Comparison of Antibiotic Resistance of Bacterial Isolates in An Intensive Care Unit of Bangladesh from 2004 to 2016

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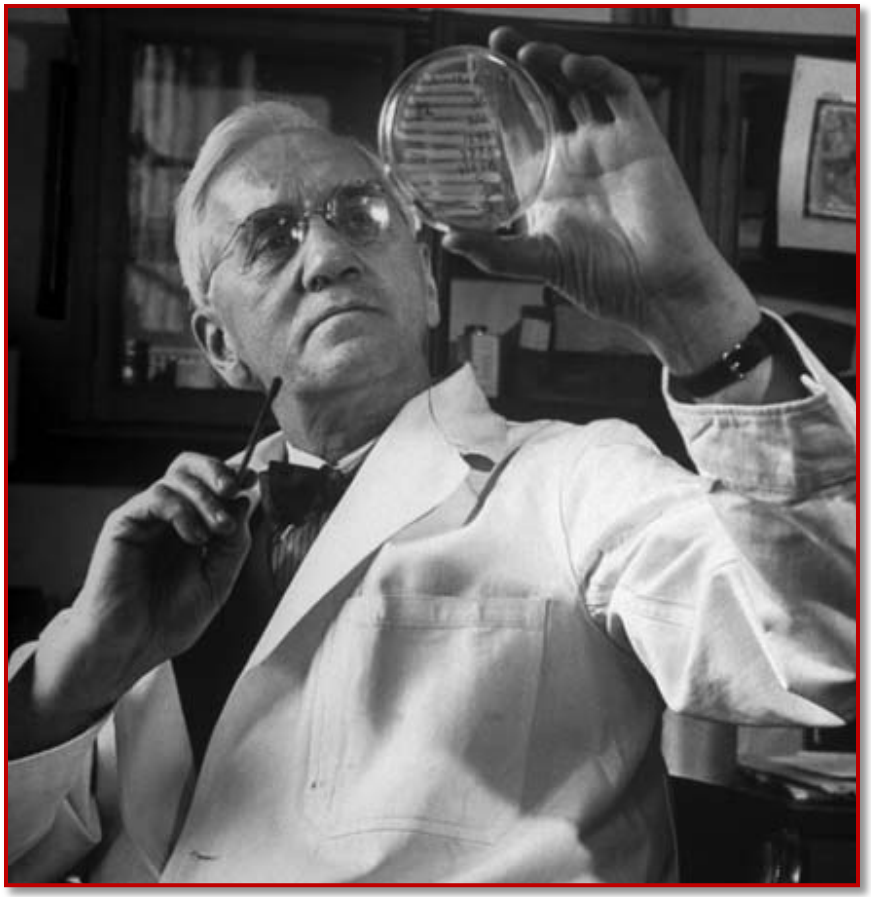
BIRDEM

“It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body.”

-Sir Alexander Fleming, Nobel lecture, December 1945.



Introduction

- Emergence of multidrug resistance organism (MDR) is a global concern.
- Antibiotic resistance plays a vital role in determining the outcome of the critically ill patients in ICU.
- Regular surveillance is necessary to explore the current situation of antibiotic resistance.

Studies	Number of ICU beds	Duration
Basunia et al	6	2004: 12 months
Barai et al	10	2006-07: 12 months
Fatema et al	10	2008-09: 6 months
Fatema et al	10	2011: 10 months
Ahsan et al	21	2015-16: 6 months
Fatema et al	21	2015-16: 6 months

Aim

- To compare the bacterial populations and their antibiotic resistance pattern in the ICU of Bangladesh Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders from 2004 to 2016.

Materials & Methods

- **Study design: Cross sectional**
- **Study unit: Adult closed combined ICU, BIRDEM**
- **Samples like respiratory secretions (sputum, tracheal aspirates or broncho-alveolar lavage), Blood (2 samples) &/or Urine were collected from patients with sepsis, or pneumonia, or septicaemia, or UTI**

Materials & Methods

- **Antimicrobial susceptibility was performed for isolated organisms by Kirby-Bauer's disk diffusion according CLSI guidelines.**

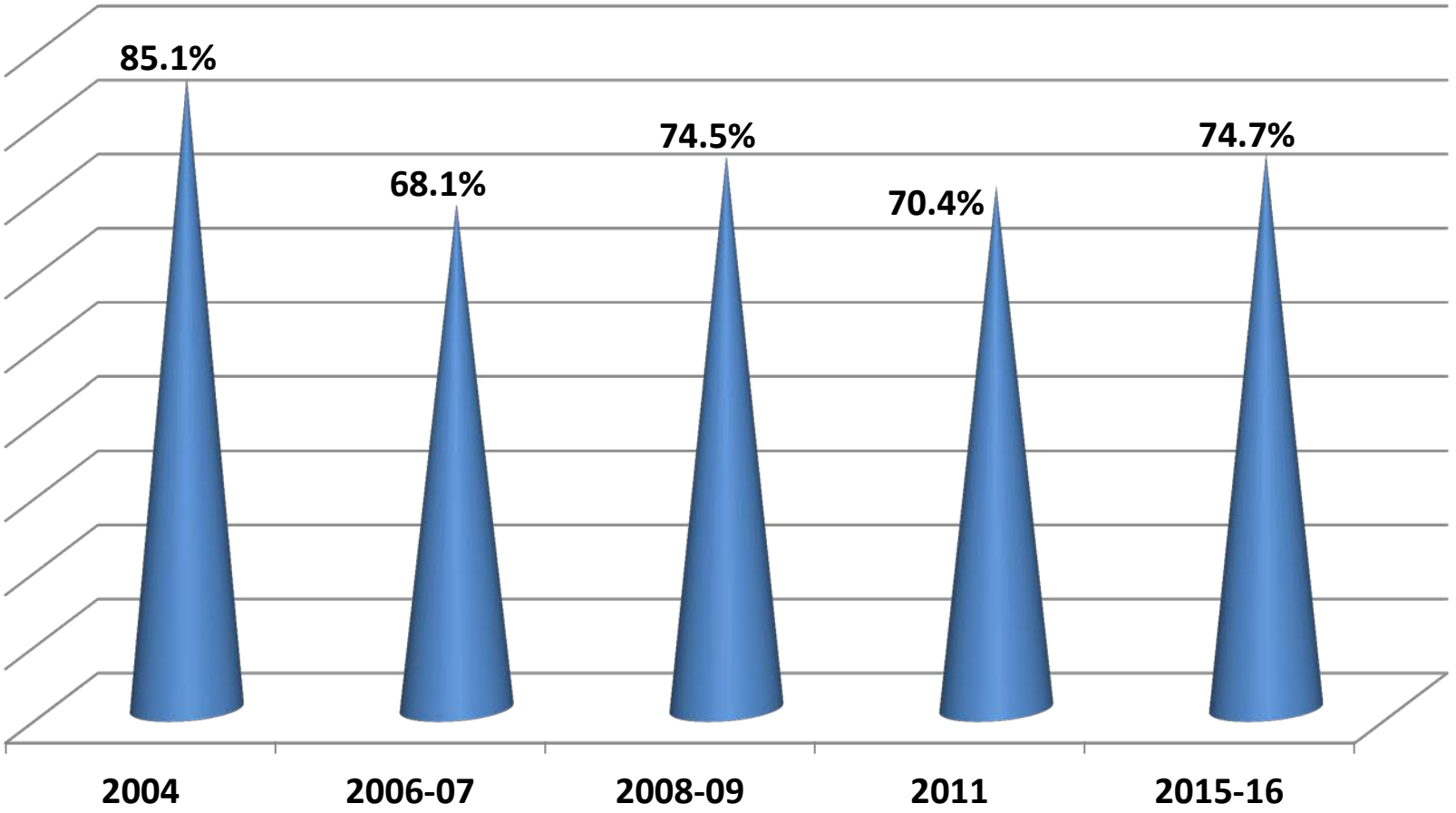
- **Statistical analysis is done by SPSS 17 for windows. Quantitative data are expressed by percentage.**

