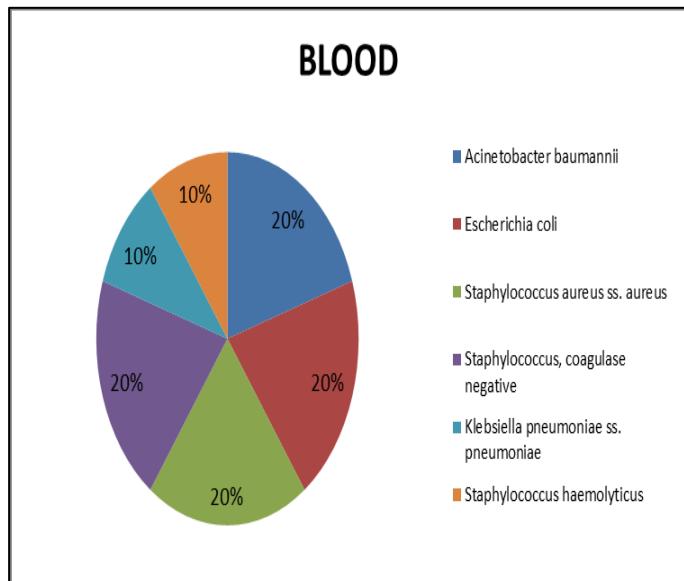
## Obstetrics and Gynaecology

## SENSITIVITY GRAM POSITIVE ORGANISM 2020

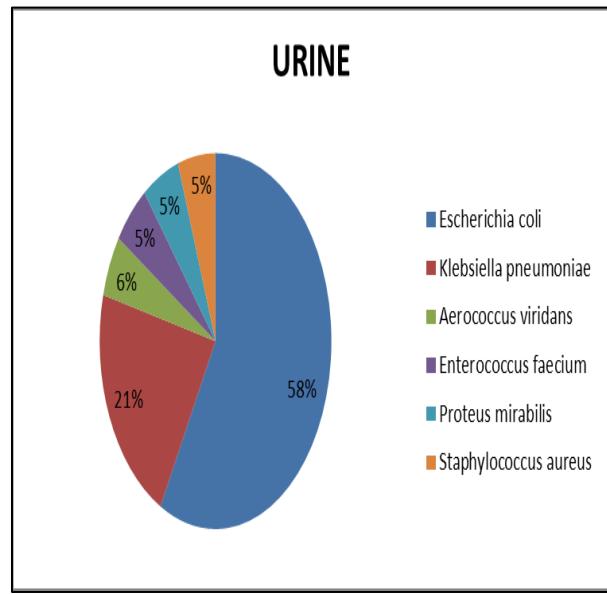
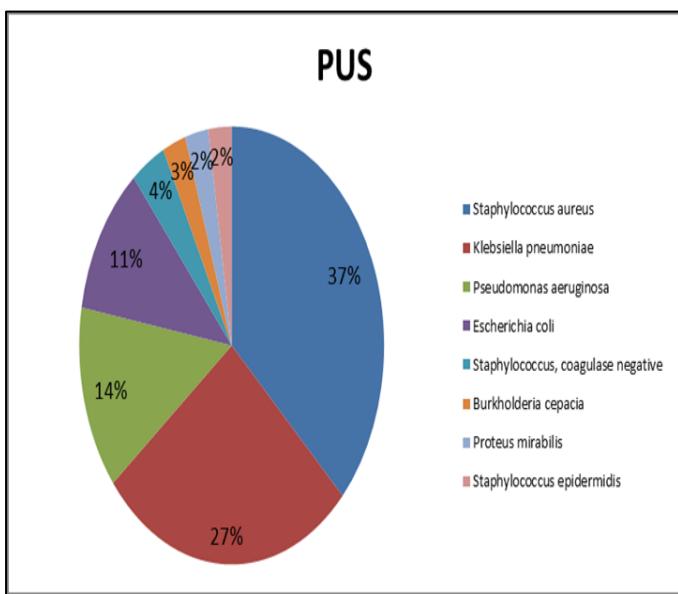
Location	Specimen type	organism	No. of patient	COTRIMOXAZOLE	NITROFURANTOIN	PENICILLIN	CIPROFLOXACIN	LEVOFLOXACIN	OXACILLIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	VANCOMYCIN	TEICOPLANIN
OBGY	PUS	Staphylococcus aureus	15	53.3		0	6.7	6.7	13.3	46.7	53.3	73.3		80	100	100	100	100	100
		CoNS	3	66.7		0	66.7	66.7	0	33.3	100	66.7		100	100	100	100	100	100
		Enterococcus faecium	2		50	50	50		50			50		50	100	100		100	100
		Staphylococcus epidermidis	6	50		0	33.3	33.3	0	33.3	50	100		66.7	100	100	100	100	83.3
	URINE	Staphylococcus aureus	2	100	100	50	50	50	100	100	100	100		100	100	100	100	100	100
		CoNS	4	100	100	0	100	100	100	50	50	100		100	100	100	100	100	100
		Staphylococcus epidermidis	1	0	100	0	0	100	0	0	0	0		100	100	100	100	100	0

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## ORTHOPAEDICS



SPECIMEN TYPE	TOTAL ISOLATES
BLOOD	10
PUS	81
URINE	19



# Orthopaedics Antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	MORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	SXT (COTRIMOXAZOLE)	AMPICILLIN	AMOXICILLIN/CLAVULANATE	CEREPIME	CFM(CEFRIMIC)	CEFOTAXIN	CEFTIAXONE	CEFTAZIDIME	CEFUROXIME	CEFOPERAZONE/SALBACTUM	PIP/TAZ	AMIKACIN	GENTAMYCIN	DORIPENEM	ERTAPEM	IMPENEM	MEROPENEM	MINOCCLINE	TIGECYCLINE	FOSFOMYCIN	COLISTIN
ORTHO	BLOOD	Escherichia coli	2	0		0		100	0	100	100			0		0	100	100	100	100	100	100	100	100	100	100	100	100	
		Klebsiella pneumoniae	1	100		0		100	0	0	0			0		0	0	0	100	100	100	0	0	0	100	100	100		
		Acinetobacter baumannii	1			0		0						0		0		0			0			0	0	100	100	100	
		Escherichia coli	9	11		11		56	11	11	33			22		22	22	22	78	56	56	56	56	56	78	78	78		
		Klebsiella pneumoniae	22	15		0	15	32	0	14	46			14		14	50	50	59	41	50	46	55	0	36	0	73		
		Pseudomonas aeruginosa	11		100	91		0		91				90		100	100	100	91	100	100	100	100	100	100	9	90		
	URINE	Escherichia coli	11	0	33	0	0	73	50	0	46	25	0	67	18	33	13	75	64	91	64	82	75	13	100	100	100		
		Klebsiella pneumoniae	4		0	25	25	0	0					0	0	25	0	50	0	50	50	50	50	0	50	50	100		

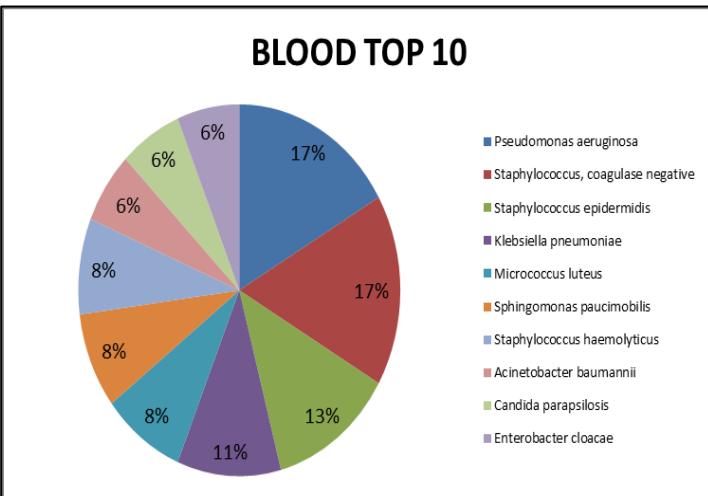
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SENSITIVITY GRAM POSITIVE ORGANISM 2020

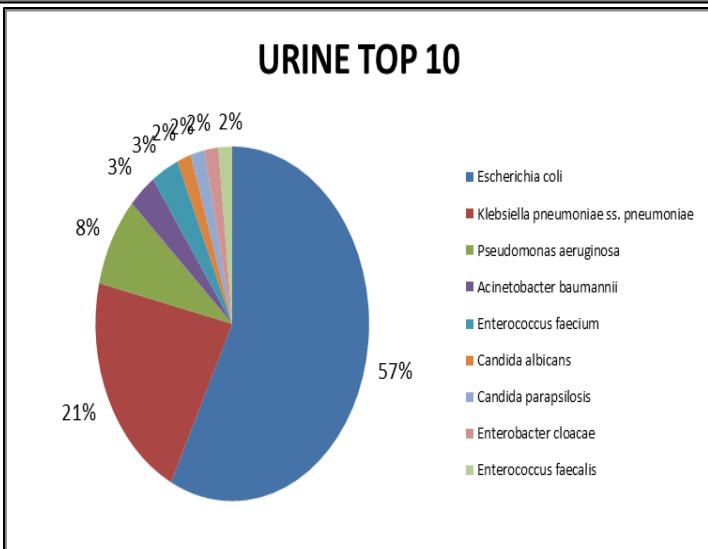
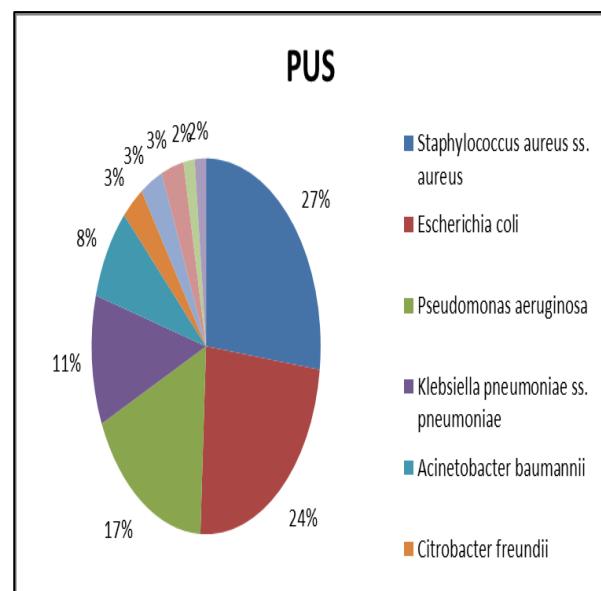
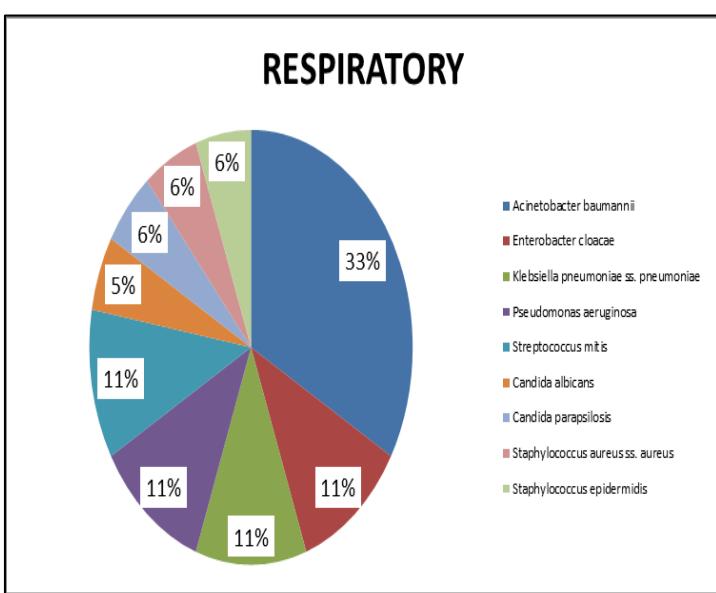
Location	Specimen type	organism	No. of patient	SXT (COTRIMOXAZOLE)	NITROFURANTOIN	PENICILLIN	OXACILLIN	CIPROFLOXACIN	LEVOFLOXACIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	TEICOPLANIN	VANCOMYCIN
ORTHO	BLOOD	Staphylococcus aureus	2	100		0	100	0	0	0	50	100		100		100	100	100	
		CoNS	2	100		100	100	100	100	100	100	100	100		100	100	100	100	
		Staphylococcus aureus	30	72		17	62	6.9	6.9	45	62	86		86		100	100	100	
		CoNS	3	67		0	67	67	67	33	100	100		100		100	100	100	
		Staphylococcus epidermidis	2	100		0	0	100	100	100	100	100		100		100	100	100	
	URINE	Enterococcus faecium	1		0	0		0	0	0			0	0		100	100	0	
		Staphylococcus aureus	1	100	100	100	100	0	0	0	0	100		100		100	100	100	

