Preliminary Results of MURIA Group Antibiotic Utilization Studies Using Point Prevalence Survey In Botswana

Bene D Anand Paramadhas, Joyce Kgatlwane, Celda Tiroyakgosi, Matshediso Matome, Amos Massele, Jaran Eriksen, Lars L Gustafsson, Arno Muller, Brian Godman

BACKGROUND

- Bacterial resistance to antibiotics is a recognized emerging public health problem.

- A burden for public health systems.

- Threatens the progress in achieved health gains of countries.

- Inappropriate and indiscriminate use and disposal of antibiotics across human and veterinary health sectors and by industry are the main factors that promote evolution of bacterial resistance.

- The extent and appropriateness of antibiotic use in Botswana remains unknown.

- Countries are expected to develop a national action plan as per recent WHA resolution

----

Ventola CL, 2016. The antibiotic Resistance Crisis. Pharmacy and Therapeutics 20(4) 277-283

2. AMR A GLOBAL PUBLIC HEALTH THREAT

UK's Independent Review by Lord Jim O'Neill

- DRIs cause 700,000 deaths worldwide each year

- At this rate by 2050 globally there would be 10 million deaths a year annually.

- The report provides a roadmap how the situation can be controlled through national and international efforts.
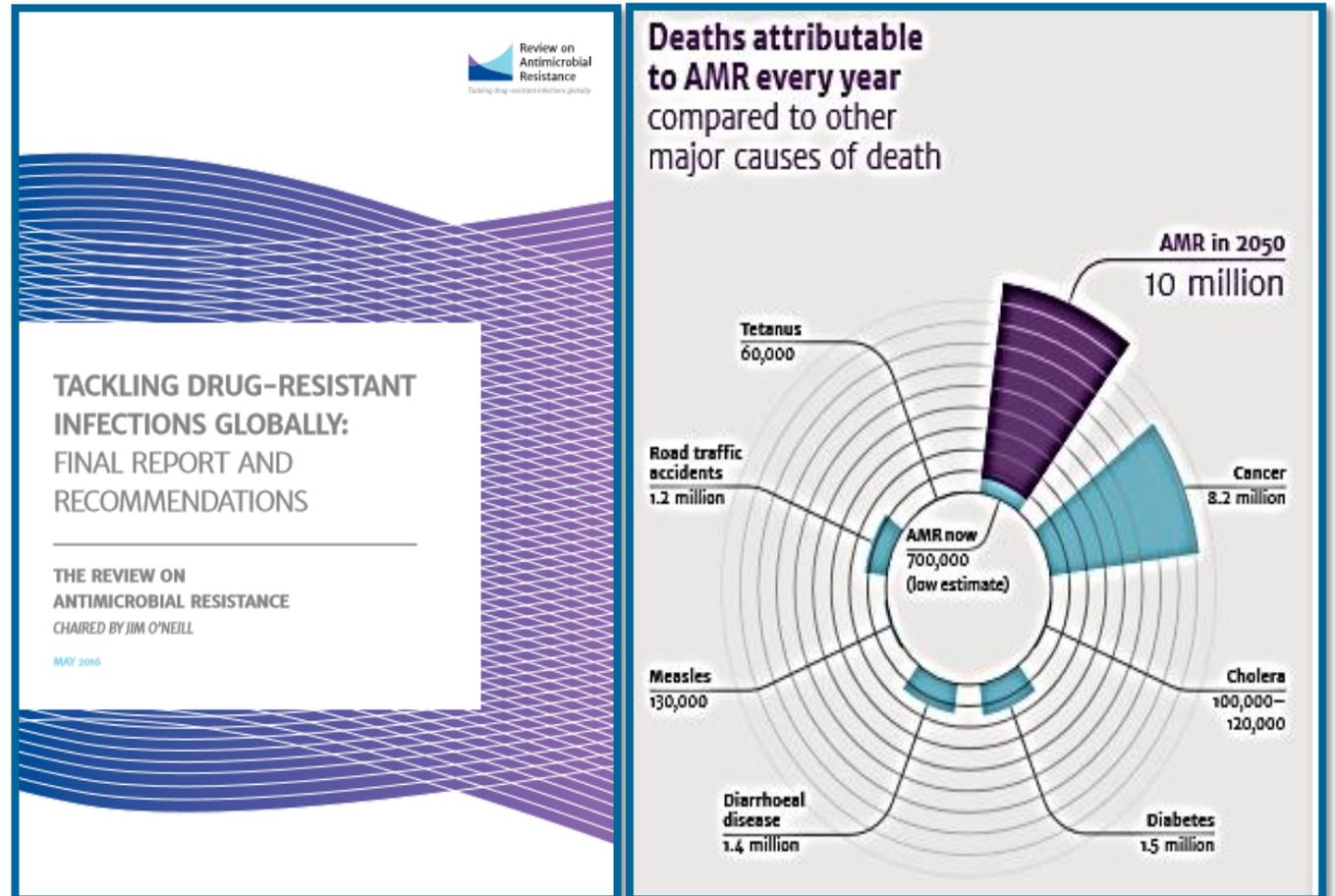
2. AMR A GLOBAL PUBLIC HEALTH THREAT!

Deaths attributable to AMR every year by 2050

Europe
390,000

North America
317,000

Asia
4,730,000

Africa
4,150,000

Latin America
392,000

Oceania
22,000

Number of deaths
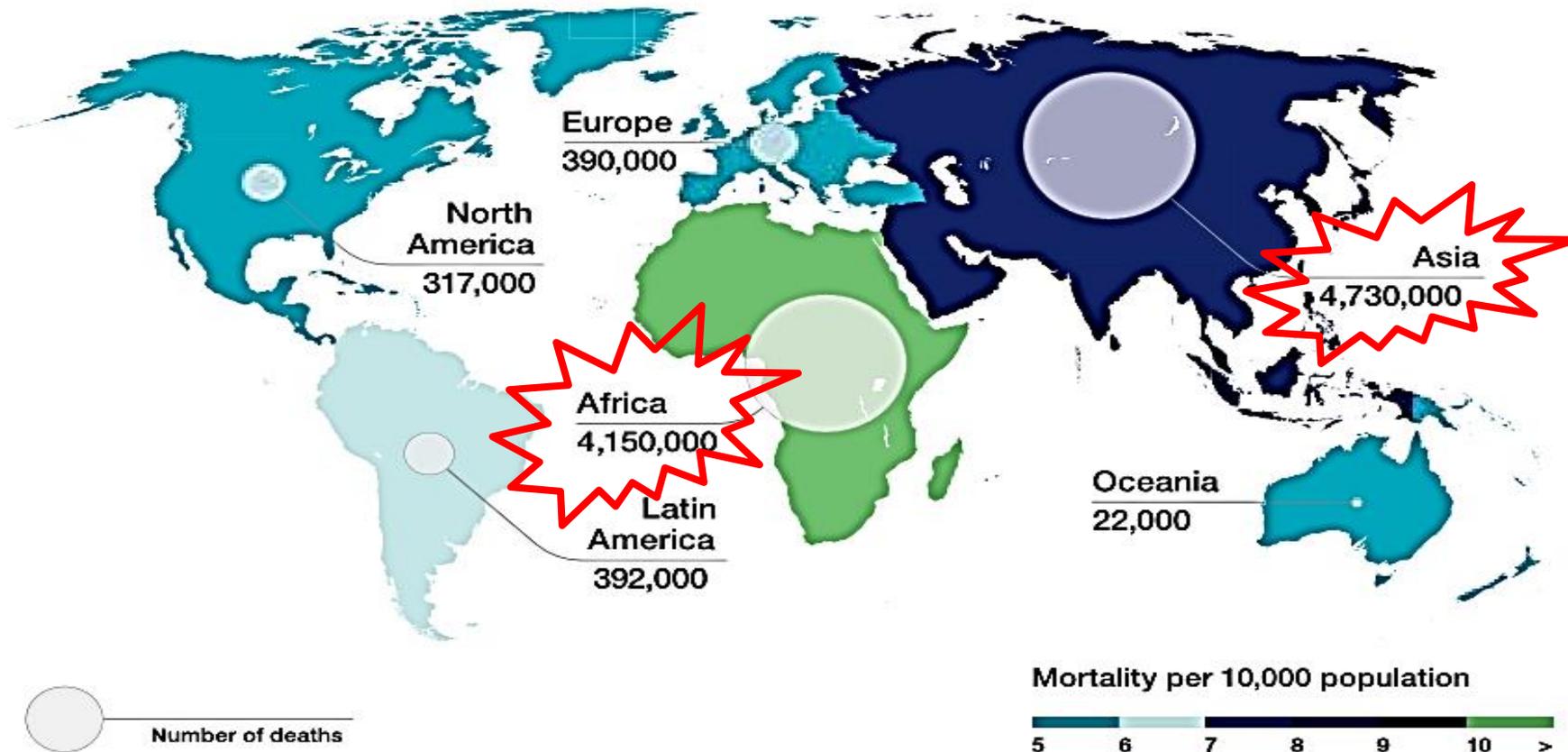
Mortality per 10,000 population