RESULTS

Rate of Positive Samples in Different Years

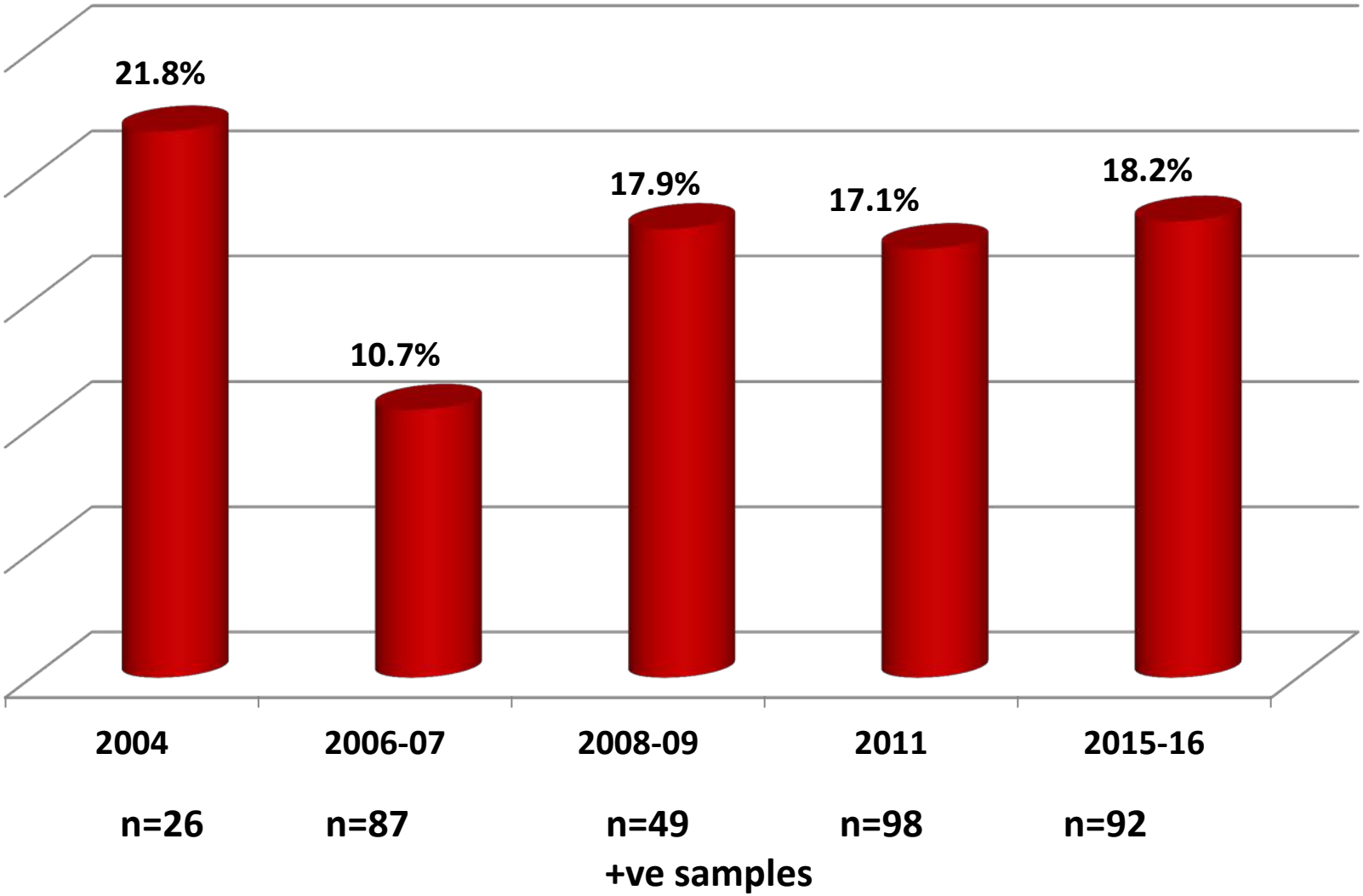
	Total samples sent	+ve samples	%
2004	133	126	94.7%
2006-07	1600	564	34%
2008-09	536	211	39.3%
2011	1408	597	42.4%
2015-16	747	293	39.2%