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## PEDIATRICS



SPECIMEN TYPE	TOTAL ISOLATES
BLOOD	48
RESPIRATORY	18
PUS	63
URINE	61



# Paediatrics Antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	SXT (COTRIMOXAZOLE)	AMPCILLIN	AMOKCILLIN/CLAVUNATE	CEFPIME	CEFTRIAZONE	CEFTAZIDIME	CEFUROXIME	CEFOPERAZONE/SALBACTUM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTAPEFENEM	DORIPENEM	IMPENEM	MEROPENEM	MINOCYCLINE	TIGECYCLINE	COLISTIN
PAEDS	BLOOD	Acinetobacter baumannii	3		100		67		100	100				100	100		100				100	100		100	100
		Escherichia coli	2	0	0		0	0	0	0				0	50	50	100	100	50		50	50		100	100
		Klebsiella pneumoniae	5	50	0		25	0	0	0				0	0	0	100	100	0		0	0		25	75
		Pseudomonas aeruginosa	8	83	88		100		75	100	83			88	83	75	75		80	88	88	100	25	100	
	CSF	Escherichia coli	1	0	0		0	0	100	100	0			0	100	100	100	100	100		100	100		100	100
		Acinetobacter baumannii	5		20		20			20	0			20	20		20				20	20		60	100
		Escherichia coli	15	13	27		50	20	40	80	20			20	73	64	93	80	80		87	80		100	100
		Klebsiella pneumoniae	7	71	29		57	0	29	29	29			29	29	29	57	100	29	29	29	71	100		
	RESP	Pseudomonas aeruginosa	11	63	73				73		63			73	64	64	55		63	73	73		0	100	
		Acinetobacter baumannii	6		17		50			17	0			17	17	17	17		17	17			67	100	
		Klebsiella pneumoniae	2	0	0	100	0	0	0	0				0	0	0	50	100	0		0	0		0	100
		Pseudomonas aeruginosa	2		100	50				50		100		50	50	100	50		100	50	50		0	100	

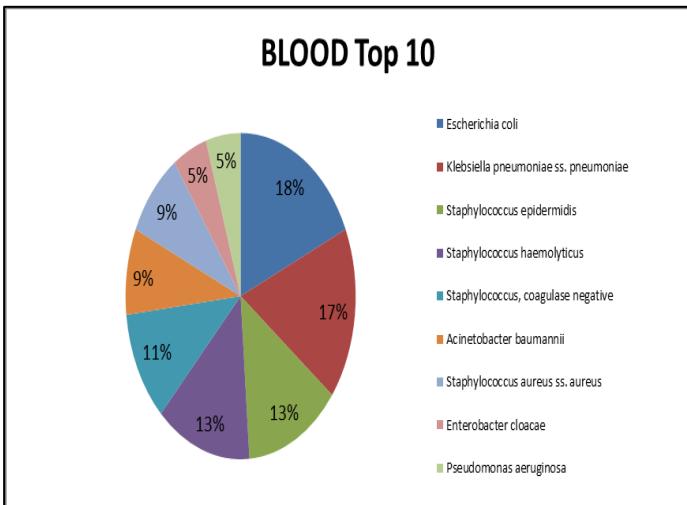
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 Antimicrobial not indicated/not tested

SENSITIVITY GRAM POSITIVE ORGANISM 2020

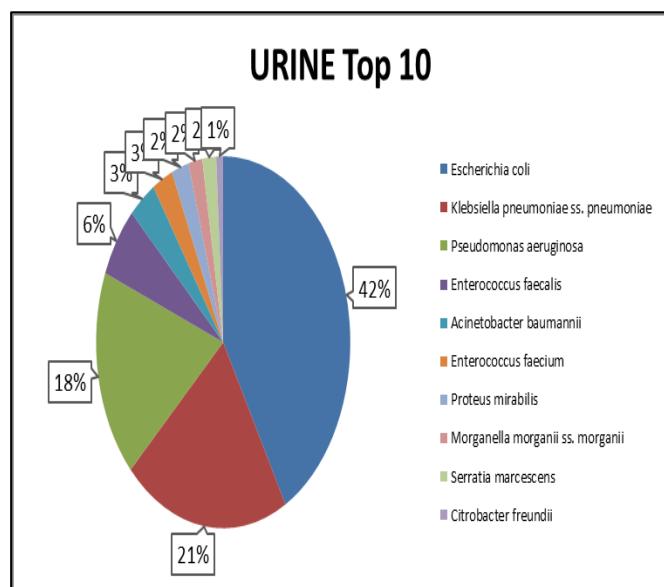
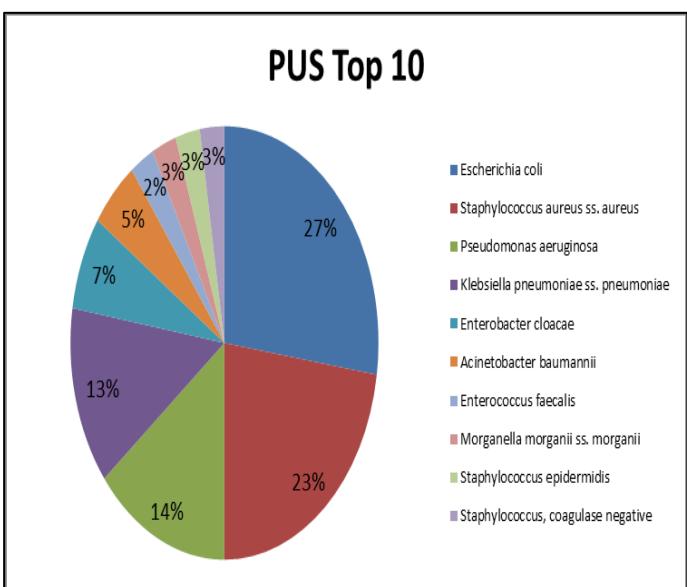
Location	Specimen type	organism	No. of patient	COTRIMOXAZOLE	NITROFURANTOIN	PENICILLIN	OKACILLIN	CIPROFLOXACIN	LEVOFLOXACIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	TEICOPLANIN	VANCOMYCIN
PAEDS	BLOOD	Staphylococcus epiderm	6	66.7	100	16.7	16.7	50	50	50	33.3	66.7		66.7		100	100	66.7	66.7
		Staphylococcus aureus	3	66.7	100	0	33.3	0	0	100	100	100		100		100	100	100	100
		CoNS	8	75	75	12.5	14.3	75	75	12.5	83.3	87.5		75		100	100	100	100
	CSF	Staphylococcus aureus	1	0	100	0	100	0	0	0	100	100		100		100	100	100	100
		Enterococcus faecium	1		0	0		0	0	0			100	0		100	100		100
	PUS	Enterococcus faecium	1		0	0		0	0	0			100	0		100	100		100
		Staphylococcus aureus	17	35.3	100	11.8	47.1	5.9	5.9	47.1	76.5	94.1		94.1		100	100	100	100
		Staphylococcus epiderm	1	0	100	0	0	0	0	0	0	0		100		100	100	100	100
	RESP	Staphylococcus aureus	1	100	100	0	0	0	0	0	0	0		100		100	100	100	100
		Staphylococcus epiderm	1	0	100	0	0	100	100	0	0	0		100		100	100	100	100

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## Surgery (IPD)



SPECIMEN TYPE	TOTAL ISOLATES
BLOOD	82
PUS	82
URINE	227



## Surgery Antibiogram (IPD)

### SENSITIVITY GRAM NEGATIVE ORGANISM 2020

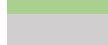
Location	Specimen type	organism	No. of patient	NALIDIXIC ACID	NORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	SXT (COTRIMOXAZOLE)	AMPICILLIN	AMOXICILLIN/CLAVUNATE	CEFPIMF	CEFOXITIN	CEFTRIAXONE	CEFUROXIME	CEFTAZIDIME	CEFIXIME	CEFOPERAZONE/SULBACTAM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTAPENEM	DORIPENEM	IMIPENEM	MEROPENEM	MINOCYCLINE	TIGECYCLINE	FOSFOMYGIN	COLISTIN	
SURG	BLOOD	Acinetobacter baumannii	8				63	63			38		13					63	17	0	14				63	38	88	100		
		Enterobacter cloacae	5	60			60	40	0	40	40	0	40					60	60	60	60	60	60	60	60	40	80			
		Escherichia coli	15	6.7			13	53	6.7	33	67		20	13			73	77	100	53	87	87	87	100	100	100	100			
		Klebsiella pneumoniae	14	64			43	43	0	43	57		36	36			64	64	64	64	64	64	64	64	43	100				
		Pseudomonas aeruginosa	4		100	100				100			100			100	100	100	100	100	100	100	100	100	0	100	100			
	CSF	Acinetobacter baumannii	2				0	0			0		0					0	0		0				0	0	100	0		
		Acinetobacter baumannii	23				14	14			14		0					14	14		14				14	14	86	100		
		Enterobacter cloacae	32	87			84	87	0	87		87	0				87	84	94	90	87	81	87	68	97					
		Escherichia coli	125	11			50	19	42	9.8	44	61	28	25	0		66	57	94	72	77	0	80	83	50	100	99			
		Klebsiella pneumoniae	58	72			54	68	0	47	72		56	53			74	71	81	75	72	74	75	77	97					
	PUS	Pseudomonas aeruginosa	62				57	61	100			68	100			71		69	65	65	61		70	66	66	1.6	97			
		Acinetobacter baumannii	5				50	20	20			20		0		50		20	0	0	20				50	20	20	50	60	100
		Escherichia coli	1	0			0		100	0	0	0		0			100	0	100	100	100	100	100	100	100	100	100			
		Klebsiella pneumoniae	11	73			73	64	0	55	73		55	36			64	64	73	73	64	64	64	64	64	64	100			
	RESP	Pseudomonas aeruginosa	6				100	100					60				75	60	75	100	100			100	100	100	0	100		
		Acinetobacter baumannii	8				33	100		57		33		14				57	20	100	43				43	100	50	100	86	
		Escherichia coli	95	16	28	9.8	26	70	41	23	32	45	61	29	17	44	33	53	60	88	65	76	66	71	37	97	94	100		
		Enterobacter cloacae	2	0	0	100	0	0	100		0	100	0	0	100	0	0	100	50	50	50	50	50	0	0	0	50	100		
	URINE	Klebsiella pneumoniae	50	35	54	6.2	24	16	41	0	16	22	54	18	2.8	39	39	33	39	50	39	41	31	75	13	42	54	100		
		Pseudomonas aeruginosa	42		0	22	10					22				17		16	14	20	22		17	22	17	0	0	86		