5   6   7   8   9   10   >

Source: Review on Antimicrobial Resistance

RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

Staphylococcus aureus
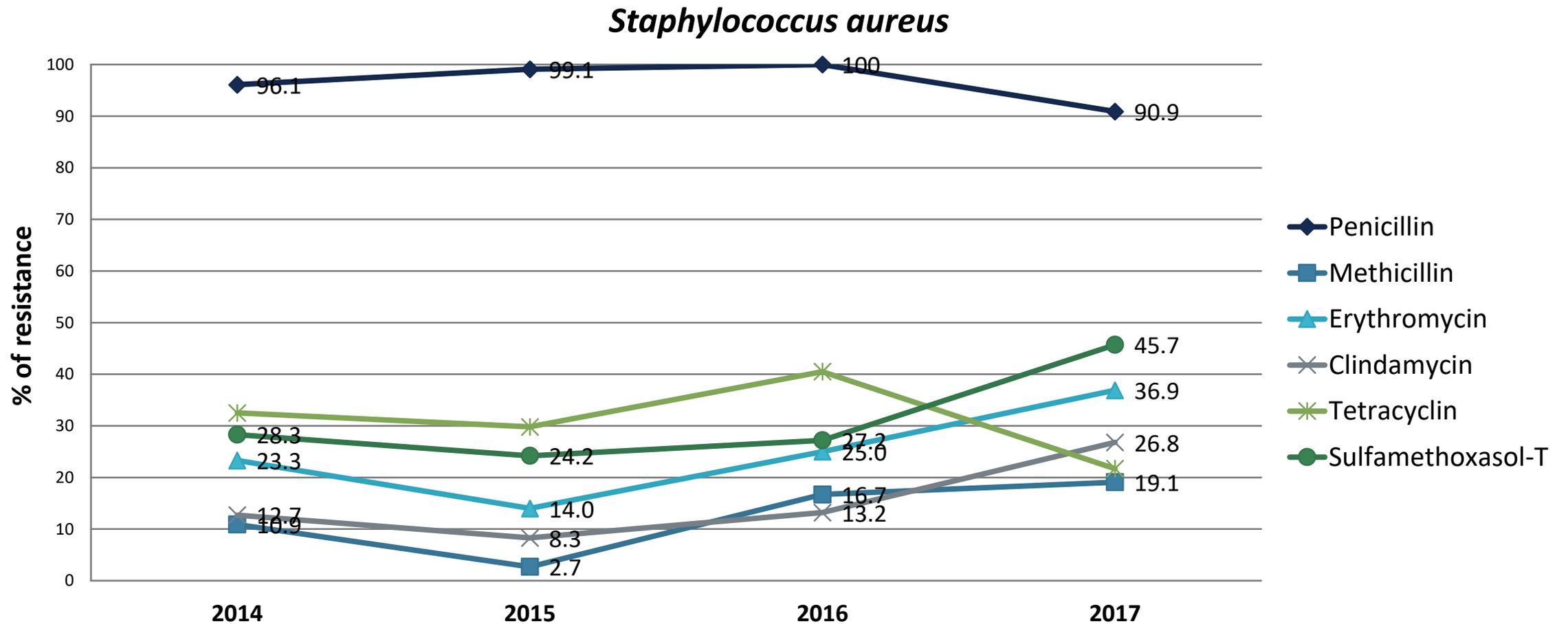
RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

Enterococcus spp.
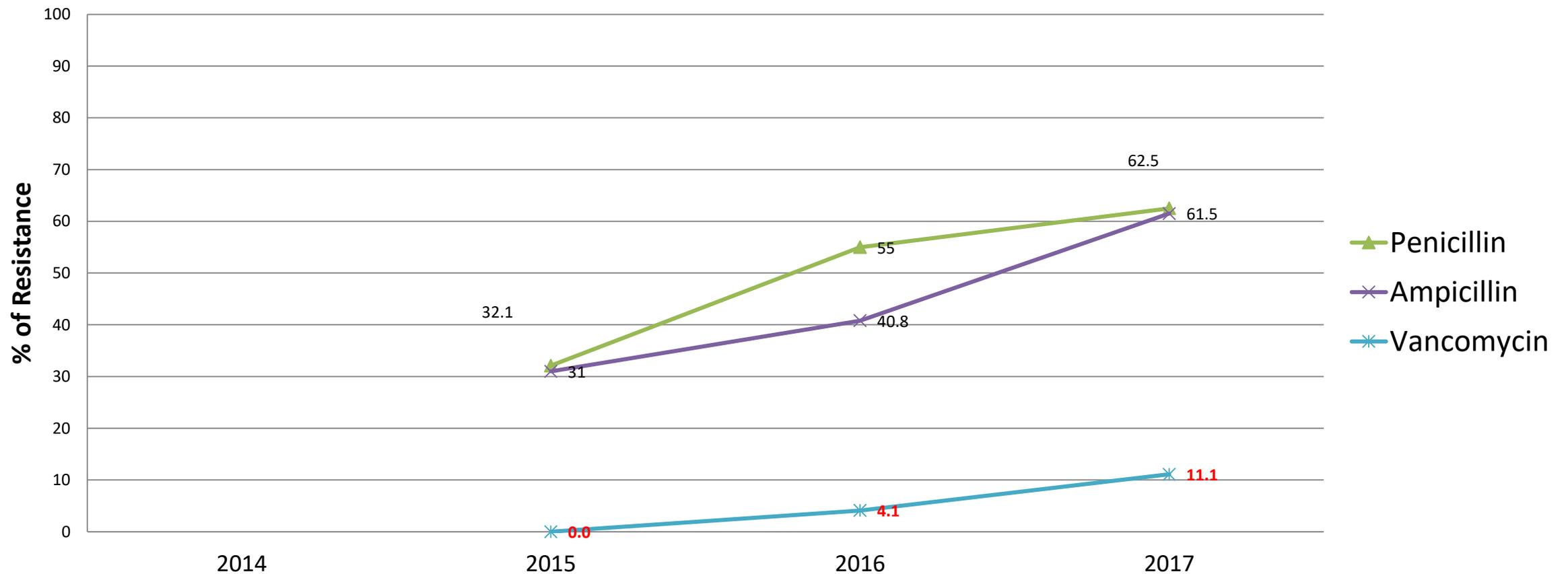
RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

Trend of Antimicrobial Resistance of Escherichia coli in pus
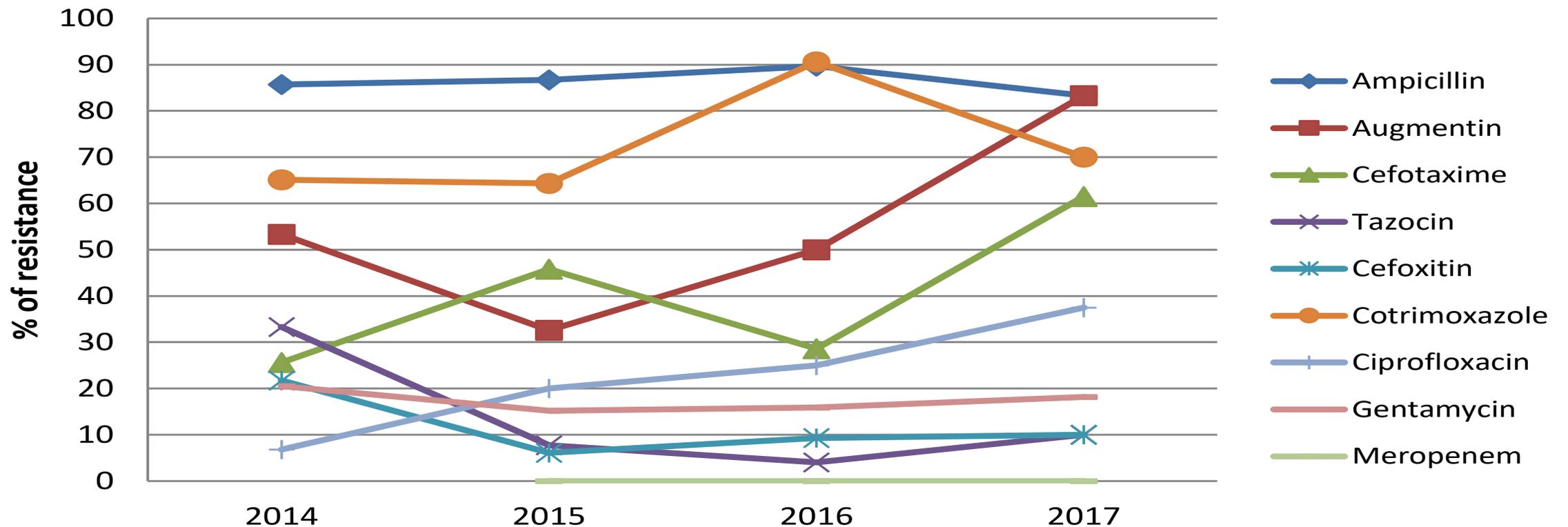
RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