Rate of Culture +ve Samples in Respiratory Secretions from 2004 to 2016

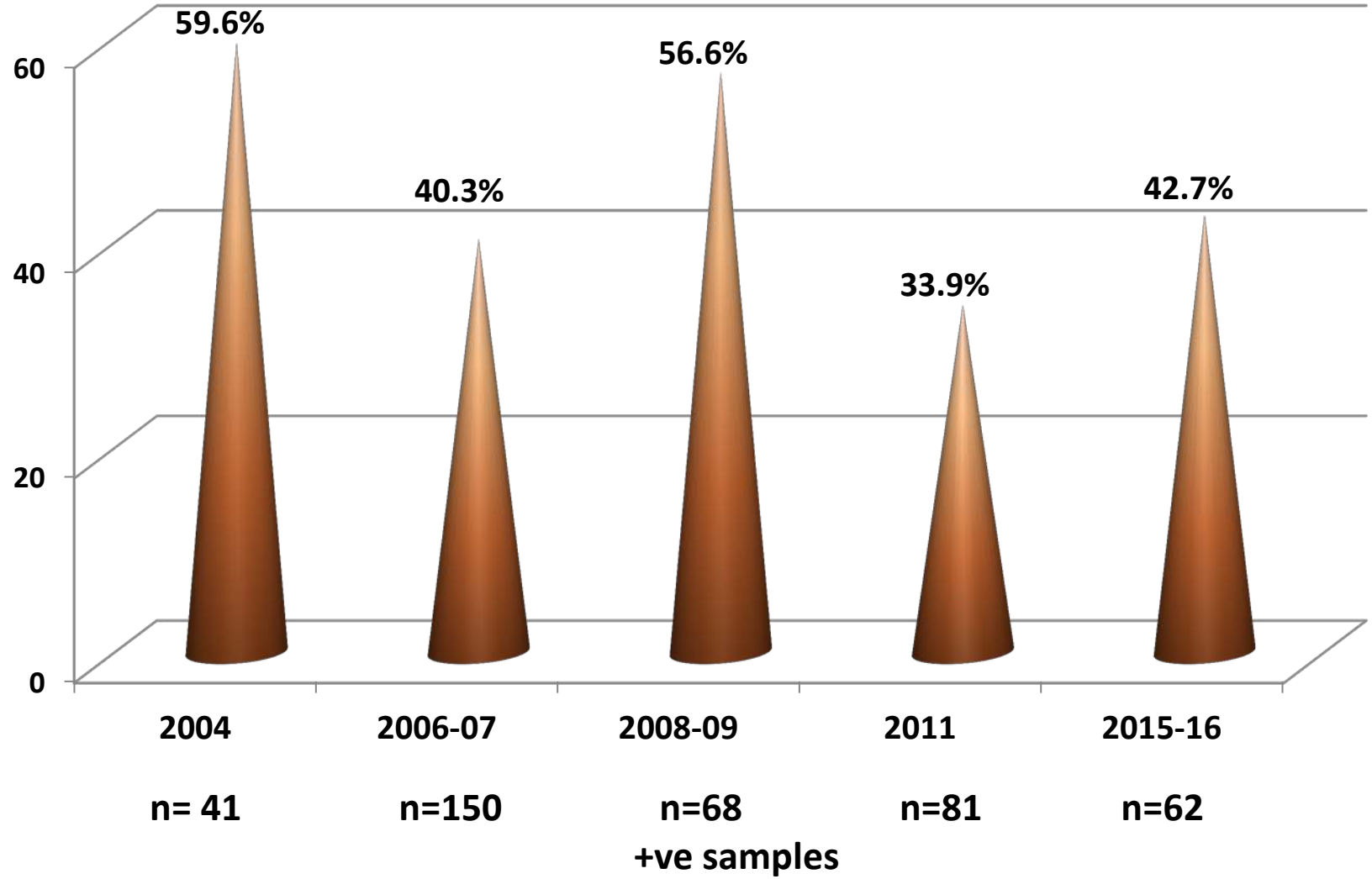


+ve samples: n= 47	n=305	n=85	n=418	n=51

Rate of Culture +ve Samples in Blood from 2004 to 2016



Rate of Culture +ve Samples in Urine from 2004 to 2016

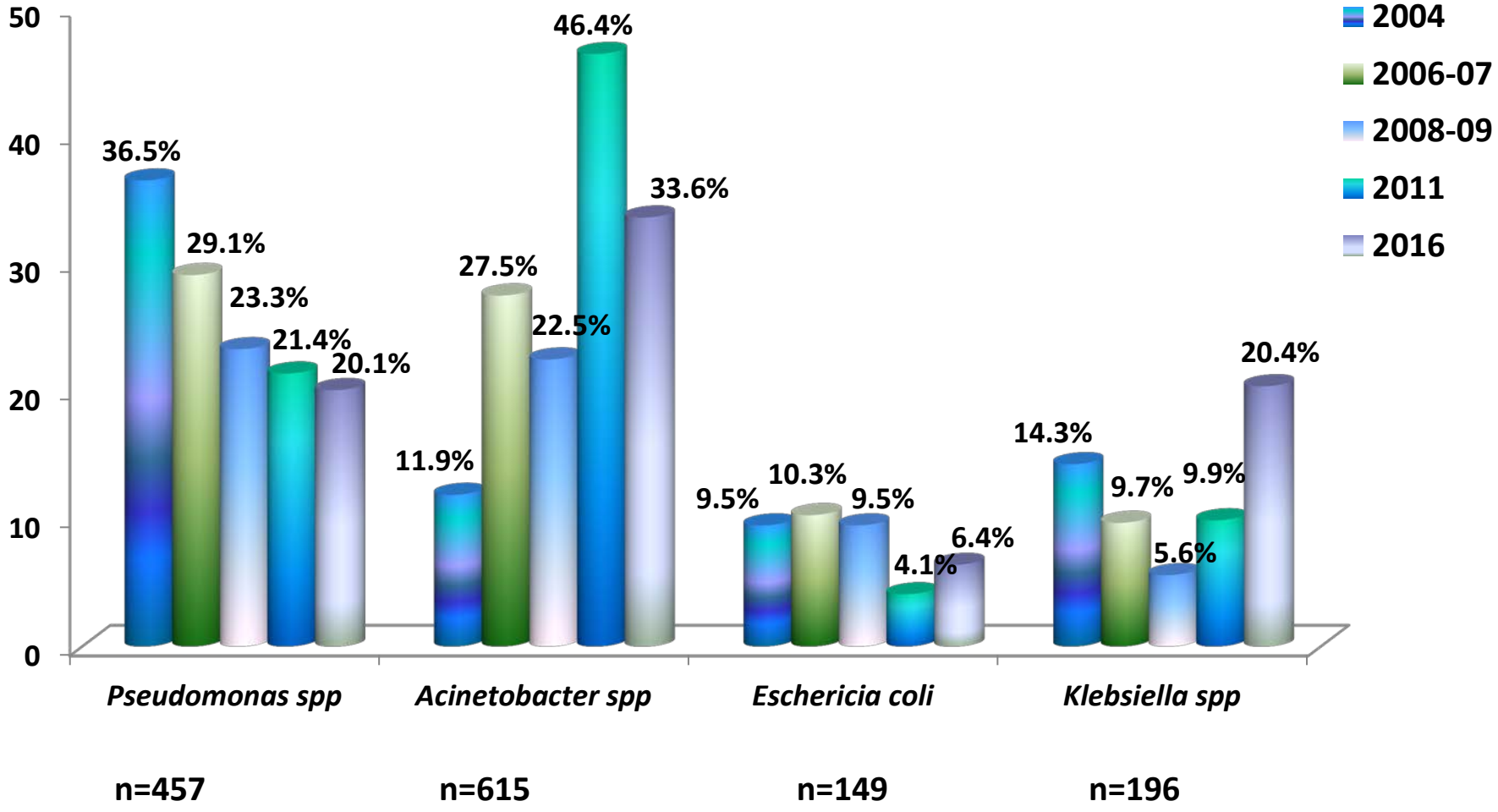


Frequency of Different Organisms from 2004 to 2016