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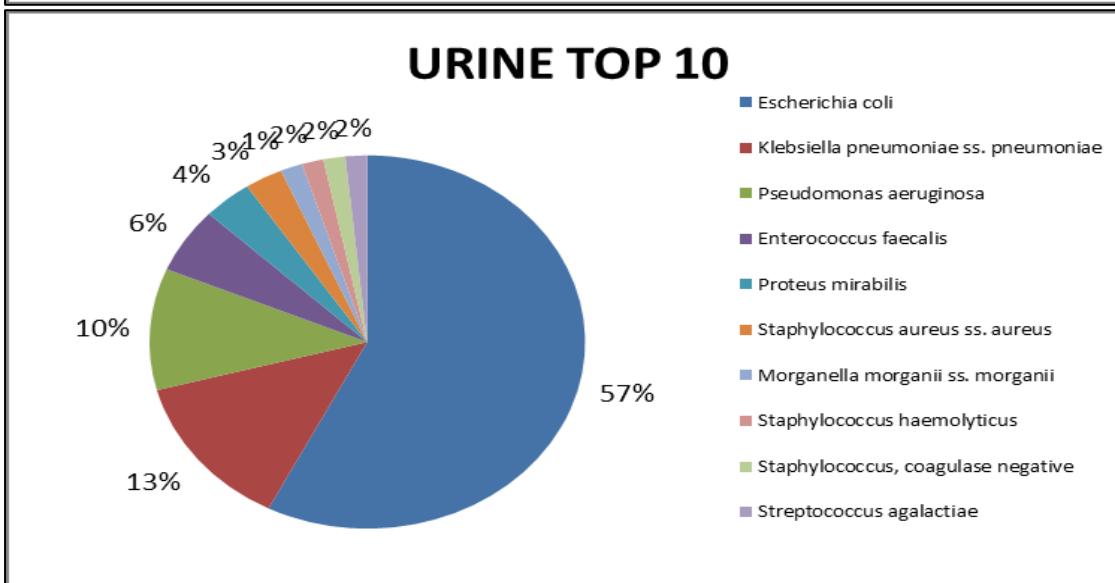
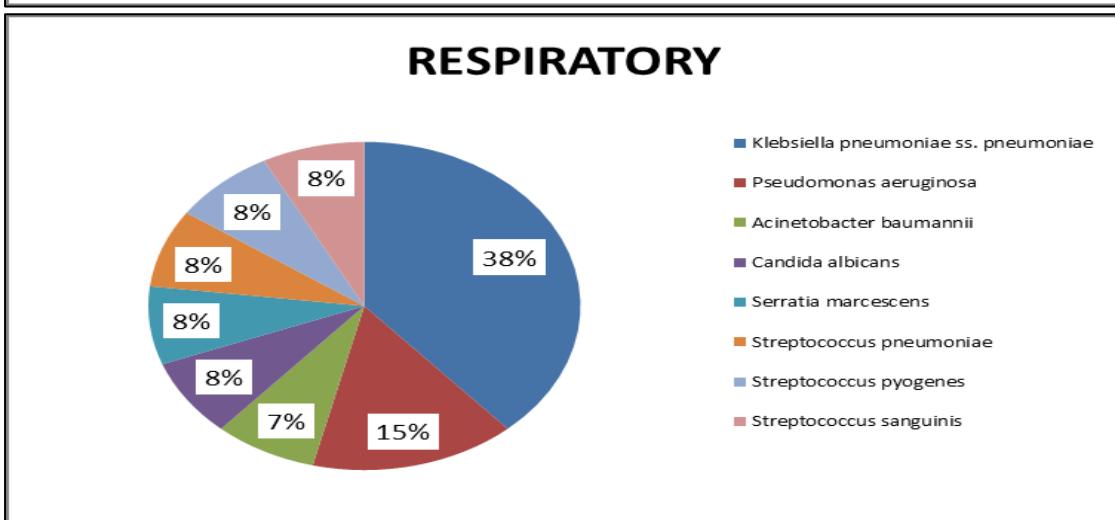
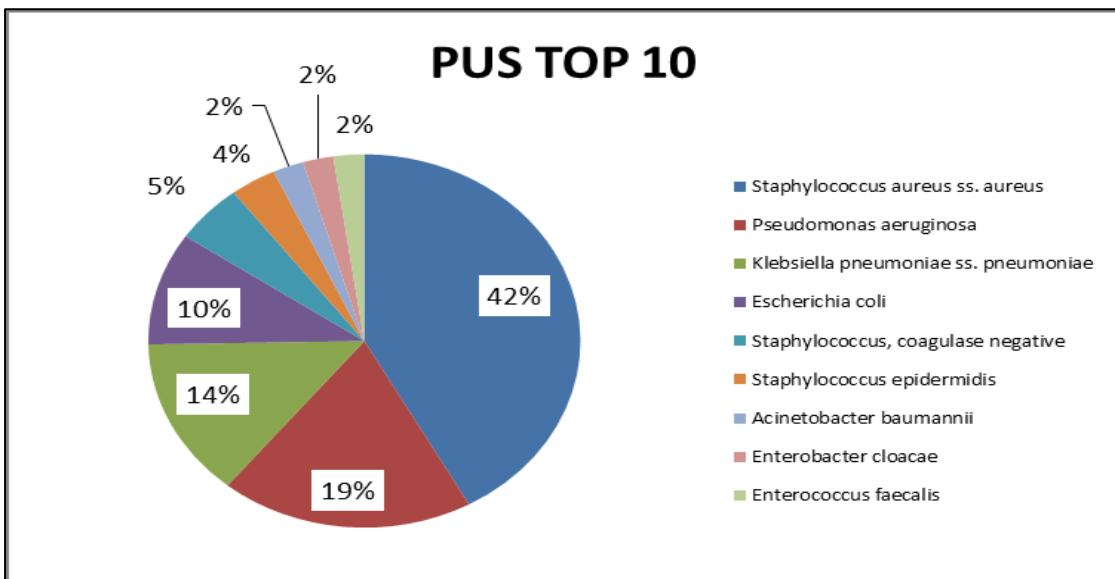
## Surgery Antibiogram

SENSITIVITY GRAM POSITIVE ORGANISM 2020

Location	Specimen type	organism	No. of patient	SXT (COTRIM OXAZOLE)	NITROFURANTOIN	PENICILLIN	CIPROFLOXACIN	LEVOFLOXACIN	OXACILLIN	ERYTHROMYCIN	CLINDAMYCIN	GENTAMYCIN	GENTAMYCIN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	DAPTOMYCIN	LINEZOLID	VANCOMYCIN	TEICOPLANIN
SURG	BLOOD	Enterococcus faecium	2	50	0	0	0	0	0	0	0	0	0	50	100	100	100	100	
		Staphylococcus aureus	7	50	100	17	0	0	33	50	50	33	83	100	100	100	100	100	
		CoNS	10	89	100	22	44	56	38	33	56	89	100	100	100	100	100	78	
		Staphylococcus epidermidis	11	20	100	0	20	20	0	10	50	70	80	100	100	100	100	90	
	CSF	Enterococcus faecium	1	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0
		CoNS	1	100	100	0	100	100	0	0	0	100	100	100	100	100	100	100	
		Staphylococcus epidermidis	2	0	100	0	100	100	0	0	0	0	100	100	100	100	100	0	
	PUS	Enterococcus faecium	3	0	33	33	33	0	0	0	33	33	100	100	100	100	100	100	
		Staphylococcus aureus	97	67	99	7.2	11	16	36	44	56	75	89	100	100	100	96	97	
		CoNS	11	80	100	10	70	80	40	50	50	100	70	100	100	100	100	100	
		Staphylococcus epidermidis	11	73	100	0	36	46	0	9.1	64	82	82	100	100	100	100	100	
	RESP	CoNS	2	50	100	0	50	50	0	50	50	100	100	100	100	100	100	100	
URINE	Enterococcus faecium	6	0	0	0	0	0	0	0	0	0	0	0	100	100	100	67	67	
		Staphylococcus aureus	2	100	100	50	0	0	100	0	0	100	50	100	100	100	100	100	
	CoNS	2	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

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# OPD



# OPD Antibiogram

SENSITIVITY GRAM NEGATIVE ORGANISM 2020 (OPD)

Location	Specimen type	organism	No. of patient	NALADIXIC ACID	NORFLOXACIN	LEVOFLOXACIN	CIPROFLOXACIN	NITROFURANTOIN	SXT (COTRIMOXAZOLE)	AMPCILLIN	AMOX/CLAV	CEFPIME	CEFTAZIDIME	CFM (CEFIXIME)	CEFOXINTIN	CRO (CEFRAXONE)	CXM (CEFDUXIME)	CEFOPERAZONE/SULBACTAM	PIPTAZ	AMIKACIN	GENTAMYCIN	ERTAPENEM	DORIPENEM	IMIPENEM	MEROPENEM	INNOCYCLINE	TIGECYCLINE	FOSFOMYCIN	COLISTIN	
OPD	PUS	Enterobacter cloacae	4	75				75	100	75		0	100			100	0	100	100	100	100	100	100	100	75	100	100	100		
		Klebsiella pneumoniae	24	61				44	26	70	0	30	74				44	39	61	52	74	52	61		52	74	65		91	
		Pseudomonas aeruginosa	33		63	63		0		79	80					100		81	78	84	78		73	75	78	3.1		81		
	RESP	Klebsiella pneumoniae	5	60				60	20	60	0	80	80				80	80	80	80	80	80	80	80	80	80	80	100	100	
		Pseudomonas aeruginosa	2		50	50					50	50						50	0	100	100	100		80	80	80	80	80	100	100
	URINE	Acinetobacter baumannii	2		100				50		100						0		100	100	100			50	100	100		100		100
		Enterobacter cloacae	3	67	67			67	0	100		0		67	67	0	67			67	67	67		67				100		
		Klebsiella pneumoniae	33	59	69	25	38	24	67	0	49	75	55	45	55	55	25	100	64	88	82		73	75	0	50	79	100		
		Pseudomonas aeruginosa	26		33	16	24	100			35	35			100		30	35	48	42			29	20	20	0	0	90		