Trend of Antimicrobial Resistant in Klebsiella pneumoniae in pus
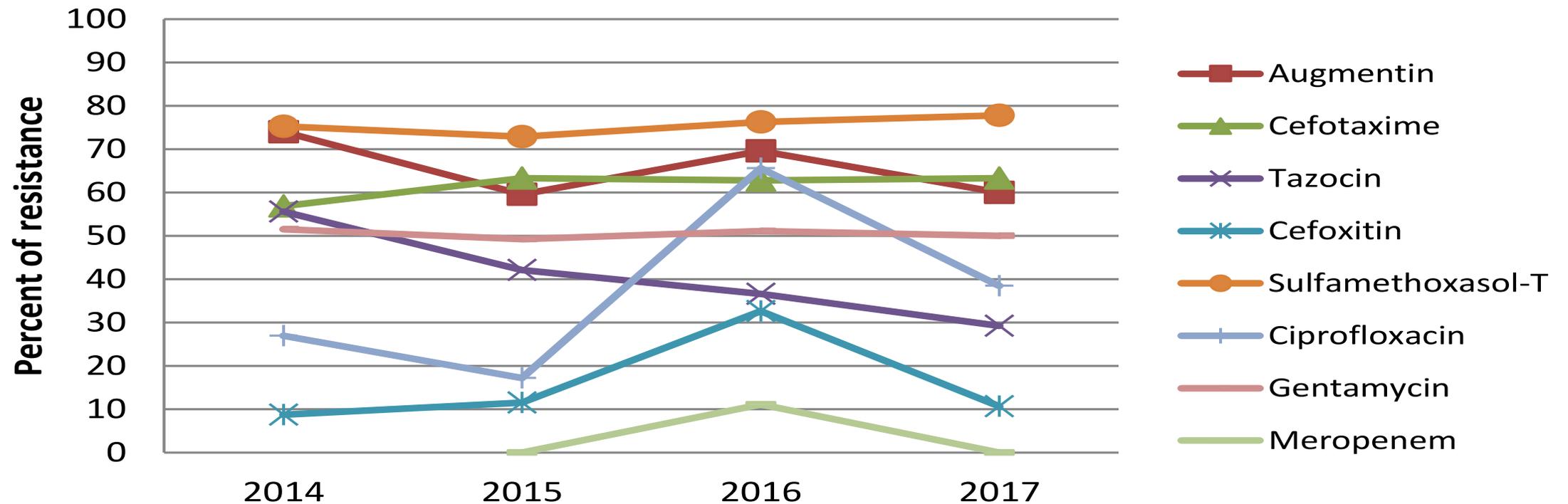
RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

Resistance of Cefotaxime & Amoxycillin Clavulanic acid (% Isolates)
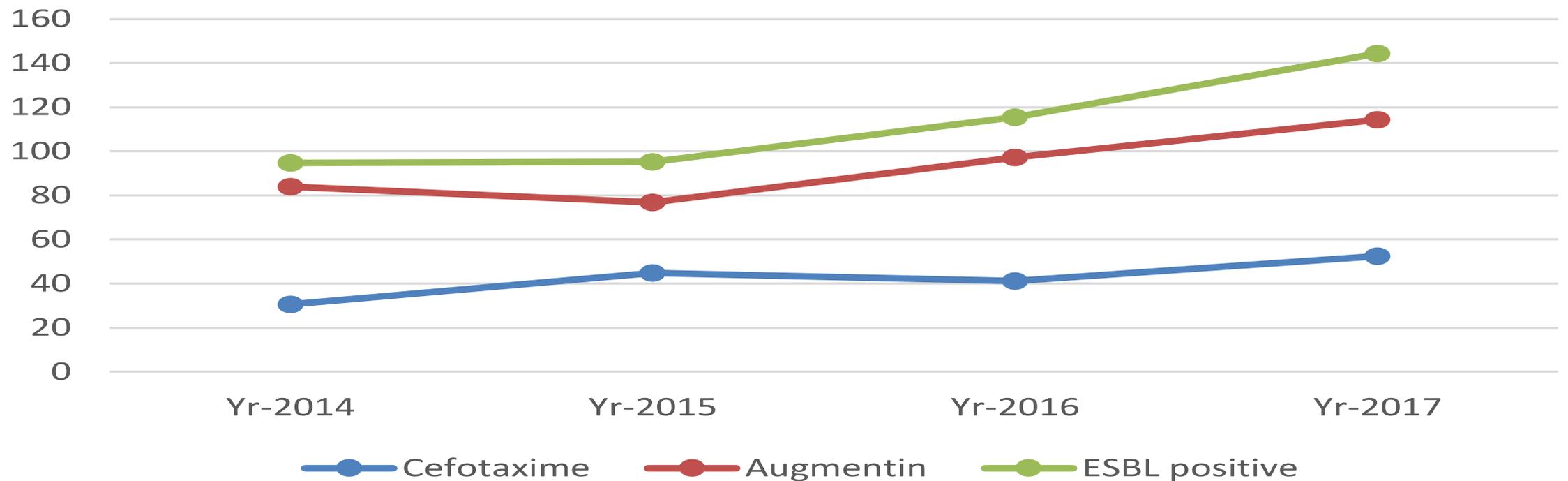
RESISTANCE PATTERNS AT NYANGABGWE HOSPITAL

ESBL Trend in Gram-negative bacilli
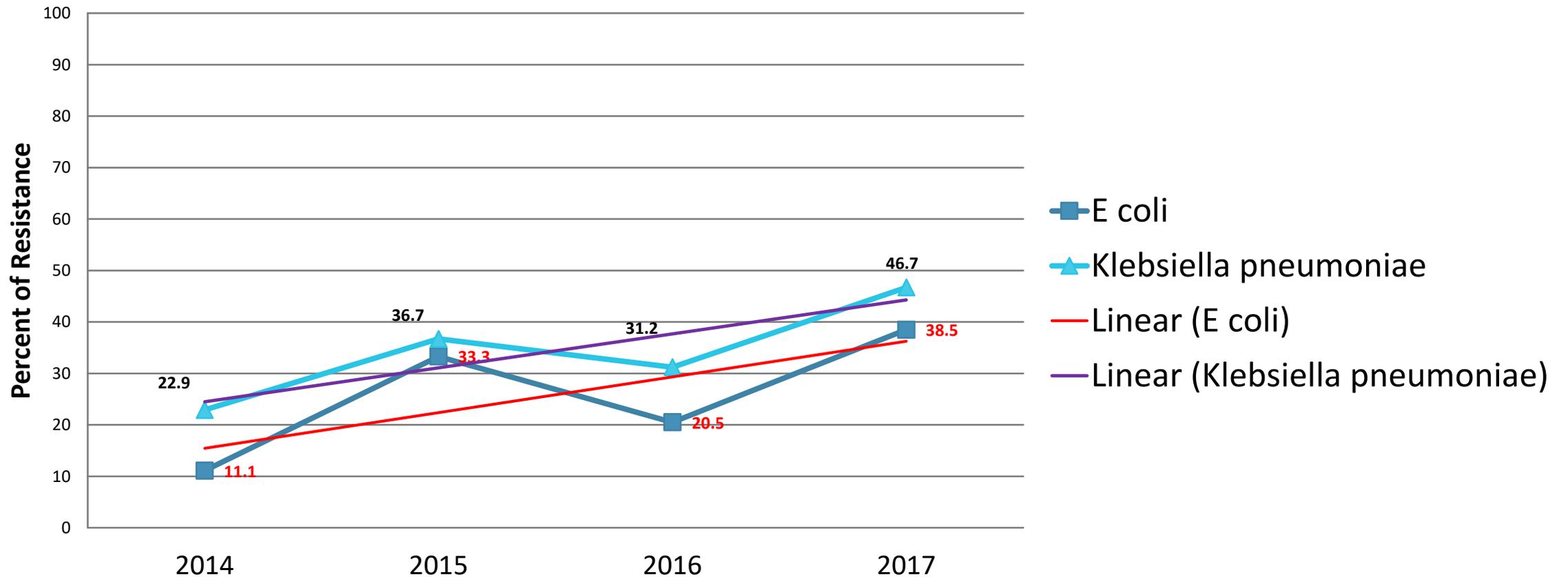
OBJECTIVES

- To describe the extent of antibiotic use in hospitalized patients; and

- Assess the structural capacity for promotion of appropriate antibiotic use in hospitals

METHODOLOGY

- **Study design** is quantitative observational descriptive.