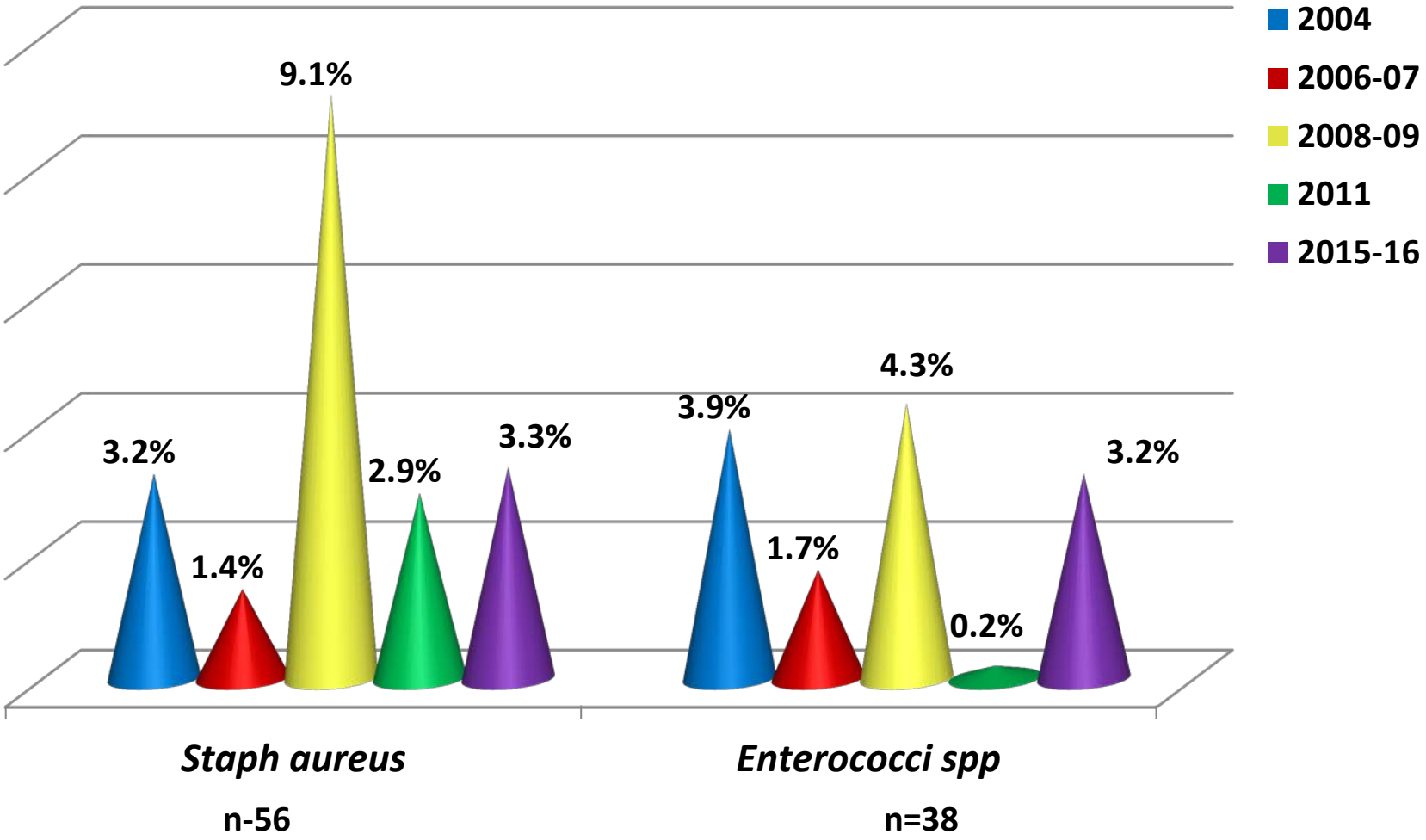
	Gram -ve organisms	Gram +ve organisms	Fungi	p value
2004 (n=126)	98 (77.7%)	09 (7.1%)	19 (15.1%)	<0.001
2006-07 (n=632)	529 (83.7%)	22 (3.4%)	81 (12.8%)	<0.001
2008-09 (n=231)	144 (62.3%)	36 (15.5%)	51 (22.1%)	<0.001
2011 (n=684)	573 (83.7%)	32 (4.6%)	79 (11.5%)	<0.001
2015-16 (n=364)	332 (91.2%)	12 (3.2%)	20 (5.4%)	<0.001