Note: These isolates are from returning patients

	Restricted, do not use empirically, unless justified
	Will not work for empiric use
	Will work for empiric use
	Will work for empiric use, but do not use restricted antimicrobials
	Antimicrobial not indicated/not tested

# OPD

SENSITIVITY GRAM POSITIVE ORGANISM 2020 (OPD)

Location	Specimen type	organism	No. of patient	SXT (COTRIMOXAZOLE)	NITROFURANTOIN	PENICILLIN	CTX (CEFTAXIME)	CEFTIAXONE	CIPROFLOXACIN	LEVOFLOXACIN	OXACILLIN	ERYTHROMYCN	CLINDAMYCN	GENTAMYCN	GENTAMYCN HIGH LEVEL	TETRACYCLINE	TIGECYCLINE	LINEZOLID	DAPTOMYCIN	VANCOMYCIN	TEICOPLANIN
OPD	PUS	Staphylococcus aureus	73	55	99	6.8			9.6	9.6	44	40	67	90		93	100	99	100	97	99
		Enterococcus faecium	1		100	100			100	100		0			100	100		100	100	100	100
		CoNS	9	56	89	22			33	33	22	33	44	78		67	100	100	100	89	89
		Staphylococcus epiderm	6	83	100	33			50	50	33	67	67	83		100	100	100	100	100	100
	RESP	Streptococcus pneumon	1	0		100	100	100		100		0	100			0		100		100	
		Enterococcus faecium	1		0	0			0	0		0				0	0	100	100	100	100
		Staphylococcus aureus	7	83	83	33			50	50	20	50	80	83		50	100	100	100	100	100
		CONS	4	75	100	0			100	100	100	25	25	100		100	100	100	100	100	100
	URINE	Staphylococcus epiderm	2	50	100	0			0	0	0	0	0	50		50	100	100	50	50	50

	Restricted, do not use empirically, unless justified
	Will not work for empiric use
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	Will work for empiric use, but do not use restricted antimicrobials
	Antimicrobial not indicated/not tested

## 6. Antibiotic therapy in hospitalized patients

Antibiotic therapy is used in hospitalized patients in three situations

1. **Empirical therapy** before the causative organism has been identified
2. **Definitive therapy** once the causative organism is identified
3. **Prophylactic therapy** to prevent infection, eg. surgical prophylaxis

### Empirical therapy

Patient requiring empirical antibiotic therapy should be classified into three types (Table 1) depending on the past history, prior exposure to health care, previous antibiotics and associated comorbidities. Antibiotic should then be chosen according to the site of infection and suspected micro-organism based on local hospital microbiologic data (antibiogram). Appropriate cultures must be sent prior to antibiotic therapy. Identification of the micro-organism will then dictate definitive therapy and also contribute to the hospital antibiogram for choosing empiric therapy.

**TABLE 1- Patient Types for selecting empiric antibiotic therapy**

Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
No contact with health care system	Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure within last 90 days. Current hospitalization less than 7 days	Current hospitalization > 7 days. Invasive procedures within last 90 days
No prior antibiotic treatment	Recent antibiotic therapy (within last 90 days)	Recent & multiple antibiotic therapies within last 90 days
No procedures done	Minimum procedures done	Major invasive procedures done
Patient young with only a few co-morbid conditions.	Patient old with Multiple co-morbidities.	Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other Severe Immunodeficiency.

## 7. Empiric Antibiotic choice

Recommended antibiotics for common conditions are listed below. This guide is broad outline; not all-inclusive and; not meant to replace treating physician's judgment.

Table 1: Acute gastroenteritis

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
<b>Acute gastroenteritis</b>	<p>Most cases are self-limited and require only supportive treatment and hydration. Selected very sick patients can be treated as per following guidelines.</p> <ul style="list-style-type: none"><li>• Co-trimoxazole 1DS tab for 3 days OR</li><li>• Cap. Doxycycline 100 mg BD-3-5 days OR</li><li>• Tab Nitazoxanide 500mg BD 3days</li></ul> <p>If stool examination shows invasive diarrhoea (&gt; 5 leucocytes /HPF or blood in the stool).</p> <p>Then consider stool culture followed by therapy as per AST</p>		

**Table 2: Pneumonia**

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
<b>Pneumonia</b>	<p><b>1] For non-ICU patients with community acquired pneumonia (CAP)</b></p> <p>Ceftriaxone (2g IV q24h X 5-7 days)/ Amoxycillin/Clavulanic acid (1.2g q8h IV) + Macrolide (Azithromycin- 500mg IV/PO once a day), x 5-7 days).</p> <p><b>2] ICU patients with CAP</b></p> <p>Ceftriaxone (2g IV q24hr X 5-7 days)/ Amoxycillin/Clavulanic acid (1.2g q8hr IV) + MacrolideAzithromycin- 500mg IV/PO q24h)/ Doxycycline 100mg PO q12h x 5-7 days). If aspiration is suspected clindamycin 600mg q8h</p> <p><b>Early onset HAP/VAP (less than 48 hours)</b></p>	<p><b>Late Onset HAP/VAP (For more than 48 hours of hospitalization but less than 7 days)</b></p> <p>If septic shock or multisystem organ failure, Imipenem 0.5-1gm q6h or Meropenem 1-2 gm q8h</p>	<p><b>Late onset HAP/VAP suspected MDR Gram negative –</b></p> <p>Imipenem (0.5-1 gm q6h /Meropenem (1-2 g IV q8h)</p> <p><b>Suspected XDR Gram negative</b></p> <p>Colistin <b>4.5 MU/BD</b></p> <p><b>Suspected MRSA-</b></p> <p>Vancomycin (1g IV q12h OR Teicoplanin (400mg IV q12h for 3 doses, then q24h)</p> <p><b>For suspected VRE-</b></p> <p>Linezolid (600mg IV/PO q12hr)**x 7-14 days</p> <p><b>For suspected Fungal (Filamentous fungi/mould) infections-</b></p> <p>Consider Antifungals in Immunocompromised host. Add Liposomal Amphotericin B. Substitute Voriconazole, if Aspergillus suspected on radiological evidence or galactomannan positive</p> <p><b>If PCP suspected-</b></p> <p>add TMP-SMX or Clindamycin</p>

	<b>admission)</b>  Antibiotic choice as above unless Pseudomonas or Gram negative bacilli are suspected. Then use Cefoperazone-Sulbactam* (1.5g-3gm q6h) or piperacillin-tazobactam (PIP-Taz) 4.5gm q6h		
<b>H1N1 Flu-like illness</b>	Look for typical viral symptoms such as sneezing and running nose.  If fever, sore throat, dry cough and viral symptoms present, initiate Oseltamivir 75 mg BD x 5 d without waiting for confirmation by PCR		
<p>1. Fluoroquinolones should not be used for empiric treatment.</p> <p>2. Fluoroquinolones should not be used routinely for treating Acute exacerbation of COPD</p> <p>3. In the uncommon scenario of hypersensitivity to <math>\beta</math>-lactams, respiratory Fluoroquinolones (e.g. levofloxacin 750 mg daily) may be used if tuberculosis is not a diagnostic consideration at admission. Patients should also undergo sputum testing for acid-fast bacilli simultaneously if fluoroquinolones are being used in place of <math>\beta</math>-lactams.</p> <p>4. **Patients with suspected MRSA infection, we recommend the use of empiric Vancomycin or Teicoplanin. The use of linezolid in India should be reserved because of its potential use in extensively drug-resistant tuberculosis.</p> <p>5. Suspected viral pneumonia [influenza] Oseltamivir and/or Zanamavir should be given.</p> <p>6. In late HAP/VAP with suspected Acinetobacter infection combination of Colistin + carbepenem / sulbactam.</p> <p>7. Duration of treatment for community acquired pneumonia should be minimum 5-7 days and patient should be afebrile 48-72 hours prior to stopping treatment.</p>			

8. For ESBL / MRSA health care associated pneumonia minimum duration of treatment should be 10-14 days.
9. For proven pseudomonal / Acinetobacter health care associated pneumonia treatment should be for minimum 2 weeks and preferably combination of antibiotic therapy should be used.
10. Colonization should be suspected if respiratory secretions culture show growth but following features are absent like Fever, leukocytosis, increased bronchorrhea, increasing oxygen requirement, new lung infiltrates.
11. In presence of Fever, leukocytosis, increased bronchorrhea, increasing oxygen requirement but absence of lung infiltrates with positive cultures [MDR GNB / MRSA] to be treated as health care associated tracheobronchitis with appropriate broad spectrum antibiotics.
- 12.** Aerosolised Tobramycin/ Colistin can be added to IV antibiotics as an adjunctive therapy for MDR gram negative infection with specialized nebulisers.

**Table 3: Meningitis**

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
Meningitis	<p><b>1] Age 2yrs-50yrs</b>            Vancomycin 1gm q12h + Ceftriaxone 2gm q12h</p> <p><b>2] Age &gt; 50yrs</b>            Above Antibiotics + Ampicillin 2gm q4h</p>	Vancomycin 1gm q12h + cefepime 2gm q12h /Ceftazidime 2gm q8h	<b>Empirical Therapy</b> Vancomycin 1gm q12h + Colistin 4.5 MU BD +/- Meropenem 2gm q8h. Consider Intrathecal Gentamicin/ Colistin 4.5 MU BD

Note : Intrathecal/ Intraventricular route dosage-

Vancomycin 10-20mgq24h; Gentamicin 4-8 mgq24h; Amikacin 30-50mg q24h; Colistin 5-20mg q24h[ 1mg = 12,500 units] IV Dexamethasone should be given in suspected pneumococcal meningitis before antibiotic therapy and should be continued only if GM stain / Culture confirms pneumococcal etiology