- **Study method** involved a structured point prevalence survey to describe the extent and appropriateness of antibiotic use and to assess the institutional capacity for promotion of appropriate antibiotic use.

- **Study variables** had categorical and discrete at hospital, ward and patient levels.

- **Study settings** included 9 public and 1 private for profit hospitals representing all geographical regions of the country offering primary, secondary, tertiary and specialized care services.

- **Sampling frame** involved medical records of all inpatients that remained admitted overnight on the date of survey in the above 10 hospitals

- **Study sample** involved medical records of all patients or an authorized person who provided a voluntary verbal informed consent.

METHODOLOGY

- **Inclusion Criteria**

  Medical records of all inpatients that remained admitted overnight on the date of survey

- **Exclusion Criteria**

  Medical records of:
  - ❑ Patients or authorized persons who do not grant consent
  - ❑ Accident & emergency outpatients
  - ❑ Consulted outpatients
  - ❑ Patients kept in observation after chemotherapy or minor procedures who did not stay overnight
  - ❑ Discharged patients lodging in ward due to lack of transport to their facility or homes
  - ❑ Patients in labour ward
  - ❑ Psychiatric in-patients and
  - ❑ Inpatients who are exclusively on TB treatment.

METHODOLOGY

Definitions

- Extent of antibiotic use is the description of the pattern of antibiotic prescriptions made in reference to the various settings, patient and disease characteristics.

- Appropriateness of antibiotic use is the assessment of antibiotic prescriptions against the current national antimicrobial guidelines for adherence.

- Structural capacity means the ability of the hospitals to provide for the needs to promote appropriate antimicrobial use for achieving appropriate outcomes.

- Point Prevalence measures the prevalence of antibiotic use during the current hospitalization episode (not what is prescribed on the date of survey)

METHODOLOGY

Ethical Considerations

- Ethical consent granted by the Health Research and Development Division (13/18/1 X(560) and by all hospital research and ethics committees or managements.

- Hospital employees who were trained by MURIA & University of Botswana on "Principles in Research Ethics" and on the "Structured Data Collection Tool" or by one of the co-researchers.

- Patients or authorized persons were explained about the study and assurance of confidentiality through anonymizing collected data, clarified their doubts to receive verbal voluntary informed consent.

- All collected data were de-identified by data collectors at their hospitals to anonymize data before emailed to investigators.

- Investigators assured of results to be shared with their respective hospitals.

METHODOLOGY

Data Collection

- Data **collected through** trained hospital employees or volunteering staff **oriented to the Principles** in Research Ethics'' and on the "Structured Data Collection Tool" or by one of the co-researchers.

- Communication support provided through telephonic and email communications to clarify any doubts.

- Data collected in hard copies of the tool and captured on the standardized Excel template with drop-down menus.

- Data collected in 30 working days in 10 hospitals (3rd May to 14th June 2017)

- Data collection took one day for Primary and Specialized hospitals with one and five data collectors respectively; 3 to 5 days in District hospitals with 1 to 2 data collectors and 10 days in referral hospital with 2 data collectors.

METHODOLOGY

Data Validation

- Data validation was done prior to data analysis through data exploration to identify typographical errors, extreme values, incomplete, missing and incoherent responses to eliminate errors and prepare for the analysis. All concerned entries were verified with data collectors for suitable amendments.

Data Analysis

- Data analysed using MS-Excel-2013 and presented as frequencies and percentages with mean and standard deviation or median and interquartile range.

RESULTS AND DISCUSSIONS

STUDY SITES

Level of Healthcare	Total	Facilities
Public Primary Hospitals	4	Bobonong Hospital, Gweta Hospital, Lethlakane Hospital, Goodhope Hospital.
Public District Hospitals	4	Lethsolathebe-II Memorial Hospital Maun, DRM Hospital Mochudi, Mahalapye Hospital , Scottish Memorial Hospital Molepolole.
Public Referral Hospitals	1	Nyangabgwe Referral Hospital, Francistown
Private for Profit - Specialized Hospitals	1	Lenmed-Bokamoso Private Hospital, Gaborone.
Total no. of Health Facilities	10	

INFORMED CONSENT AT HOSPITAL LEVEL

Health Facility	Bed Capacity	Admissions	Consented (Population)	% Consented
Primary Hospitals	20 - 50	69	67	97,10
District Hospitals	100 - 150	330	280	84,85
Referral Hospital	572	311	307	98,71
Specialized Hospital	<100	63	57	90,48
Total		773	711	92,37

INFORMED CONSENT AT WARD LEVEL

Ward Admissions & Consent (N=773)	Admissions	Consented	% Consented
Paediatric Intensive Care Unit (PICU)	6	6	100
Obstetrics & Gynaecology (OBGY)	209	199	95.22
Adult Medical Ward (AMW)	207	192	92.75
Adult Surgical Ward (ASW)	177	164	92.66
Paediatric Surgical Ward (PSW)	34	31	91.18
Adult Intensive Care Unit (AICU)	19	17	89.47
Paediatric Medical Ward (PMW)	68	59	86.76
Neonatal Intensive Care Unit (NICU)	53	43	81.13

GENDER DISTRIBUTION (N=711)

- ■ Males ■ Females

278 (39.10%)

433 (60.90%)
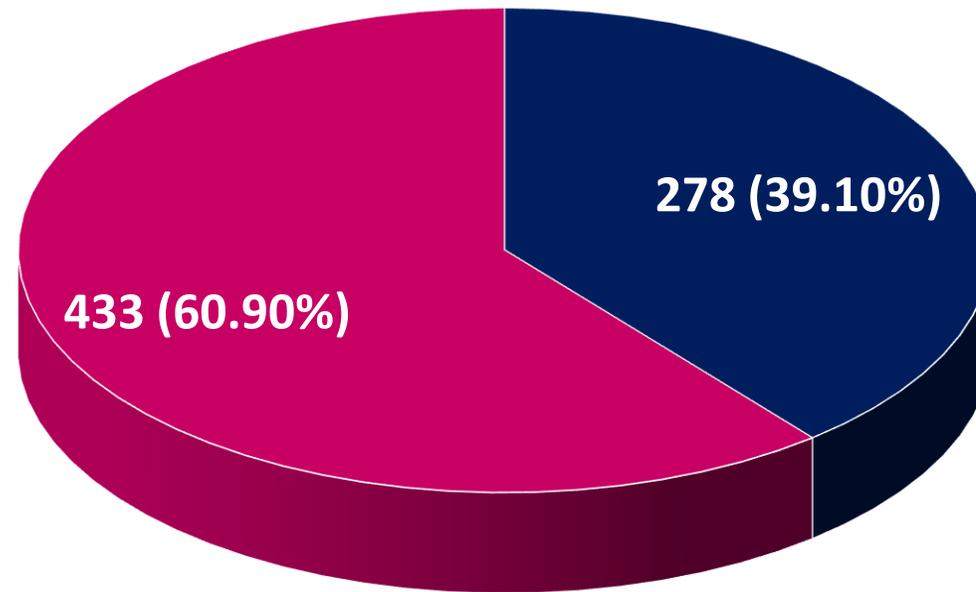
AGE DISTRIBUTION (N=711)

Age Group	Total	Age (Mean)	Standard Deviation	Median	IQR
Adult (Years)	**627**	38.79	22.28	34	28
Children (Years)	21	10.48	1.29	10	3
Infants (Months)	22	3.95	2.26	4	4
Neonates (Days)	41	4.83	6.95	1	5

EMPLOYMENT STATUS (N=512)