Gram negative	***Pseudomonas spp, Acinetobacter spp, Klebsiella spp, Eschericia coli, Proteus spp, Flavobacterium spp, Citrobacter spp, Enterobacter spp, Providencia spp, Serratia spp, Burkholderia pseudomallei***
Gram positive	***Staphylococcus aureus, Staphylococcus epidermidis, Coagulase negative staphylococci, Streptococcus pyogenes, Enterococci spp, Non-enterococci spp***
Fungi	***Candida spp, Aspergillus spp***

Isolation Rate of Major Gram Negative Organisms from 2004 to 2016

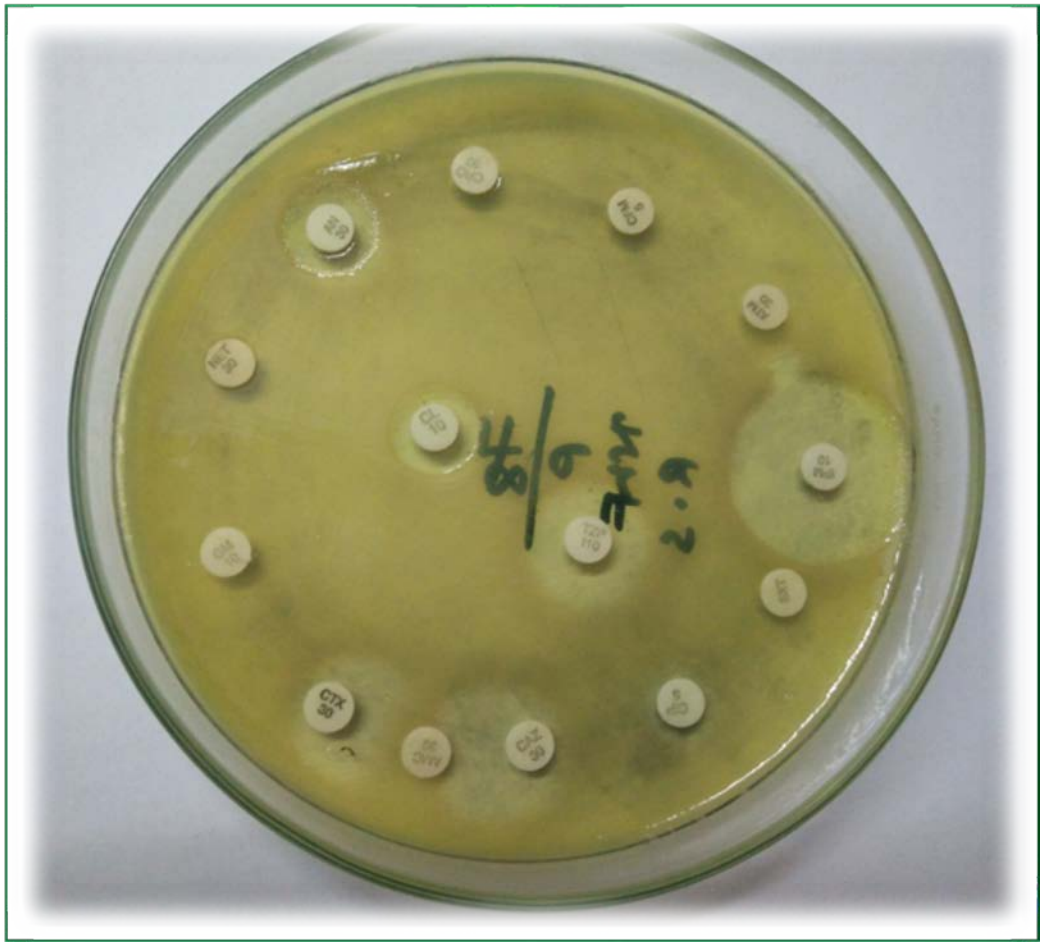


Isolation Rate of Major Gram Positive Organisms from 2004 to 2016



BACTERIA & ANTIBIOGRAM

Pseudomonas spp



Pseudomonas spp

	Res. Sec.	Blood	Urine	Total
2004	13 (27.6%)	21 (80.7%)	08 (19.5%)	42
2006-07	116 (32.9%)	45 (51.7%)	17 (9.9%)	178
2008-09	22 (21.3%)	25 (51.1%)	05 (7.1%)	52
2011	95 (19.3%)	47 (45.1%)	05 (5.6%)	141
2015-16	12 (13.6%)	25 (26.5%)	07 (11.2%)	44

(* % indicates number of organisms/total isolates in respective sample in that respective year)