**Table 4: Urinary tract infection**

Name of condition	Patient Type 1 (Community acquired)	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
UTI	<p><b>Asymptomatic bacteriuria</b> No empirical therapy. Send C/S.</p> <p><b>Non complicated UTI</b> (Cystitis, Urethritis, No evidence of obstructive uropathy) PO TMP SMX 160/800 q12h / PO Nitrofurantoin 100 mg q12h</p> <p><b>Acute Uncomplicated Pyelonephritis</b> Fluroquinolones Ofloxacin 400 mg q12h OR Gentamicin 3 – 5 mg q24h 5-7 days If hospitalized Ceftriaxone 1gm q12h</p>	<p><b>Complicated UTI</b> (Obstruction, reflux, azotemia, CAUTI) IV Meropenem 1gm q8h/ IV Imipenem-cilastatin 0.5 gm q6h</p> <p><b>Complicated Pyelonephritis</b> (Obstruction, reflux, azotemia, CAUTI, Shock, perinephric abscess) Meropenem 1gm q8h/Imipenem-cilastatin 0.5 gm q6h</p>	<p><b>Complicated UTI and Pyelonephritis</b> (Suspected MDRO's/ Post renal transplant/ Recurrent UTI's) IV Meropenem 1gm q8h/IV Imipenem-cilastatin 500mg q6h +/- IV Colistin 4.5 MUBD</p> <p><b>If MRSA or enterococcus,</b> Consider Vancomycin 1 gm q12h/ Teicoplanin 400 mg q24h</p> <p>Urgent USG or CT to look for obstruction. Surgical management is mandatory to relieve obstruction</p>

Lower Urinary tract infection(UTI) in antenatal patients up to 20 weeks gestation	<b>OPD-</b> Cap.Amoxyccillin 500 mg q8h PO  <b>In-patient</b> IV Ceftriaxone 1gm q12h		Meropenem 1gm q8h Or Colistin 4.5MUBD
Lower Urinary tract infection(UTI) in antenatal patients after 20 weeks gestation	<b>OPD</b> Tab. Nitrofurantoin SR 100 mg BD oral  Inpatient: Ceftriaxone 1gm q12h	IV PIP-TZ 4.5 gm q6h	Meropenem 1gm q8h

**Table 5- Skin & soft tissue infections**

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
<b>Erysipelas / uncomplicated cellulitis</b>	IVCeftriaxone 2 gm q24h  <b>If beta lactam allergy</b> IVClindamycin 600 – 900 mg q8h		
<b>Necrotizing infection of skin/fascia and muscle</b>	IV Ceftriaxone 2gm q12h + IV Clindamycin 600- 900mg q8h / IV Metronidazole 500mg q6h <b>If Suspected MRSA</b> IV Vancomycin1 gm q12h/ IV Teicoplanin 400 mg q24h		
<b>Fournier gangrene</b>	<b>Mixed aerobic and anaerobic cover including S.aureus, pseudomonas suspected</b> IV PIP-TZ 4.5gm q6h + MRSA cover IV Vancomycin1 gm q12h		
<b>Diabetic foot</b>	IV Co-amoxiclav 1.2 gm q8h  <b>if beta lactam allergy-</b> IV Clindamycin 600 q8h	<b>IV PIP-TZ4.5 gmq6h</b>  <b>If Suspected MRSA infection</b> IV Vancomycin1 gm q12h	IV Meropenem 1gm q8h IV Imipenem + Cilastatin 1gm q6h IV/IV. If MRSA infectionVancomycin1 gm IV q12h

**Table 6- Bone and joint infections**

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2 (Healthcare associated)	Patient Type 3 (Nosocomial Infections)
<b>Acute Osteomyelitis / Septic Arthritis</b>	Ceftriaxone IV q12h OR Co-amoxiclav 1.2 gm q8h with/without Gentamicin 3 – 5 mg q24h  If MRSA suspected- Vancomycin 1gm IVq12h	-	-
Early implant associated infection (< 3 months)	-	Usual Suspected organism- Staph aureus/ MRSA  IV Vancomycin 1 gm q12h/ Teicoplanin(400mg IV q12h for 3 doses, then q24h) + If Suspected MDR Gram negative organism IV Meropenem 1gm q8h IV Imipenem + Cilastatin 1gm q6h IV/IV Colistin	-
Late implant associated infection (after 3 months)	-	-	Usually low grade infection If Coagulase negative staphylococcus suspected -  IV Vancomycin 1 gm q12h / Teicoplanin (400mg IV q12h for 3 doses, then q24h) If Anaerobe (Propriionibacterium Acne) suspected IV Clindamycin 600-900 mg q8h.

**Table 7 Intra-abdominal infections -**

Name of condition	Patient Type 1	Patient Type 2	Patient Type 3
Intra Abdominal	(Community acquired )	(Healthcare associated)	(Nosocomial Infections)
<b>A) Extra – biliary</b>	IV Ceftriaxone1-2 gm q12h+IV Metronidazole500mg q8h or IV PIP-TZ 4.5gm q6h	IV Meropenem 1gm q8h/ IV Imipenem-cilastatin 500mg q6h	IV Meropenem 1gm q8h IV Imipenem - cilastatin500mg q6h In case of suspected Acinetobacter or XDR Gram negative organisms Colistin.5 MU BD <b>If MRSA or Enterococcus suspected</b> IV Vancomycin 1 gm q12h / Teicoplanin(400mg IV q12h for 3 doses, then q24h) <b>If VRE suspected</b> Linezolid 600 mg IV q12h <b>suspected</b> , Add Fluconazole 400 mg IV q24h <b>If non albicansCandida- IV Caspofungin 70 mg stat and 50 mg q24h or Amphi B</b>
<b>B)Intra Abdominal Biliary</b>	IV Ceftriaxone1-2 gm q12h + IV Metronidazole500mg q8h or IV PIP-TZ 4.5gm q6h	IV Meropenem 1gm q8h / IV Imipenem- cilastatin 500mg q6h	Eg- Acute cholangitis following bilioentericanastomosis IV Meropenem 1gm q8h/ IV Imipenem - cilastatin500mg q6h .If MRSA or Enterococcus suspected IV Vancomycin 1 gm q12h / Teicoplanin(400mg IV q12h for 3 doses, then q24h). If VRE suspected Linezolid 600 mg IV q12h If Fungal Infection suspected, Add Fluconazole 400 mg IV q24h If non Albicanscandida IV Caspofungin 70 mg stat and 50 mg q24h Or Amphi B

Metronidazole dosing based on pharmacokinetic studies is 1.5 gm q24h PIP-TZ covers all anaerobic infections except *Bacteroidesfragilis*. For lower GI surgeries add Metronidazole

**Table 8: Infective Endocarditis**

Native Valve	IV Ceftriaxone	Alternative 1. Penicillin G2-3mu IV q4h or 2. Vancomycin500 mg q12h for 4weeks 3. Ceftriaxone 2 gmq24h for 2 weeks plus Gentamicin 3mg per kg divided into equal doses q8h for 2 weeks
Prosthetic Valve	Cloxacillin 2gm IV q4h for 4-6 weeks or IV Vancomycin500 mg q12h for 4-6 weeks	IV Cefazolin 2g q8h

**Note:-**

If Penicillin resistant Streptococi - Ceftriaxone 2 gram per day IV q24h for 6 weeks plus Gentamicin 3mg per kg divided into equal doses q8h for 6 weeks

Enterococci – Ampicillin 2gm IV q4h + Gentamicin3mg per kg divided into equal doses q8hboth 4-6 weeks or Vancomycin 500 mg q12h + Gentamycin for 4weeks.

Staphylococci –Nafcillin or Oxacillin 2gm IV 4 hourly for 4-6 weeks or Vancomycin 15 mg /kg IV 12 hourly for 4-6 weeks

If Methicillin Resistant Staphylococcus aureus -Vancomycin 15mg/kg Iv 12hourly for 6-8 weeks + Gentamycin

3mg per kg divided into equal doses q8hfor 2 weeks + Rifampin 300mg 8 hourly oral 6-8 weeks

**Table 9: Malaria, Leptospirosis, Scrub Typhus, Enteric fever  
( IN LABORATORY CONFIRMED CASES)**

Plasmodium Vivax Malaria	Chloroquine Sensitive	Chloroquine resistant – any of the ACT therapy excluding SP 1. Artesunate +Amodiaquine 2. Artesunate +Mefloquine 3. Dihydroartemisin plus piperaquine
	Chloroquine (10mg base/kg stat followed by 5 mg/kg at 12,24,36 hours) plus Primaquine (7.5 mg (base) q12h PO x14days) (Primaquine should not be given in severe G6PD deficiency)	
Plasmodium Falciparum Malaria 5 days	<b>OPD</b> Artesunate(2.4 mg/kg at 12 & 24 hours) plus Sulfadoxine (25 mg/ kg) &Pyrimethamine (1.25 mg/kg) as a single dose or Artesunate (same dose as above) plus Amodiaquine (10mg) base per kg OD for 3 days (Fixed dose combinations are available) orArtemether plus Lumefantrine (1.5/9mg/kg BD for 3 days) Drug combination of A+L(mg)available 40+240:60+360:80+480 or Artesunate +Mefloquine (25mg base/kg –total) (8mg/kg once a day for 3 days) <b>Hospitalized patient</b> Artesunate IV 2.4 mg/kg at 12 & 24 hours and 2.4 mg/kg q24h X 5 days + Doxycycline 100mg q12h x 7 days	Drug resistant Falciparum Malaria Artesunate 2.4 mg/kg for 7 days or Quinine (10mg/kg TDS for 7 days plus one of the following three 1. Tetracycline 4mg/kg Odx7 days 2. Doxycycline 3mg/kg OD x 7days 3. Clindamycin 10mg/kg BD x 7days
Leptospirosis (Mild)	Doxycycline 100mg q12h x 7 days	Alternative Amoxicillin (500 mg)PO TDS x 7 days Ampicillin (500mg)PO TDS x 7 days
Leptospirosis (Moderate or Severe )	Ceftriaxone (1gm 12 hourly x7 days or Cefotaxime (1gm 6 hourly IV x 7 days	Alternative Penicillin (1.5 million units /IV /IM 6 hourly x7 days
Scrub Typhus	Doxycycline (100mg) BD x 7 to 15 days or Azithromycin (500mg) OD x 3days	Alternative Chloramphenicol (500mg)QID x7-15 days
Enteric Fever (OPD)	T. Cefixime 400 mg TDS for 14 days	Alternative T. Azithromycin (1gm)OD for 5 days
Enteric Fever( IPD)	Ceftriaxone (4gm/day )IV for 7-14 days	

Table 10 Pediatric Infections

Name of condition	Patient Type 1 (Community acquired )	Patient Type 2	Patient Type 3
<b>Pneumonia</b>  <b>AGE: 3 weeks to 3 months</b>	Community acquired Pneumonia  Ceftriaxone 100mg/kg/d od or Cefotaxime 150mg/kg/d tds x 10-14 days and *Azithromycin 10mg/kg/day x	Either Type II or Early HAP/VAP  Piperacillin-tazobactam 300 mg/kg/d qid	Either Type III or late HAP/VAP,  IV Meropenem (60-120 mg /kg/day divided 8 hrly) plus Vancomycin (40-60 mg/ kg/ day divided 6-8 hrly)  IV Meropenem (60-120 mg /kg/day divided 8 hrly) plus Vancomycin (40-60 mg/ kg/ day divided 6-8 hrly. Add Fluconazole 6-12 mg/kg/day or amphotericin B (if renal dysfunction)
<b>AGE: 4 months to 5 years</b>	Lobar pneumonia/effusion  Ceftriaxone 100mg/kg/d od with Cloxacillin 100-200mg/kg/d   Bronchopneumonia without effusion Ampicillin 200mg/kg/d qid days*consider adding macrolide(azithromycin, ) to cover Pertussis in partially unimmunized with DPT	Piperacillin-tazobactam 300 mg/kg/d qid plus Vancomycin (40-60 mg/ kg/ day divided 6-8 hrly)   Ceftriaxone 100mg/kg/d od Or Piperacillin-tazobactam 300 mg/kg/d qid	Same as above