Employment Status (%)
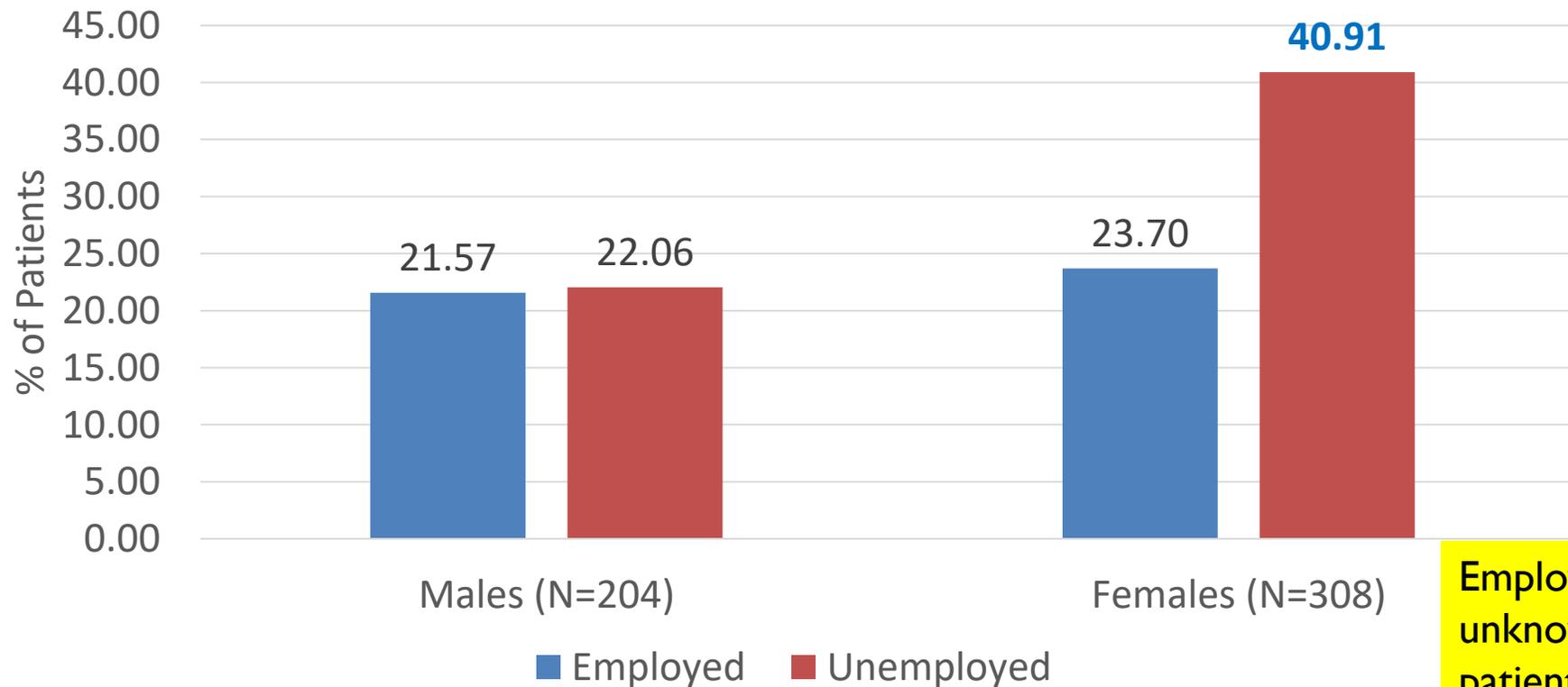
Employment Status was unknown for 199 admitted patients

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
(PREVIOUS HOSPITALIZATIONS AND DISEASE CONDITIONS)

Age Group	Admissions	Trans-In	Prev-Hosp	Malaria	Malnourished	TB Positive
0-29 days	41	29	5	0	1	0
1 to 11 months	23	7	0	0	2	1
1 to 5 years	45	15	6	0	7	0
6 to 10 years	22	13	7	0	1	3
11 to 15 years	18	9	0	0	1	0
16 to 20 years	39	14	1	0	2	2
21 to 25 years	84	24	5	0	0	2
26 to 30 years	70	30	5	0	0	3
31 to 35 years	76	31	9	0	3	2
36 to 40 years	55	26	5	0	5	9
41 to 45 years	39	15	6	0	0	1
46 to 50 years	35	12	5	0	0	2
51 to 55 years	28	13	6	1	2	1
56 to 60 years	25	8	2	0	0	1
61 to 65 years	18	11	1	0	0	0
66 and above	93	42	15	2	6	5
Total Cases	**711**	**299**	**78**	**3**	**30**	**32**
Unknown		**14**	**97**	**593**	**112**	**585**
N	**711**	**697**	**614**	**118**	**599**	**126**
%	**100.00**	**42.90**	**12.70**	**2.54**	**5.01**	**25.40**

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
(CATHETER USE)

Age Group	Admissions	None	Peripheral	Urinary	Haemodialysis	Central	Other	Peritoneal
0-29 days	41	9	32	0	0	0	0-0	0
1 to 11 months	23	8	15	0	0	0	0	0
1 to 5 years	45	26	19	0	0	0	0	0
6 to 10 years	22	12	10	2	0	0	0	0
11 to 15 years	18	10	8	1	0	1	0	0
16 to 20 years	39	20	17	2	0	0	2	0
21 to 25 years	84	37	46	4	0	0	0	0
26 to 30 years	70	27	42	6	0	1	1	0
31 to 35 years	76	28	46	6	0	0	1	0
36 to 40 years	55	24	31	5	0	1	1	0
41 to 45 years	39	18	20	4	1	0	0	0
46 to 50 years	35	18	14	3	3	3	1	0
51 to 55 years	28	12	14	3	0	0	1	0
56 to 60 years	25	12	12	3	0	1	0	0
61 to 65 years	18	9	7	3	3	1	0	0
66 and above	93	44	44	11	3	1	2	0
Total	**711**	**314**	**377**	**53**	**10**	**9**	**9**	**0**
%	**100**	**44.16**	**53.02**	**7.45**	**1.41**	**1.27**	**1.27**	**0**

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
(INTUBATION)

Age Group	Admissions	None	Nasogastric	Endotracheal	Suction	Tracheostomy	Gastroduodenal
0-29 days	41	14	**27**	1	1	0	0
1 to 11 months	23	19	4	0	0	0	0
1 to 5 years	45	43	1	1	1	0	0
6 to 10 years	22	20	1	2	2	0	0
11 to 15 years	18	16	1	2	2	1	0
16 to 20 years	39	38	1	0	0	0	0
21 to 25 years	84	80	2	1	1	0	0
26 to 30 years	70	66	1	4	4	0	0
31 to 35 years	76	71	3	3	3	0	0
36 to 40 years	55	51	1	2	2	0	0
41 to 45 years	39	38	1	1	1	0	0
46 to 50 years	35	31	1	4	4	1	0
51 to 55 years	28	28	0	0	0	0	0
56 to 60 years	25	23	1	2	2	0	0
61 to 65 years	18	17	0	1	1	0	0
66 and above	93	86	4	4	4	0	0
Total	**711**	**641**	**49**	**28**	**28**	**2**	**0**
%	**100**	**90.15**	**6.89**	**3.94**	**3.94**	**0.28**	**0**

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE (TYPE OF INFECTIONS)

Age Group	Admissions	Community Acquired Infection	% CAI	Hospital Acquired Infection	% HAI	Home based Care Infection	% HBCI	Non-Infectious Conditions	% NIC
0-29 days	41	4	9.76	24	58.54	0	0.00	13	31.71
1 to 11 months	23	19	82.61	3	13.04	0	0.00	1	4.35
1 to 5 years	45	33	73.33	4	8.89	0	0.00	8	17.78
6 to 10 years	22	16	72.73	0	0.00	0	0.00	6	27.27
11 to 15 years	18	10	55.56	0	0.00	0	0.00	8	44.44
16 to 20 years	39	25	64.10	2	5.13	0	0.00	12	30.77
21 to 25 years	84	60	71.43	3	3.57	0	0.00	21	25.00
26 to 30 years	70	49	70.00	2	2.86	0	0.00	19	27.14
31 to 35 years	76	54	71.05	4	5.26	0	0.00	18	23.68
36 to 40 years	55	33	60.00	2	3.64	0	0.00	20	36.36
41 to 45 years	39	23	58.97	1	2.56	0	0.00	15	38.46
46 to 50 years	35	24	68.57	1	2.86	0	0.00	10	28.57
51 to 55 years	28	15	53.57	0	0.00	0	0.00	13	46.43
56 to 60 years	25	15	60.00	0	0.00	0	0.00	10	40.00
61 to 65 years	18	8	44.44	3	16.67	1	5.56	6	33.33
66 and above	93	51	54.84	11	11.83	2	2.15	29	31.18
Total	**711**	**439**	**61.74**	**60**	**8.44**	**3**	**0.42**	**209**	**29.40**

Nearly 70% of the hospitalizations were for treatment of Infectious Diseases with a high proportion of HAIs occurring among children and elderly patients

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
(HIV & HAART STATUS)

	Admissions	Tested	Positive	Negative	On HAART
Total	711	462	185	277	158
%	100	64.97	**40.04**	59.95	**85.40**

HIV related opportunistic infections increase the demand for prescription of antibiotics

RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
PREVIOUS ANTIBIOTIC EXPOSURE (N=134)
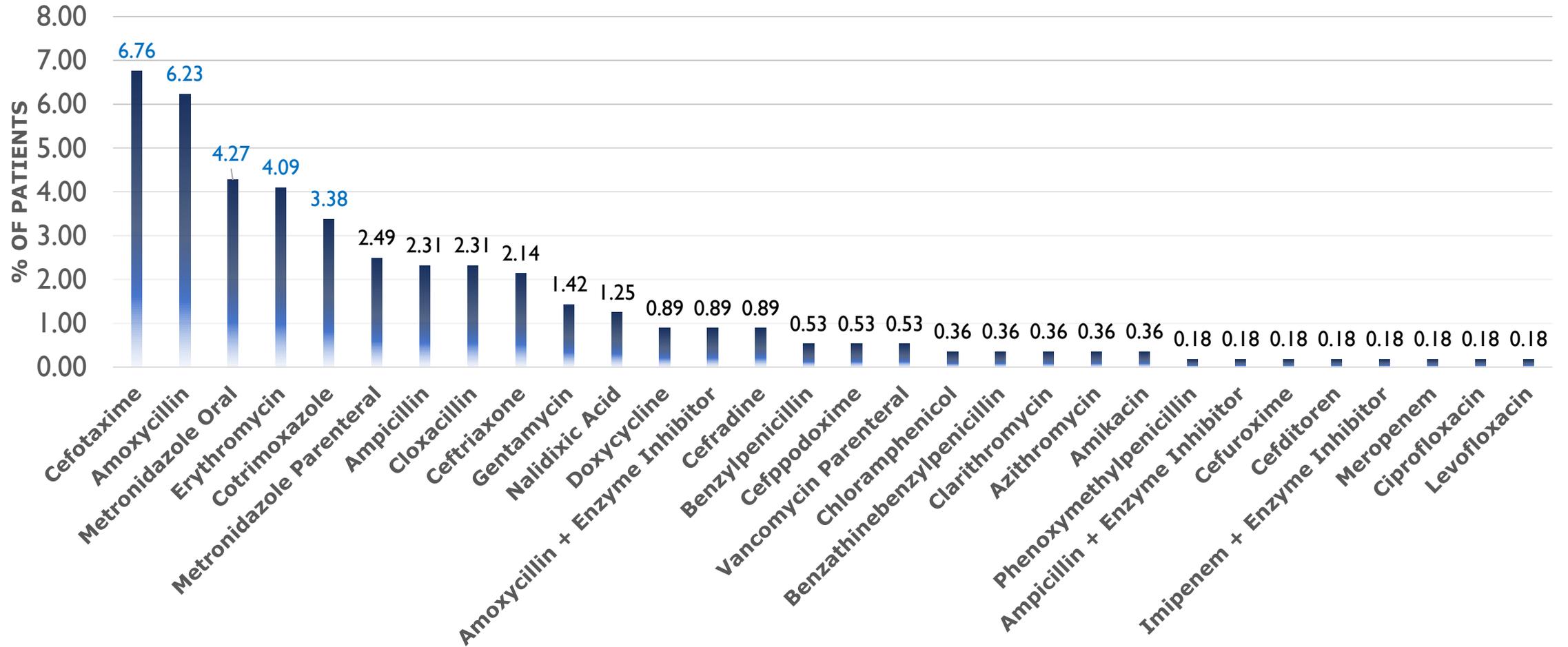
RISK FACTORS FOR POTENTIAL ANTIBIOTIC USE
DURATION OF PRE-HOSPITALIZATION ANTIBIOTIC EXPOSURE
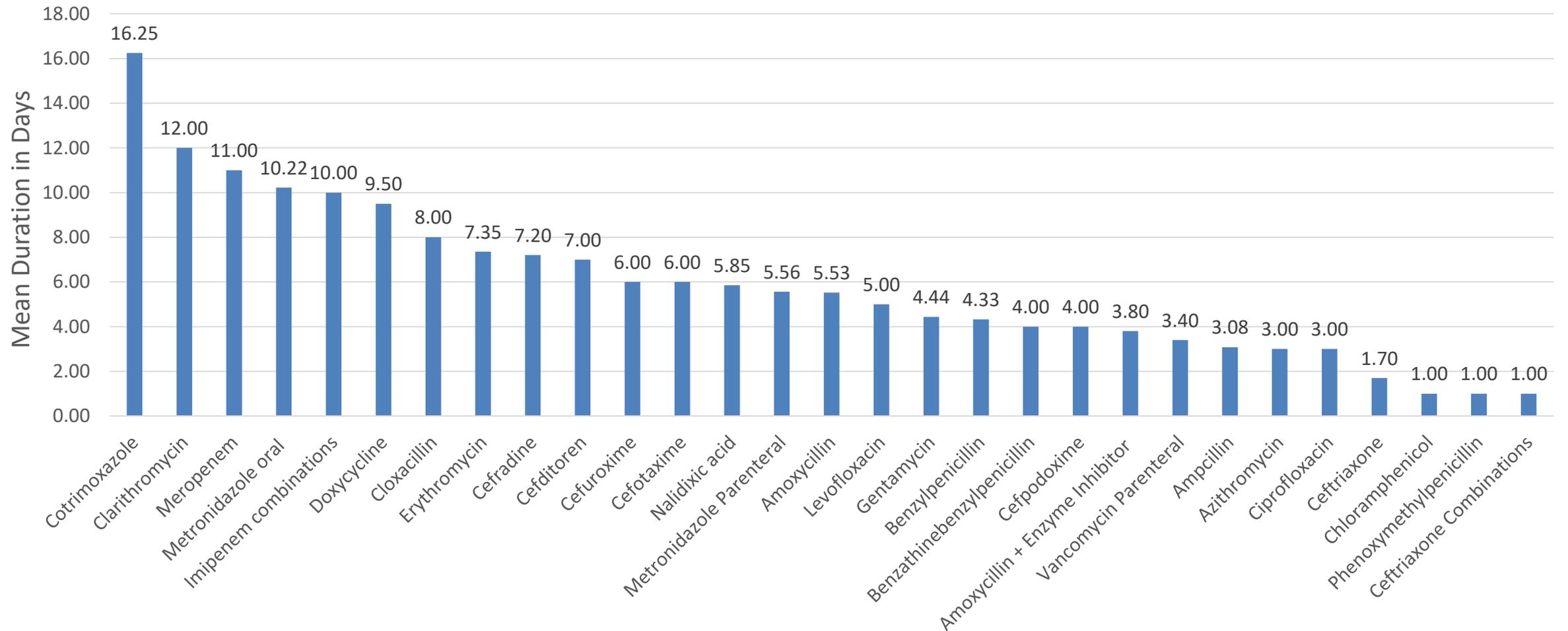
ADMISSION DIAGNOSIS USING ECDC CODES

Age Group	Admissions	Non Inf. NA	OBGY	PNEU	SST	GI	CNS	CSEP	BRON	BJ	ENT	CYS	CVS	FN	PYE	UND	EYE	GUM	IA	SIRS	ASB	BAC
0-29D	41	28	0	1	0	1	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-11M	23	3	0	12	1	2	0	2	3	0	2	0	0	0	0	0	0	0	0	0	0	0
1-5Y	45	22	0	8	4	3	1	1	5	0	1	0	0	0	0	0	0	0	0	0	0	0
6-10Y	22	9	0	2	3	0	2	0	1	3	0	0	1	0	0	0	0	0	1	0	0	0
11-15Y	18	14	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-20Y	39	22	8	1	2	1	2	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0
21-25Y	84	49	23	2	7	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
26-30Y	70	36	21	2	2	0	4	0	0	2	0	0	1	0	0	2	0	0	0	0	0	0
31-35Y	76	31	24	9	7	1	1	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0
36-40Y	55	32	8	4	2	2	2	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0
41-45Y	39	18	6	3	4	5	2	0	0	1	0	0	0	1	2	0	0	0	0	0	0	0
46-50Y	35	17	2	3	3	2	2	0	1	0	1	2	1	1	0	0	0	0	0	0	0	0
51-55Y	28	14	0	2	2	2	1	0	0	1	0	0	1	2	2	0	1	0	0	0	0	0
56-60Y	25	17	1	1	4	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
61-65Y	18	11	0	0	3	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
>66Y	93	49	0	11	8	4	2	1	4	1	1	6	2	2	2	1	0	1	0	0	0	0
Total	711	372	94	62	54	25	20	19	16	10	10	8	7	7	7	5	2	1	1	1	0	0
%	100.00	52.32*	13.22	8.72	7.59	3.52	2.81	2.67	2.25	1.41	1.41	1.13	0.98	0.98	0.98	0.70	0.28	0.14	0.14	0.14	0.00	0.00

*22.92% of community acquired infections were diagnosed after admission.