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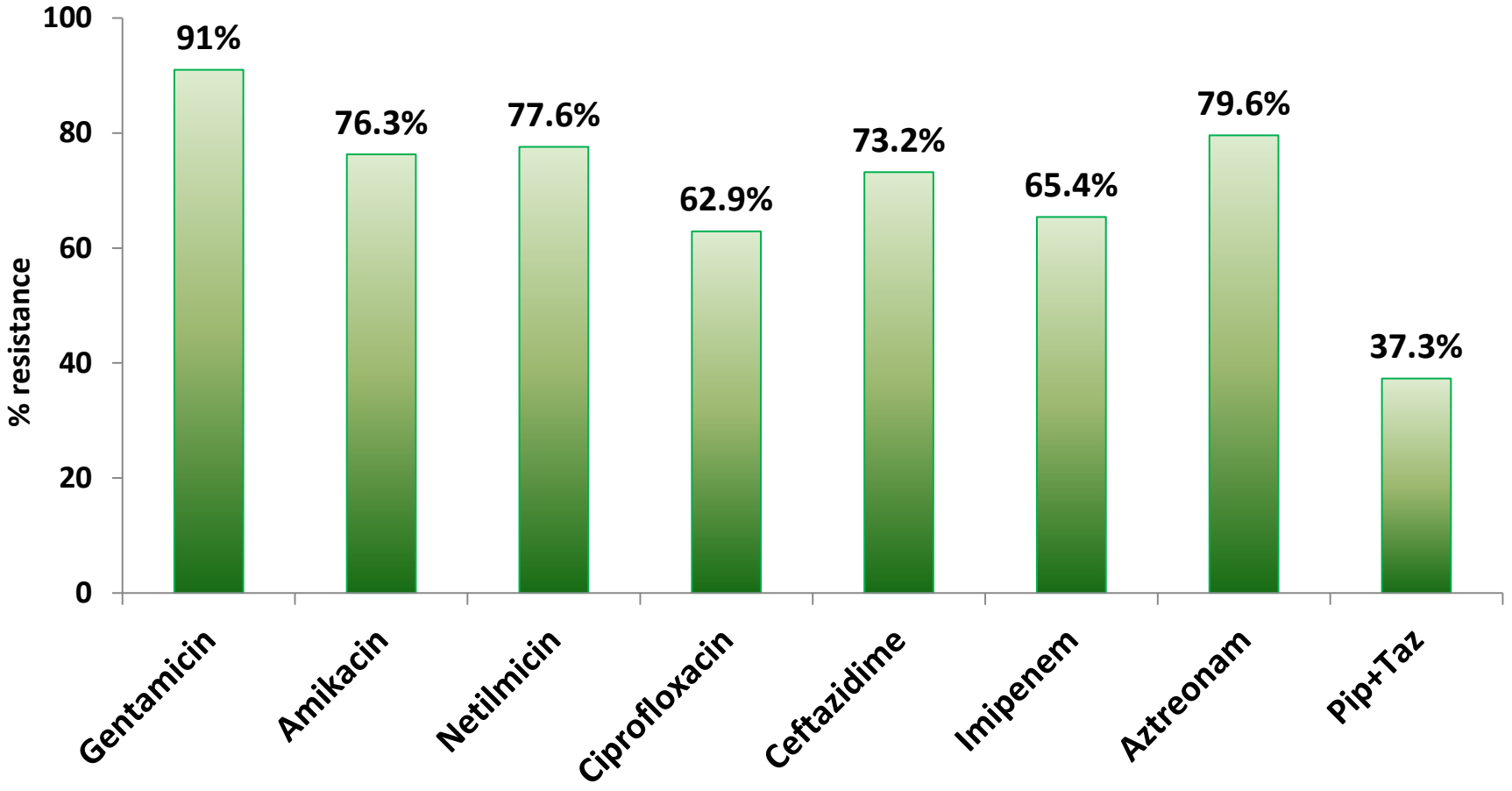
(* % indicates number of organisms/total isolates in respective sample in that respective year)

Resistance of Isolated *Pseudomonas spp (n=457)*



Acinetobacter spp

Acinetobacter spp

	Res. Sec.	Blood	Urine	Total
2004	12 (20%)	01 (3.8%)	01 (2.4%)	14
2006-07	144 (40.9%)	16 (18.3%)	08 (4.6%)	168
2008-09	45 (43.6%)	04 (8.1%)	02 (2.8%)	51
2011	288 (58.6%)	26 (25%)	04 (4.4%)	318
2015-16	33 (37.5%)	28 (29.7%)	03 (4.8%)	64

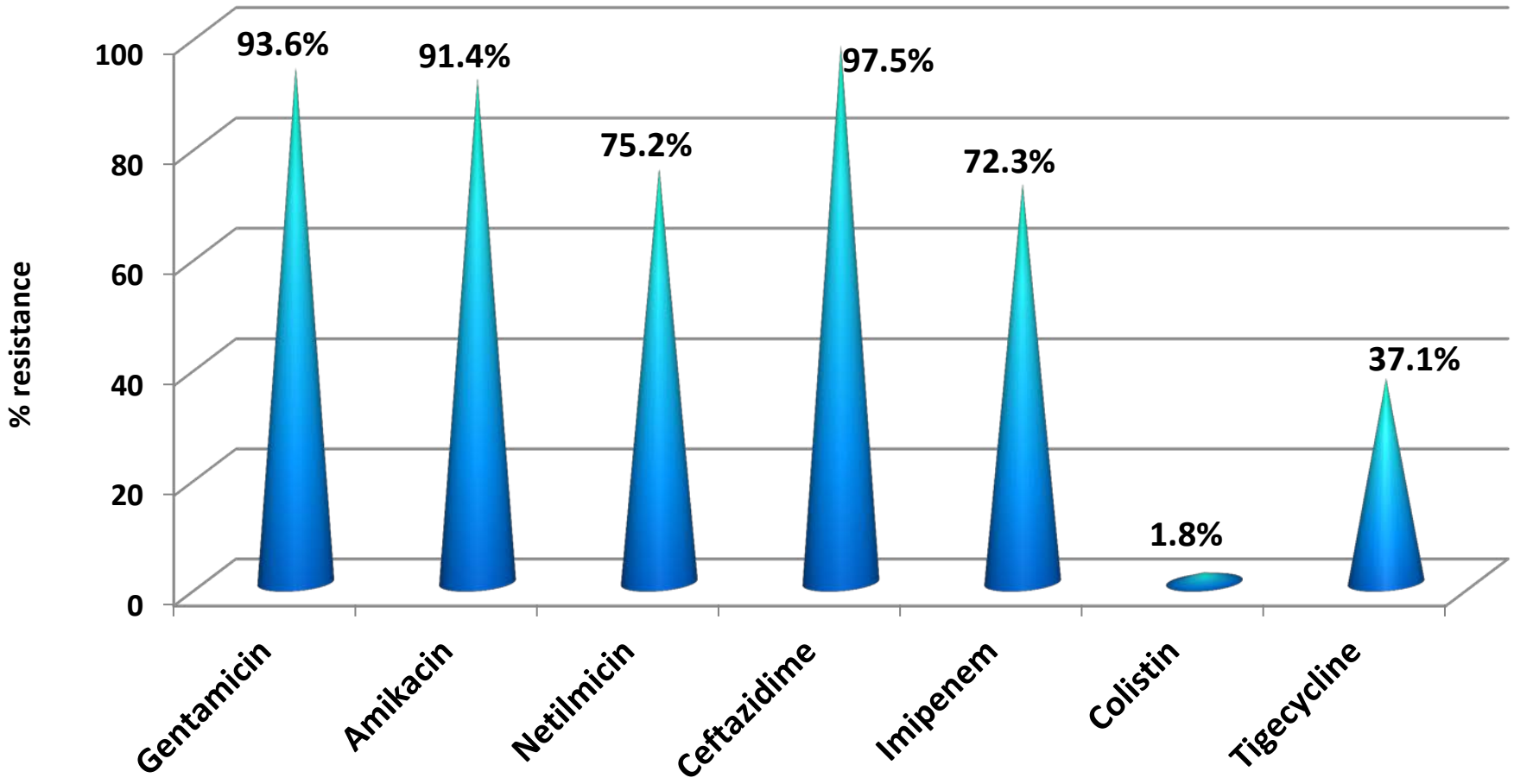
(* % indicates number of organisms/total isolates in respective samples in respective year)