Meningitis	Community acquired	Either type II/post neurosurgical meningitis	Either type II/III or post shunt infection
<b>Age &gt; 3 months</b>	Cefotaxime 200 mg/kg/d qid/or Ceftriaxone100mg/kg/d od/bd plus Vancomycin*60mg/kg/d qid*Discontinue Vancomycin if rapid latex agglutination negative for S. pneumoniae, or positive for N. meningitidis, or H. influenzae	IV Meropenem (120 mg /kg/day divided 8 hrly)/ plusVancomycin60mg/kg/d qid with or without rifampin 10 mg/kg (PO) q12h x 7-10 days after shunt removal Consider additional Intraventricular therapy Vancomycin 10mg or Genta 1-2 mg/or Polymixin B 2mg or Colistin 10mg[ 1mg = 12,500 units]	
<b>Urinary Tract Infection</b>			
<b>Cystitis</b>	Co-trimoxazole 8-10 mg/kg/d of trimethoprimbd OR Amoxy-clav 30-40 mg/kg/d bd OR Cefixime 8-10 mg/kg/d od		
<b>Pyelonephritis</b>	Uncomplicated Amoxy-clav 30-40 mg/kg/d bd OR Ceftriaxone100mg/kg/dod ORCefotaxime150mg/kg/ d tds	Piperacillin-tazobactam300 mg/kg/d tds/qid Or Meropenem120mg/kg/ d	Same as for type II
	Complicated: Ceftriaxone100mg/kg/d od OR Cefotaxime150mg/kg/d tds OR Piperacillin-tazobactam 300 mg/kg/d tds/qid +/- Amikacin 15-Piperacillin- tazobactam 300 mg/kg/d tds/qid+/- Amikacin 15-20mg/kg/d od X10-14 days		Same as for type II

<b>HEENT</b>	Cloxacillin 200mg/kg/d	Piperacillin-tazobactam 300 mg/kg/d tds/qid plus Vancomycin 60mg/kg/d qid	IV Meropenem (120 mg /kg/day divided 8 hrly)/ plusVancomycin 60mg/kg/d qid
<b>Infections Orbital cellulitis</b>	plus either Cefotaxime 150mg/kg/d tds or Ceftriaxone 100mg/kg/d od/bd x 10-14 days		
<b>Bone and Joint</b>	Cloxacillin 200mg/kg/d	Vancomycin	IV Meropenem (120 mg /kg/day divided 8 hrly)/ plusVancomycin 60mg/kg/d qid or Clindamycin 20-40 mg/kg/d tds/qid
<b>Infections</b>	plus either Cefotaxime 150mg/kg/d tds or	60mg/kg/d qid or	
<b>Acute Osteomyelitis/s epitic arthritis</b>	Ceftriaxone 100mg/kg/d od/bd x 10-14 days	Clindamycin 20-40 mg/kg/d tds/qid  Plus either  Cefotaxime 150mg/kg/d tds or Ceftriaxone 100mg/kg/d od/bd	mg/kg/d tds/qid
<b>Osteochondritis</b>	Piperacillin-tazobactam300 mg/kg/d tds/qid or combination therapy with cloxacillin 200mg/kg/d plus Ceftazidime 100mg/kg/d tds  7-10 days after surgery		
<b>Skin and soft tissue infections</b>	Cloxacillin 200mg/kg/d  or Cefazolin 60- 100mg/kg/d or Clindamycin 20-40 mg/kg/d tds/qid x 7-10 days	Vancomycin  60mg/kg/d qid	Piperacillin- tazobactam 300 mg/kg/d tds/qid or IV Meropenem (120 mg /kg/day divided 8 hrly plus Vancomycin 60mg/kg/d qid

<b>Animal bite wounds (dog / cat)</b>	Amoxicillin/clavulanate 50mg/kg/d tds i.v or p.o	Alternatives  Piperacillin 300mg/kg/d qid 7-10 days  <u>Penicillin allergy</u>  Clindamycin 20- 40mg/kg tds/qid plus TMP /SMX 80mg/kg/ bd X 7-10 days (dog bites); or cefuroxime 20-30mg/kg/d x 7-10 days (cat bites)	NA
<b>Vascular catheter associated Infections</b>		Piperacillin- tazobactam 300 mg/kg/d tds/qid + Vancomycin 60mg/kg/d qid	Meropenem 120mg/kg/d tds plus Vancomycin 60mg/kg/d qid
<b>Severe Sepsis/septic shock</b>	Cefotaxime 150 mg/kg/ day divided 6-8 hrly  OR Ceftriaxone 100 mg/kg/ day divided 12 hrly +/- amikacin 15-20 mg/kg/d od	IV Piperacillin – Tazobactam  300-400 mg/kg/day divided 8 hrly + IV Vancomycin 45-60 mg/kg/day divided 6-8 hrly	IV Meropenem 80-120 mg/ kg/8 hrly + IV Vancomycin 45-60 mg/kg/day divided 6-8 hrly

**Table 11: Empiric Therapy of Neonatal Intensive Care Unit Sepsis and Meningitis**

Diagnosis	Organisms isolated	Early onset	Late onset	Nosocomial	Community acquired	Duration
<b>Sepsis</b>	Klebsiella, Acinetobacter, E.coli, Enterococcus, Others :Serratia, Burkholderia,Pseudomonas, Proteus	Gentamycin (for haemodynamically stable) Piperacillin-Tazobactum (for haemodynamically unstable)	1 <sup>st</sup> line :Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line: Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line: Colistin	1 <sup>st</sup> line :Cefotaxime and Amikacin 2 <sup>nd</sup> line:Piperacillin-Tazobactum 3 <sup>rd</sup> line: Meropenem 4 <sup>th</sup> line: Colistin	10days
<b>Pneumonia</b>	E coli, Klebsiella, Acinetobacter, Enterococcus,Staphylococcus(CONS) Others :Serratia, Burkholderia,Pseudomonas, Proteus	Gentamycin (haemodynamically stable) Piperacillin-Tazobactum (haemodynamically unstable)	1 <sup>st</sup> line :Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line: Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	Ceftriaxone plus Azithromycin	7days
<b>NEC</b>			1 <sup>st</sup> line Piperacillin-Tazobactum and Amikacin 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	7-10days
<b>Meningitis</b>	For early onset: E coli, GBS, enteric bacilli, listeria, streptococcus, H	1 <sup>st</sup> line: Cefotaxime plus Gentamycin 2 <sup>nd</sup> line: Meropenem	Meropenem	Meropenem	Ceftriaxone /cefotaxime	Gram Positive: 14-days Gram negative: 21 days# #Ventriculitis/Br

	influenza, Neisseria meningitidis. For late onset: Klebsiella, Acinetobacter, E. coli, Enterococcus, Staphylococcus (CONS) Others : Serratia, Burkholderia, Pseudomonas, Proteus					ain abscess: 6-8 weeks
<b>UTI</b>	Enterococcus, E. coli, Enterobacter		1 <sup>st</sup> line: Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line: Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line: Colistin	Amikacin	10 days
<b>Skin and soft tissue infection</b>	Staphylococcus		1 <sup>st</sup> line: Cloxacillin 2 <sup>nd</sup> line: Vancomycin	Vancomycin	Cloxacillin	7 days
<b>Arthritis</b>	Staphylococcus, Klebsiella		1 <sup>st</sup> line Piperacillin-Tazobactum] 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	1 <sup>st</sup> line Piperacillin-Tazobactum 2 <sup>nd</sup> line: Meropenem 3 <sup>rd</sup> line Colistin	Ceftriaxone plus Vancomycin	Culture Negative : 2 weeks Culture positive: 3 weeks
<b>Osteomyelitis</b>	Staphylococcus, Gram Negative Bacilli		1 <sup>st</sup> line Piperacillin-Tazobact 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	1 <sup>st</sup> line Piperacillin-Tazobact 2 <sup>nd</sup> line Meropenem 3 <sup>rd</sup> line Colistin	Ceftriaxone plus Vancomycin	4 weeks

<b>Catheter related Infection</b>	Staphylococcus( CONS), S.aureus, Gram negative bacteria		1 <sup>st</sup> line: Vancomycin and Amikacin 2 <sup>nd</sup> line:Piperacillin-Tazobact 3 <sup>rd</sup> line: Meropenem 4 <sup>th</sup> line Colistin			10days
<b>Fungal infection</b>	Candida albicans and Candida Non albicans		Amphotericin B or Fluconazole(depending on Culture and sensitivity report)			Depending on location

**Table 12: Empiric therapy of Ophthalmic infections**

Sr. No	Category	Organisms	First Line	Alternative
1	Bacterial conjunctivitis	S aureus and albus H Aegyptius H Influenzae, C diiphtheriae	Topical Moxifloxacin 0.5% eyedrops 3- 6 times per day Tobramycin eye ointment at bed time Penicillin eye drops 10,000 units/ml	
2	Bacterial Keratitis	Pseudomonas, S .aureus  Pneumococcus N gonorrhea	Moxifloxacin eye drops 0.5% 1 hourly Fortified Tobramycin eye drops	Fortified Vancomycin eye drops Amikacin eye drops
3	Fungal Keratitis	Aspergillus, Fusarium, Candida albicans	Natamycineye drops 6 times a day  Itraconazole eye drops /ointment at bed time  Tablet Fluconazole 150mg twice a day & eye drops 4-6 times per day  Nystatin eye ointment	Amphotericin B eye  drops Voriconazole eye drops Intracameral Amphotericin B
4	Viral Keratitis	H Simplex  H Zoster	Acyclovir Tablet 800mg 5 times a day  and ointment 5 times a day Gancyclovir ointment	Tablet Valacyclovir 1000mg 3 times a day
5	Endophthalmitis	S aureus Sepidermidis Streptococcus Pseudomonas H Influenzae Candida /fusarium	Intravitreal Vancomycin 1 mg /0.1 ml and Amikacin 400microgrames /.ml  Intravitreal Amphotericin B	Intravitreal Vancomycin 1mg /0.1ml and Ceftriaxone 2.25mg/0.1ml
6	Orbital cellulitis	Staphylococci  Mucormycosis/Aspergillus	Intravenous Piperacillin and Tazobactam 4.5g twice a day  Intravenous Metronidazole 100ml 3 times a day  Intravenous Amphotericin B	Intravenous Ceftriaxone
7	Acute Dacryocystitis	Staphylococcus, Streptococcus, Pneumococcus	Tablet Amoxicillin and Clavulanic acid 625 mg twice a day Moxifloxacin eye drops 0.5% 3-6 times a day	