MISSED ANTIBIOTIC DOSES

Total no of Abx Prescriptions	982
Total Doses Missed	1923
Mean	1.96
SD	4.17
No. of Prescriptions with Missed Doses	437
No. of Instances of Stock Outs in Pharmacy	26

X-axis: No. of Prescriptions
Y-axis: No. of Missed Doses
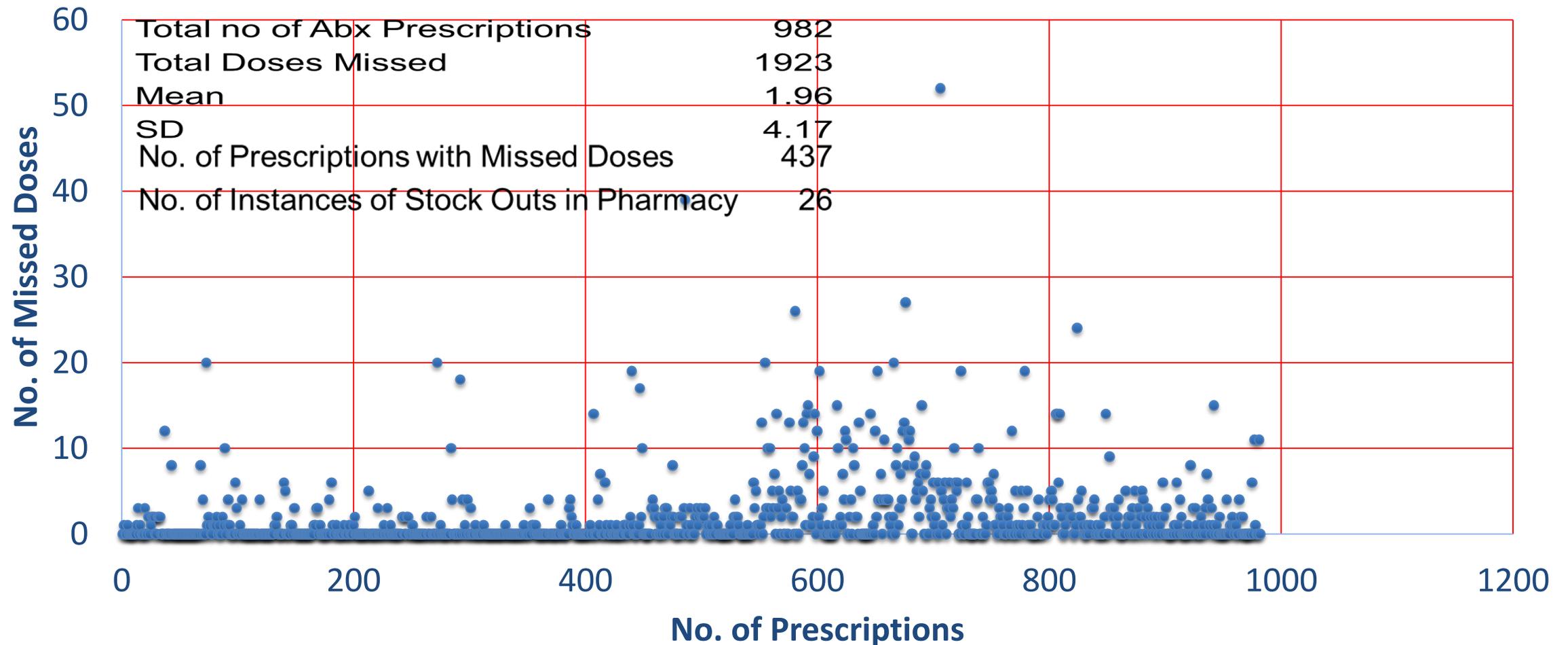
ANTIBIOTIC PRESCRIBING RATIO & PATTERN

	Primary	District	Tertiary	Specialty
No. of patients requiring antibiotics	67	280	307	57
No. of antibiotics prescribed	77	283	541	81
Antibiotic prescribing ratio	1.15	1.01	**1.76**	**1.42**

ATC Code	Antibiotic	Prescriptions	Specialist	Tertiary	District	Primary
J01DD01	Cefotaxime	199	17	101	67	14
J01XD01	Metronidazole Parenteral	126	12	67	35	12
J01CA01	Ampcillin	95	1	57	27	10
J01CA04	Amoxycillin	82		41	31	10
J01CR02	Amoxycillin + Enzyme Inhibitor	79	7	62	7	3
P01AB01	Metronidazole oral	77		42	31	4
J01EE01	Cotrimoxazole	49		32	14	3
J01GB03	Gentamycin	43	2	24	13	4
J01XA01	Vancomycin Parenteral	31	7	15	9	
J01GB06	Amikacin	28	1	27		
J01DD04	Ceftriaxone	26	16		8	2
J01FA01	Erythromycin	26	1	5	17	3
J01AA02	Doxycycline	24		14	9	1
J01DC02	Cefuroxime	17	2	10	4	1
J01DH02	Meropenem	16	3	12	1	
J01MB02	Nalidixic acid	14		7	3	4
J01CF02	Cloxacillin	13		8	2	3
J01DB09	Cefradine	7		6		1
J01CR05	Piperacillin + Enzyme Inhibitor	7	3	4		
J01DH51	Imipenem combinations	5	5			
J01DD13	Cefpodoxime	4	2	1	1	
J01FF01	Clindamycin	4		2	2	
J01MA12	Levofloxacin	2		1	1	
J01FA10	Azithromycin	1				1
J01CE01	Benzylpenicillin	1				1
J01DB04	Cefazolin	1	1			
J01DD02	Ceftazidime	1		1		
J01DB01	Cephalexin	1	1			
J01BA01	Chloramphenicol	1		1		
J01FA09	Clarithromycin	1			1	
J01GA01	Streptomycin	1		1		
	Total	982	81	541	283	77

PRESCRIPTIONS ACROSS ANTIBIOTIC CLASSES AND HEALTH FACILITIES

ABX Categories	Specialist (%)	Tertiary (%)	District (%)	Primary (%)	Total (%)
Cephalosporins	15.23	**46.48**	31.25	7.03	100.00
Penicillins	2.96	**62.22**	24.81	10.00	100.00
Macrolides	3.70	18.52	**62.96**	14.81	100.00
Carbapenems	**38.10**	**57.14**	4.76	0.00	100.00
Aminoglycosides	4.17	**72.22**	18.06	5.56	100.00
Glycopeptides	**22.58**	**48.39**	**29.03**	0.00	100.00

INJECTABLE VS ORAL ANTIBIOTIC USE

Ratio of	Specialist N=57	Tertiary N=307	District N=280	Primary N=67
Injectable antibiotic use	**1.37**	**1.22**	0.60	0.67
Oral antibiotic use	0.05	0.54	0.40	0.48

DURATION OF SURGICAL PROPHYLAXIS

Duration of Prophylaxis	Specialist (%) N=27	Tertiary (%) N=58	District (%) N=31	Primary (%) N=2
1 Dose	25.93	0.00	6.45	0.00
1 Day	7.41	0.00	3.23	0.00
> 1 Day	66.67	**100.00**	**90.32**	100.00