Acinetobacter spp

	Res. Sec.	Blood	Urine	Total
2004	12 (20%)	01 (3.8%)	01 (2.4%)	14
2006-07	144 (40.9%)	16 (18.3%)	08 (4.6%)	168
2008-09	45 (43.6%)	04 (8.1%)	02 (2.8%)	51
2011	288 (58.6%)	26 (25%)	04 (4.4%)	318
2015-16	33 (37.5%)	28 (29.7%)	03 (4.8%)	64

(* % indicates number of organisms/total isolates in respective samples in respective year)

Resistance of Isolated *Acinetobacter spp (n=615)*



Enterobacteriaceae

Klebsiella spp

	Res. Sec.	Blood	Urine	Total
2004	10 (21.2%)	0	05 (12.1%)	15
2006-07	38 (10.7%)	05 (5.7%)	14 (8.1%)	57
2008-09	11 (10.6%)	01 (2.1%)	01 (1.4%)	13
2011	47 (9.5%)	14 (13.4%)	07 (7.8%)	68
2015-16	20 (22.7%)	17 (18.1%)	06 (9.6%)	43

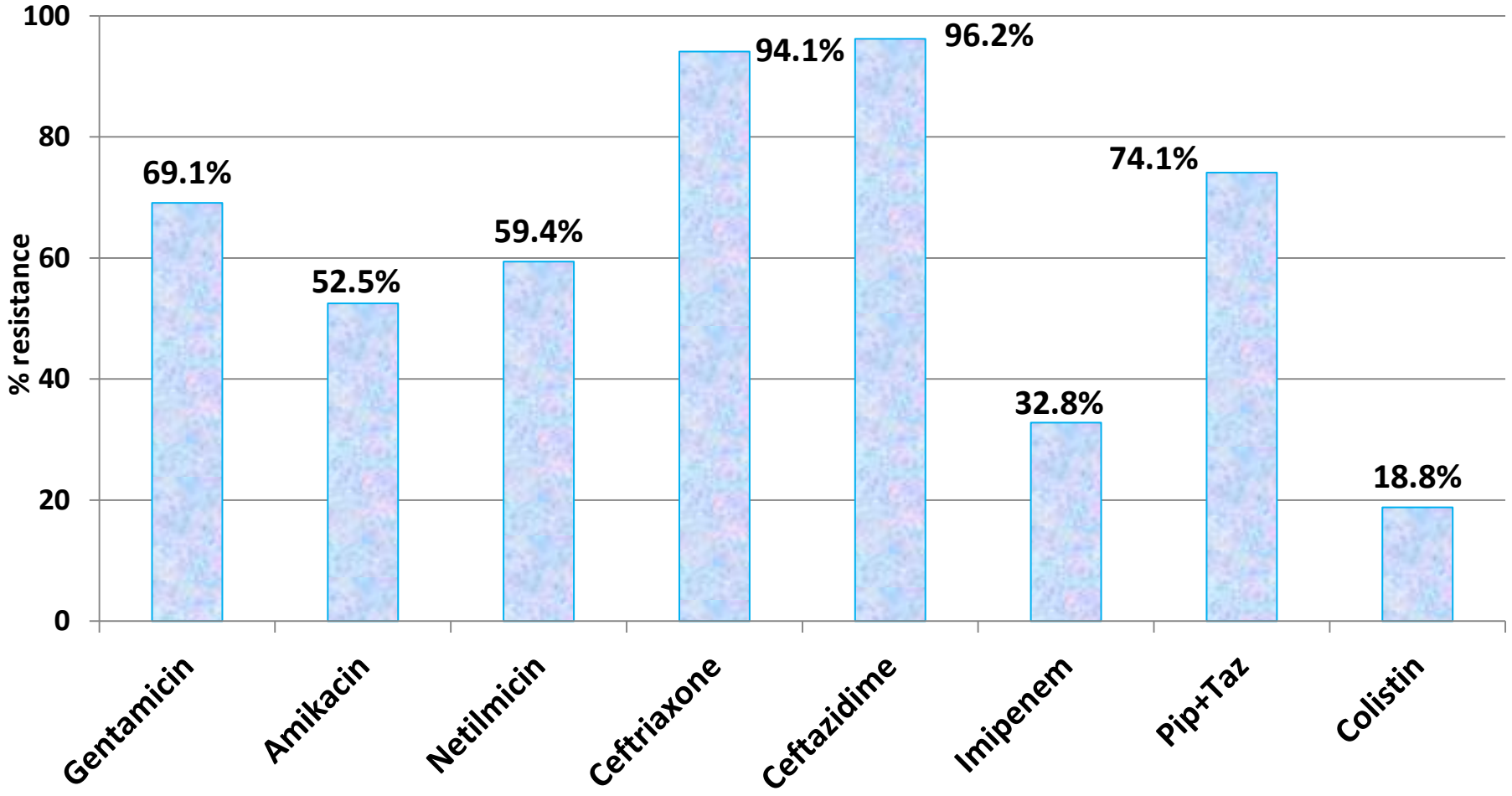
(* % indicates number of organisms/total isolates in respective samples in that year)

Klebsiella spp

	Res. Sec.	Blood	Urine	Total
2004	10 (21.2%)	0	05 (12.1%)	15
2006-07	38 (10.7%)	05 (5.7%)	14 (8.1%)	57
2008-09	11 (10.6%)	01 (2.1%)	01 (1.4%)	13
2011	47 (9.5%)	14 (13.4%)	07 (7.8%)	68
2015-16	20 (22.7%)	17 (18.1%)	06 (9.6%)	43

(* % indicates number of organisms/total isolates in respective samples in that year)