**Table 13: ENT Infection**

Name of condition	Patient Type 1 (Community acquired)	Patient Type 2	Patient Type 3
Acute infection like acute membranous tonsillitis, ASOM, Acute epiglottitis without complication	Inj Ampicillin 1 gm q6h Amoxicillin +clavulanic acid 1.2 gm q8h	-	-
Acute infection with complications like acute mastoiditis, Quinsy	Addition Of aminoglycoside for gram negative coverage and metronidazole for anaerobic coverage	-	-
Chronic infection without complication like CSOM, chronic sinusitis	Amoxicillin +clavulanic acid 1.2 gm q8h IV Ceftriaxone 1 gm q12h IV	ID/ Medicine consult	ID/Medicine consult
Chronic infection with complications like meningitis, orbital cellulitis, brain abscess	Inj Ceftriaxone+ inj amikacin + inj metronidazole	ID/ Medicine consult	ID/ Medicine consult

**Table 14: Surgical site infection**

Name	Type 1	Type 2	Type 3
<b>Head &amp; Neck</b>	Ceftriaxone 1gm q12h IV + Metronidazole Or PIP-TZ 4.5 gm q6h IV If MRSA suspected Add Vancomycin 1gm IV q12h If CNS infection Ceftazidime 2 gm q8h IV instead of Ceftriaxone/PIP-TZ	Meropenem 2gm q8h IV + Vancomycin 1 gm q12h IV	If fungal infection suspected Ampho B If VRE suspected Linezolid If XDR or PDR Gram negative infection suspected Colistin 4.5MUBD If CNS infection Add intrathecal antibiotics as above
<b>Other infections</b> <b>Sternal infections</b> <b>Chest</b> <b>Abdominal</b> <b>Perineal</b>	Ceftriaxone 1gm q12h IV + Metronidazole Or PIP-TZ 4.5 gm q6h IV If MRSA suspected Add Vancomycin 1gm IV q12h	Meropenem 2gm q8h IV + Vancomycin 1 gm q12h IV	If fungal infection suspected Ampho B If VRE suspected Linezolid If XDR or PDR Gram negative infection suspected Colistin 4.5MUBD If clostridium difficile colitis or sepsis suspected Oral Vancomycin 250 mg q6h + Metronidazole 500 mg q8h IV

Note:

Surgical debridement is almost always necessary.

Any graft, device or foreign body must be removed.

**Table 15: Catheter related blood stream infections (CRBSI)**

Name	Type 1	Type 2	Type 3
<b>Peripheral catheter</b>		Cloxacillin 1 gm q6h IV	Ceftriaxone 1gm - q12h IV
<b>Central venous catheter (short term)</b> <b>Dialysis catheter (short term)</b>	-	+ Meropenem 2gm q8h IV Vancomycin 1 gm q12h IV	Meropenem 2gm q8h IV + Vancomycin 1 gm q12h IV
<b>Dialysis catheter (long term)</b> <b>Hickman or other implanted catheter (long term)</b>			If fungal infection (Non-AlbicansCandida suspected) Ampho B iv Or Caspopfungin 70 mg IV q24h flowed by 50 mg If VRE suspected Linezolid If XDR or PDR Gram negative infection suspected Colistin 4.5MUBD

**Note:**

Change catheter if signs of thrombophlebitis are present

Catheter cultures and blood cultures to be sent as per HICC protocol.

Catheter maybe kept in situ pending culture reports especially if CRBSI not strongly suspected and no other IV access is available

Remove catheter immediately if local signs of suppuration present or if central venous catheter and blood cultures are positive

## **Definitive therapy once the causative organism is identified**

It is vital to send cultures before empiric antibiotics are prescribed. Once cultures results are available the next steps are

1. Decide whether the organism grown is a colonizer or an actual pathogen. Evaluate carefully if the site from which culture has been sent has active infection either from clinical signs or from elevated WBC counts or radiological evidence.
2. Don't treat colonizing organisms, Consult microbiology for the decision
3. Choose the simplest antibiotic class to which the organism shows sensitivity
4. If the cultures show intermediate sensitivity ask for MIC levels and consult infectious disease specialist for choice of appropriate antibiotic.
5. Linezolid should be given only in culture confirmed MRSA infections after consultation with ID physician.
6. Levefloxacin is reserved for use in culture confirmed pulmonary infections only
- 7.. Do not continue therapy beyond indicated duration. If the duration is to be exceed then the clinician will justify the same and endorse it in the clinical notes

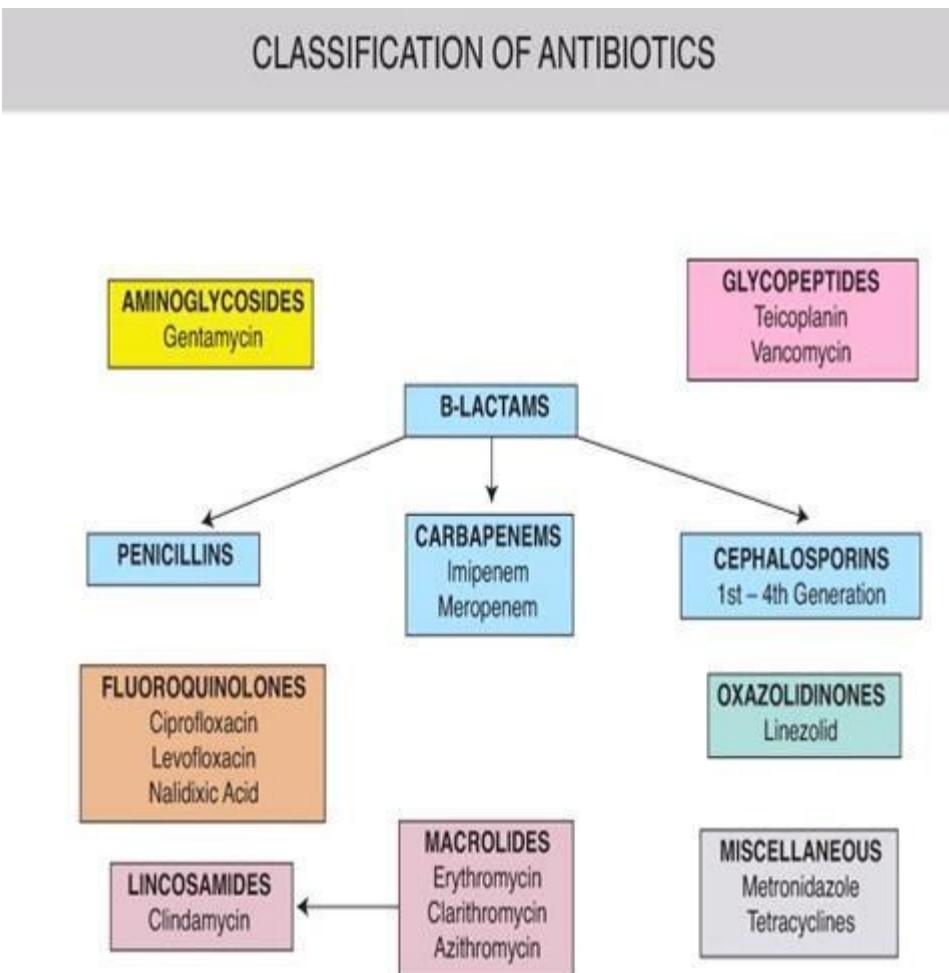
## **8. Antibiotic Prophylaxis for Surgery**

### **Clean and Clean Contaminated cases**

<b>Procedure</b>	<b>Antibiotic</b>
Clean surgeries (example: elective hernia repair, breast surgeries)	Cefazolin / Cefuroxime
Orthopedic surgery	Cefazolin / Cefuroxime
Cardiovascular / vascular surgery	Cefazolin / Cefuroxime
Neurosurgery	Cefazolin / Cefuroxime
Ophthalmic surgery	Topical quinolone. Systemic- Cefazolin / Cefuroxime
Head, neck and ENT surgery	Cefazolin / Cefuroxime
Gastroduodenal	Cefuroxime / Cefazolin
Appendicular / Colorectal surgery Biliary	Cefuroxime / Cefazolin and Metronidazole Cefuroxime / Cefazolin/ cefoperazone-sulbactum
Abdominal / Vaginal hysterectomy / Caesarian section	Cefazolin / Cefuroxime +Metronidazole
Urologic surgery	Cefuroxime (or as guided by urine culture)
Preoperative (cataract surgery)	Moxifloxacin eye drops 0.5% 4 times a day 2 days prior to surgery
Post operative (cataract surgery)	Moxifloxacin eye drops 0.5% 4 times a day for 15 days
<b>Note: Preoperative dose of antibiotic is to be given within 60 minutes before incision</b>	
<b>Dose of Cefazolin 2 gm IV</b>	
<b>Dose of Cefuroxime 1.5 gm IV</b>	
<b>Dose is to be repeated if surgery &gt; 4 hours</b>	
<b>Consider either clindamycin or Vancomycin, if penicillin allergy</b>	
<b>Antibiotic prophylaxis must not be continued for more than 24 hours after surgery</b>	

## Appendix 1

### Commonly used antibiotics



## Spectrum of commonly used antimicrobials:

Antibiotic Class	Name	Organisms	Indication & Dose	Side effects
<b>Penicillins</b>				Allergy
<b>β-lactamase susceptible</b>	Penicillin G Penicillin V Ampicillin. Amoxycillin (PO)	Gram +ve Gram +ve Gram +ve& Gram -ve Gram +ve	Not easily available 1-2 gms q6h 500 mg q8h	
<b>β – lactamase resistant</b>	Cloxacillin	Gram +ve	0.5-1gm q6h	
<b>β-lactam/ β-lactam inhibitor combination</b>	Piperacillin-tazobactam. Ampicillin-sulbactam. Amoxycillin-clavulanate (IV)	ESBL Gram -ve organisms ESBL Gram -ve organisms Gram +ve&Haemophilus. influenzae	4.5 gm q6h as infusion 1 gm q6h 1.2 gm q8h	
<b>Cephalosporins</b>				
1 <sup>st</sup> Generation	Cefazolin (IV) Cephalexin (PO)	Gram +ve	1gm q8h 500 mg q8h	
2 <sup>nd</sup> Generation	Cefadroxil (PO)  Cefuroxime (PO & IV)	Gram +ve  Gram +ve	500 mg q12h 750 mg q8h	
3 <sup>rd</sup> Generation	Cefotaxime Ceftriaxone Ceftizoxime Ceftazidime  Cefixime (PO) Cefpodoxime (PO) Cefdinir (PO)	Gram +ve& Gram -ve Gram +ve& Gram -ve Gram +ve& Gram -ve Gram +ve& Gram -ve  Anti-pseudomonal	1 gram q6h 1-2gm q12h 1 gm q12h 1-2 gm q8h  200 mg q12h	