ANTIBIOTIC USE IN SURGICAL PROPHYLAXIS (%) N=127
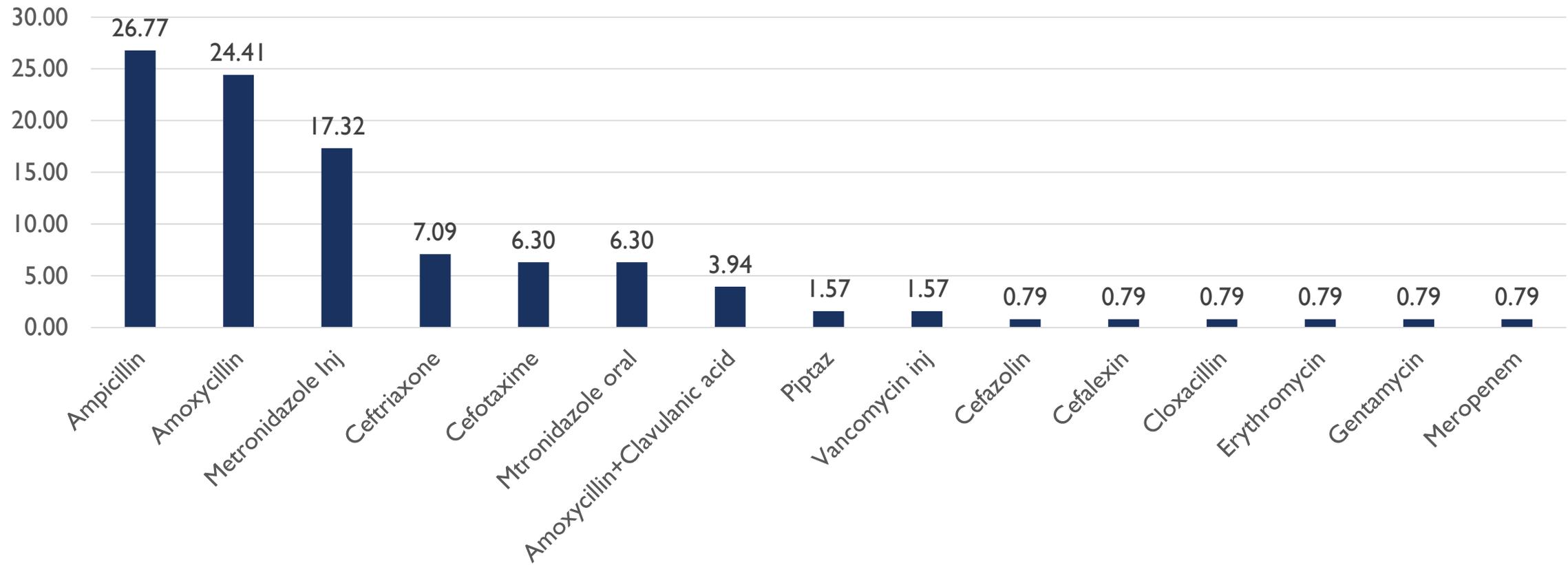
CULTURE & SENSITIVITY TESTS

Culture & Sensitivity Tests -	Specialist (%) N=57	Tertiary (%) N=307	District (%) N=280	Primary (%) N=67
Ordered	29.82	2.61	3.57	22.39
Reported	58.82	50.00	70.00	26.67
Antibiotic therapy consolidated	100.00	100.00	0.00	100.00

ASSESSMENT OF INSTITUTIONAL CAPACITY FOR PROMOTION OF ANTIMICROBIAL STEWARDSHIP

A. INFRASTRUCTURE (N=10)

#	Indicator	Score (%)
1.	Availability of a formal ASP	20%
2.	ASP part of hospital's Organizational Structure	40%
3.	An Appointed ASP team	20%
4.	ASP lead by a Physician	20%
4a.	Who provides leadership? (Pharmacist)	10%
5.	Have an accessible Microbiologist	50%
6.	Have a responsible Pharmacist to ensure appropriate use of antibiotics	50%
7.	Receive salary support for ASP activities	0%
8.	Have IT support for ASP activities	40%
9.	Have a functioning Microbiology lab	100%
10.	Number of culture tests done in last 3 months = 4261	Median 139 IQR 37.5-346.5

A. INFRASTRUCTURE (N=10) CONT.…

#	Indicator	Score (%)
11.	Continuous supply of reagents for microbiology	90%
12.	Availability of culture media in the past 90 days	97.77% of lab days
13.	Availability of antibiotic discs in the past 90 days	90%
14.	Availability of equipment for microbiology	100%
15.	Availability of Botswana Antimicrobial Guidelines 2012 in the wards	50%
16.	Have a functioning Infection Prevention & Control Committee	100%
17.	Have a functioning Drugs & Therapeutics Committee	90%
18.	Availability of Botswana Essential Drugs List 2016 in the wards	40%

B. POLICY & PRACTICE

#	Indicator	Score (%)
19.	Have a facility specific treatment recommendation based on local CSTs	20%
20.	Prescribing policy to document indication(s) on medical record	40%
21.	Routine practice for specified antimicrobials to be preauthorized by a Physician or Pharmacist	60%
22.	Formal procedure to review appropriateness of antimicrobial after 48 hours	0%
23.	Botswana Antimicrobial Guidelines 2012 used for empiric decision making	40%
24.	Availability of current Antibiogram	20%
25.	Continuing education provided on local antimicrobial resistance pattern	10%

C. MONITORING & FEEDBACK

#	Indicator	Score (%)
26.	Facility produced a cumulative antimicrobial susceptibility report	20%
27.	Facility monitors if the indication for antimicrobial is captured in the medical record	10%
28.	Facility audits or reviews choice of antimicrobials and duration	20%
29.	The above audit results communicated directly with the prescribers	20%
30.	Facility monitors DDDs or counts of antimicrobials per patient days	0%
31.	Facility annual report focused on antimicrobial susceptibility	0%

A. Infrastructure		Specialist (N=1)	Tertiary (N=1)	District (N=4)	Primary (N=4)
1	Formal ASP	100	0	25	0
2	ASP part of Hospital Organogram	100	0	50	25
3	An appointed ASP Team	100	0	25	25
4	ASP lead by Physician	ID Physician	0	25	0
	If not who?		Pharmacist	None	None
5	Microbiologist accessible	100	100	25	25
6	Pharmacist responsible for ASP	100	100	25	25
7	Salart Support for ASP	0	0	0	0
8	IT support for ASP	100	100	25	25
9	Functioning Microbiology Lab	100	100	100	75
10	Total number of culture tests conducted in the past 3 months?	2508	739	588	396
11	Continuous supply of reagents for culture media available in the last 3 months?	100	100	75	75
12	Number of days in the past 3 months when cultures ingredients unvailable for preparing the culture media.	0	0	20(1)	5(1)
13	Was there a continuous supply of Antibiotic Discs in the hospital in the last 3 months?	100	100	100	75
14	Number of days in the past 3 months when Sensitivity Tests could not be performed?	0	0	0	0
15	Number of days when Sensitivity Tests could not be performed due to a breakdown of equipment in the past	0	0	0	0
16	Botswana Antimicrobial Guidelines 2012 available in the ward?	0	100	50	50
17	Functioning Infection Prevention & Control Committee in the hospital?	100	100	100	75
18	Functioning Drugs and Therapeutics Committee in the hospital?	100	0	100	75
19	Was the current Botswana Essential Drug List June 2016 version available/accessible in the ward?	100	100	25	25

#	Question				
19	Was the current Botswana Essential Drug List June 2016 version available/accessible in the ward?	100	100	25	25
B. Policy and Practice					
20	Facility have specific treatment recommendations based on local antimicrobial susceptibility	0	100	50	0
21	Facility have a written policy that requires prescribers to document an indication in the medical record	100	0	50	0
22	Preauthorization for specified antimicrobial agents to be approved by a physician or pharmacist.	0	100	50	25
23	Procedure for a physician, pharmacist to do post prescription review after 48hrs?	0	0	0	0
24	Mntimicrobial guidelines used at wards for empiric decision making?	0	0	75	25
25	Current antibiogram available in the hospital **(with data from last 12 months)**?	100	100	0	0
26	Continuing education provided to prescribers on local Antimicrobial Resistance pattern	0	100	0	0
C. Monitoring and Feedback					
27	Facility produced a cumulative antimicrobial susceptibility report in the past year?	100	100	0	0
28	Facility monitors if the indication is captured in the medical record for all antimicrobial prescriptions?	100	0	25	0
29	Facility audits or reviews surgical antimicrobial prophylaxis choice and duration?	100	0	25	0
30	Antimicrobial audits or reviews communicated directly with prescribers?	0	0	25	0
31	Facility monitors antimicrobial use by grams (Defined Daily Dose [DDD]) or counts (Days of Therapy [DOT]) of antimicrobial(s) by patients per days?	0		0	0
32	ASP team produces an annual report focused on antimicrobial stewardship the past year?	0	0	0	0

LIMITATIONS

- No on-site supervision and support for data collectors

- Committing time for data collection at the same work station was difficult though released from work due to staff shortages and the need to remain providing services.

- Confusion with several terminologies for diagnosis: Impression, Assessment, Query??? Rule out….. Etc.

- No standard template used for taking patient history; information may not be available, had to search volumes of notes. E.g. previous hospitalization, medication history etc…

- Some tests are not indicated for the admitted condition; therefore TB, Malaria, CD4 counts or HIV wasn't tested.

- Difficult to confirm a HAI as not recorded as the diagnosis and not elaborately defined in data collection tools.

- Field for "Antibiotic Stop date" was not provided

- Discrepant prescription orders: Electronic prescriptions when stopped; it wasn't stopped in drug administration sheets – the later used for the study as nurses use this to administer medications.

- Obtaining consent at some settings difficult due to participant bias (Moms of Paediatric and Neonatal)

FURTHER ANALYSIS

- Calculate DDDs/Patient Days for comparison across populations

- Facility specific analysis of PPS data

- Assess compliance with antimicrobial guidelines and WHO guidelines.

ACKNOWLEDGEMENTS

THANK YOU