4 <sup>th</sup> Generation Cephalosporin Plus beta lactamase inhibitor	Cefepime Cefoperazone /sulbactam	Anti-pseudomonal Anti-pseudomonal	1-2 gm q12h 1.5 gm – 3gm q12h	
<b>Aminoglycosides</b>	Streptomycin Kanamycin Gentamicin Amikacin Tobramycin Netilmicin	Gram -ve Gram -ve Gram -ve Gram -ve Gram -ve Gram -ve	0.75 – 1gm q24h 3mg/kg q24h 13mg/kg q24h 3mg/kg q24h 5mg/kg q24h	Deafness Vertigo Muscle weakness
<b>Quinolones</b>  <b>Extended spectrum</b>	Nalidixic acid Norfloxacin Ciprofloxacin Ofloxacin Levofloxacin Moxifloxacin		1 gm q6h 400 mg q12h 500 mg q12h 200 mg q12h 750 mg q24h 400 mg q24h	Seizures
<b>Carbapenems</b> Imipenem-cilastatin Meropenem Doripenem  Ertapenem		Gram +ve except MRSA, ESBL Gram -ve except Stenotrophomonas, Burkholderia, Corynebacterium, Enterococcus faecium not covered  Does not cover Pseudomonas, Acinetobacter & Enterococcus	0.5gm -1gm q6h 1 – 2 gm q8h  1gm q24h	Seizures
<b>Polymyxins</b> Polymyxin B Colistin		ESBL, Metalloproteinase producing Gram -ve	Colistin 4.5MUBD	Muscle weakness Renal toxicity
<b>Lincosamide</b> Clindamycin		Gram +ve and anerobes	600mg q8h	C. difficile colitis
<b>Glycopeptides</b>				Renal

Vancomycin Teicoplanin		MRSA	1gm q12h 400 mg q24h	toxicity
<b>Oxazolidinedione</b> Linezolid		VRE	600 mg q12h	Thrombocytopenia
<b>Lipopeptides</b> Daptomycin		MRSA	4-6mg/kg q24h	
<b>Antifungals</b> Fluconazole  Voriconazole  Caspofungin  Anidulafungin  AmphoB aqueous AmphoB colloidal AmphoB liposomal		Candida albicans  Aspergillus  Non albicans candida  Non albicans candida  Broad spectrum covers all above + Mucor etc	400 mg q12h 6mg/kg q12h first day then 4mg/kg 70mg IV then 50 mg q24h  Refer product insert	

## Appendix 2

### Duration of therapy for various clinical conditions

Short course therapy is equally effective			
Condition	Short Course (Days)	Long Course (Days)	Outcome
Chronic Bronchitis and obstructive pulmonary disease, acute exacerbations*	<=5	>=7	<b>Equivalent</b>  Most patients do not require antibiotics at all
Intra-abdominal infection	4	10	<b>Equivalent</b>
Neutropenic fever	Until afebrile and stable	Until non neutropenic	<b>Equivalent</b>
Osteomyelitis, Chronic	42	84	<b>Equivalent</b>
Pneumonia community acquired	<=8	10-15	<b>Equivalent</b>
Pyelonephritis	5-7	10-14	<b>Equivalent</b>
Skin Infections (Cellulitis, Major abscesses, wound infections)	5-6	10-14	<b>Equivalent</b>
Sinusitis, acute bacterial	5	10	<b>Equivalent</b>

Reference : Harrison's principle of Internal Medicine 20th ed

## Appendix 3

### Antimicrobial Agent Form

	<b>BHARATI VIDYAPEETH UNIVERSITY MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTRE</b> <b>ANTIMICROBIAL AGENT FORM</b> <b>BHRC/HIC/F23(V-2)</b>	
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List of high end antibiotics:

1. Carbapenems 2. Piptaz 3. Levofloxacin ,4. Colistin, 5. Polymyxin B , 6. Fosfomycin/daptomycin 7.Teicoplanins 8.Vancomycin, 9.Tigecycline/ Minocycline 10. Teicoplanins 11. Linezolids 12.Echinocandins 13. Voriconazole/ Posaconazole 14.Amphotericin B

Ward : ICU I/II/III (Surg/ Ortho) Med 3/6/10/11 Other Wards: \_\_\_\_\_

Bed No : \_\_\_\_\_ Clinician/Unit Head : \_\_\_\_\_

Date of Admission: \_\_\_\_\_ Date of filling: \_\_\_\_\_

Paste Patient Barcode here

Confirmed Diagnosis: \_\_\_\_\_ Patient type : 

1	2	3
---	---	---

Suspected cause/ site of infection: \_\_\_\_\_ Wt of patient \_\_\_\_ kg.

Date of Surgery: \_\_\_\_\_

Time of incision	Time of 1 <sup>st</sup> dose	Time of 2 <sup>nd</sup> dose	Duration of surgery																
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AMA Details: 1. High End Antibiotics  2. Other Antibiotics

AMA(Generic name)	E/D/SP*	Route , Freq and Dose (mg/g)	Start Date	Day 1	Day3	Day7	IV to Oral	Stop Date	CHANGE OF AMA (remarks)
				(TEMP, TLC ,PCT, SERUM CREATININE)					

\*=E- Empirical; D- Definitive; SP- Surgical Prophylaxis

Device in situ : 1. Central Line 2. Peripheral line 3. HD Catheter 4. Urinary Catheter 5. ETT/TT 6.Drains  
Date of insertion \_\_\_\_\_ Date of removal \_\_\_\_\_

Culture/ Sensitivity Investigations done: YES / NO; If YES; Date of Report:

Specimen taken (B/P/U/Resp/CSF )* and Date(DD/MM/YY) (1BEFORE,2AFTER)	Microorganism isolated Date received(DD/MM/YY)	Sensitivity Pattern (Name of imp antibiotics)	Change of AMA Y/N	Response after change Y/N

\*=B- Blood ; P- Pus ; U- Urine; Resp – Sputum,ETT,BAI ; CSF- Cerebro spinal fluid

Collected Data by : \_\_\_\_\_

Prescriber sign : \_\_\_\_\_  
(in case of High end Antibiotic)

## **Appendix 4**

### **Operative Procedure for Sample Collection**

#### **1. URINE CULTURE**

##### **(a) Items required**

The following items should be available as preparation for collecting a catheter specimen of urine for analysis:

- Sterile gloves;
- Alcohol-saturated swab;
- Gate clip or non-traumatic clamps;
- Sterile Universal specimen container;



##### **(b) Collection of urine sample from indwelling catheter:**

Use sterile precautions

Clean hands using hand rub

Clamp the distal portion of the catheter.



Disconnect urine bag.

Disinfect distal portion of the catheter using 70% alcohol swab Allow it to dry thoroughly.

Do not allow the distal end of the catheter to touch body or clothes of the patient.

After 10 minutes release the clamp and collect urine in a sterile urine collection container

##### **(c) Urine must be transported to the lab without delay. If delay is unavoidable, sample should be stored in the refrigerator at 4°C.**

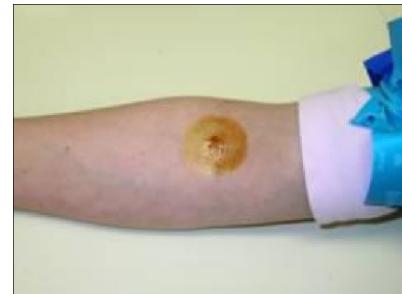
#### **2. BLOOD CULTURE**

##### **(a) Hands should be clean and dry and gloved before taking sample.**



##### **(b) Prepare Blood culture vials by proper labeling**

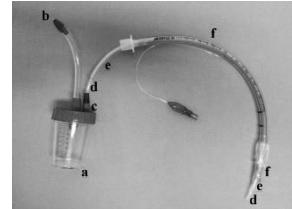
- (c) The culture bottle should be brought to room temperature before the sample inoculation and should not be refrigerated after inoculation.
- (d) Remove flip-off caps and wipe the rubber bung with a 70% alcohol swab
- (e) Disinfect skin at venepuncture site by wiping with 70% alcohol in a circular motion from centre to periphery and then with 1% iodine. Wait for at least one minute, allow to dry before venipuncture.



- (f) After venepuncture carefully withdraw the needle and compress the venepuncture site.
- (g) The number of sets to be collected is as follows.
  - (i) Febrile episode: 2 bottles from separate sites within 10 min
  - (ii) Acute endocarditis: 6 bottles from separate sites at 30 min intervals
  - (iii) Central Line related : 1 bottle drawn from the central line and 1 bottle from a peripheral venipuncture site
- (h) The various culture bottles for Automated Blood Culture System and the volume of blood to be added to them are as under.
  - (i) BacT/Alert/BACTEC Aerobic (30 ml): 10 ml blood (optimal)
  - (ii) BacT/Alert/BACTEC Paediatric (20 ml): 4 ml blood (optimal)

### **3. ENDOTRACHEAL/TRACHEOSTOMY ASPIRATE CULTURES**

- (a) The collection of endotracheal aspirate will be performed by the Anaesthetist or the Intensivist.
- (b) Do not use a swab for collecting sample.
- (c) Use a BAL collection trap to collect the endotracheal aspirate.
- (d) The aspirate is to be drawn as such in case it is less tenacious or alternatively, 5 ml of sterile saline is instilled and withdrawn immediately through the disposable sterile endotracheal aspiration catheter.



(e) The material is to be sent to laboratory within the next one hour.

#### **4. PUS CULTURE**

(a) Clean surface of wound or abscess with 70% alcohol and allow to dry; aspirate pus or fluid from the depth of the wound in a disposable syringe, place in a sterile container and send to the laboratory.



(b) Cotton swab to be used only if pus cannot be collected in sterile bottle or syringe.



#### **5. Body fluids**

Sample-Amniotic fluid, Synovial fluid, pericardial fluid, Pleural fluid, peritoneal fluid

Sterile fluids are usually collected by a trained, qualified physician.

Aseptically collect at least 1 ml of fluid into a new disposable sterile container.

#### **6. Bronchoalvelar Lavage**

BAL should be collected under aseptic conditions preferably with a protected specimen brush if available. The material should be collected in a BAL trap container.

#### **7. Endotracheal tube/Tracheostomy tube aspirate**

The specimen should be collected in a BAL trap as mentioned above after a saline wash to remove all secretions. Swabs are not acceptable specimens

## **References:**

1. National treatment guidelines for antimicrobial use in infectious disease, version 1 (2016)
2. ICMR , Treatment guidelines for antimicrobial use in common syndromes, 2019 2nd edition
3. Antimicrobial Stewardship Programmes in low and middle income countries 2019
4. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. NICE guideline 2015
5. IDSA : New Antibiotic Stewardship Guidelines Focus on Practical Advice for Implementation 2016

## **List of amendments**

1. Title changed from ‘Antibiotic Policy’ to ‘Antimicrobial policy and antimicrobial stewardship’
2. Workflow of the Antimicrobial Stewardship
3. Isolate listing and Antibiogram for the year 2020
4. Clinician will justify prolonged duration of therapy in case notes
5. Levofloxacin will be reserved for pulmonary infections only
6. Introduced duration of therapy for common conditions
7. Added antimicrobial Agent Form
8. Added sample collection methods and instructions