Resistance of Isolated *Klebsiella spp (n=196)*



Eschericia coli

	Res. Sec.	Blood	Urine	Total
2004	05 (10.6%)	0	05 (12.1%)	10
2006-07	16 (4.5%)	14 (16.1%)	33 (19.2%)	63
2008-09	05 (4.8%)	07 (14.2%)	10 (14.2%)	22
2011	14 (2.8%)	06 (5.7%)	08 (8.9%)	28
2015-16	01 (1.1%)	11 (11.7%)	14 (22.5%)	26

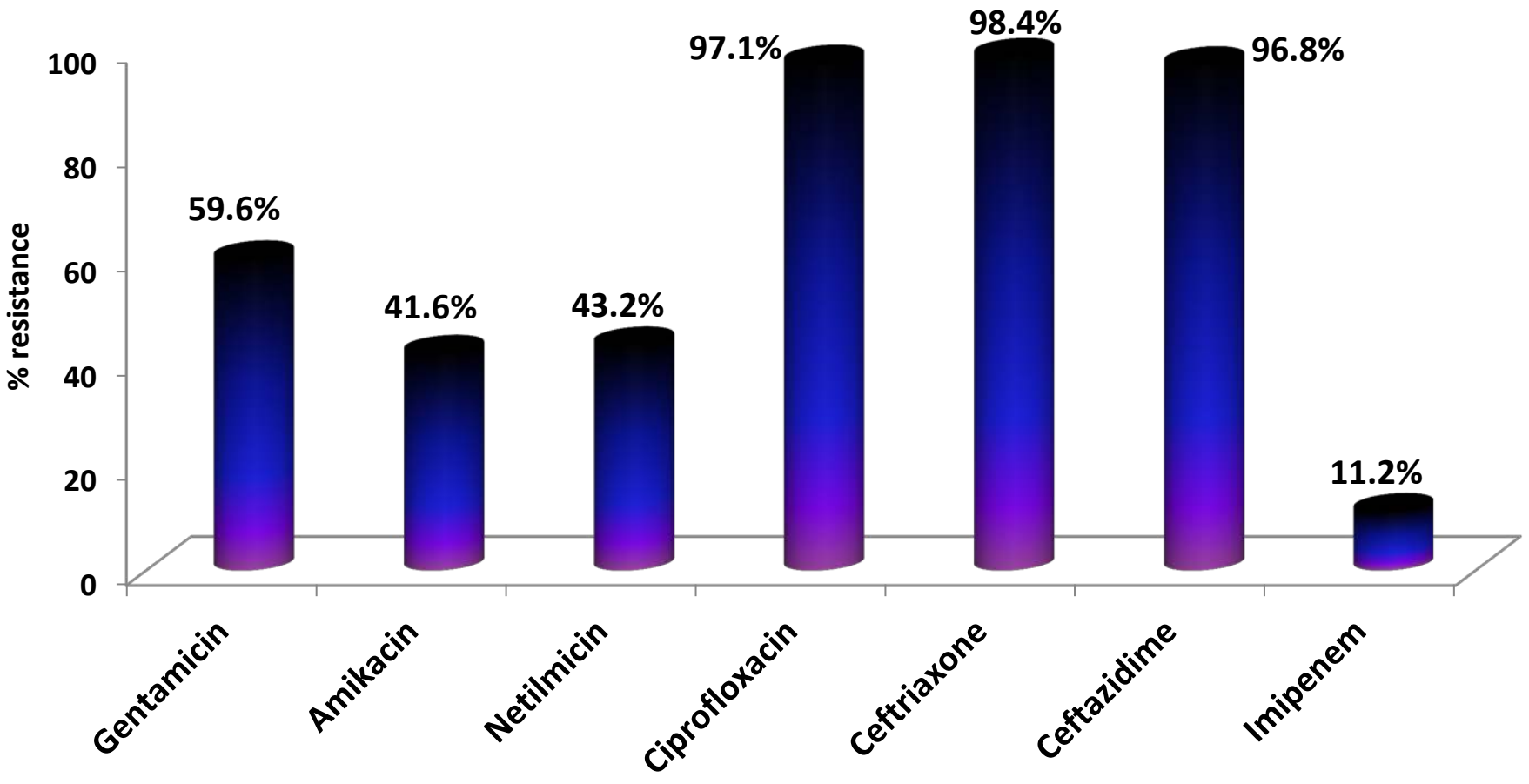
(* % indicates number of organisms/total isolates in respective sample in that year)

Eschericia coli

	Res. Sec.	Blood	Urine	Total
2004	05 (10.6%)	0	05 (12.1%)	10
2006-07	16 (4.5%)	14 (16.1%)	33 (19.2%)	63
2008-09	05 (4.8%)	07 (14.2%)	10 (14.2%)	22
2011	14 (2.8%)	06 (5.7%)	08 (8.9%)	28
2015-16	01 (1.1%)	11 (11.7%)	14 (22.5%)	26

(* % indicates number of organisms/total isolates in respective sample in that year)

Resistance of Isolated *Eschericia coli (n=149)*



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Coag +ve

Staphylococcus aureus (n=56)

	Res. Sec.	Blood	Urine	Total
2004	02 (4.2%)	02 (7.6%)	0	04
2006-07	08 (2.2%)	0	01 (0.5%)	09
2008-09	08 (7.7%)	07 (14.2%)	02 (2.8%)	17
2011	19 (3.8%)	01 (0.9%)	0	20
2015-16	04 (4.5%)	02 (2.1%)	0	06

(* % indicates number of organisms/total isolates in respective sample in respective year)

Staphylococcus aureus (n=56)

	Res. Sec.	Blood	Urine	Total
2004	02 (4.2%)	02 (7.6%)	0	04
2006-07	08 (2.2%)	0	01 (0.5%)	09
2008-09	08 (7.7%)	07 (14.2%)	02 (2.8%)	17
2011	19 (3.8%)	01 (0.9%)	0	20
2015-16	04 (4.5%)	02 (2.1%)	0	06

(* % indicates number of organisms/total isolates in respective sample in respective year)

Enterococci spp (n=38)

	Res. Sec.	Blood	Urine	Total
2004	01 (2.1%)	0	04 (9.7%)	05
2006-07	01 (0.2%)	0	10 (5.8%)	11
2008-09	0	0	09 (12.8%)	09
2011	0	0	02 (2.2%)	02
2015-16	02 (2.2%)	04 (4.2%)	05 (8.1%)	11

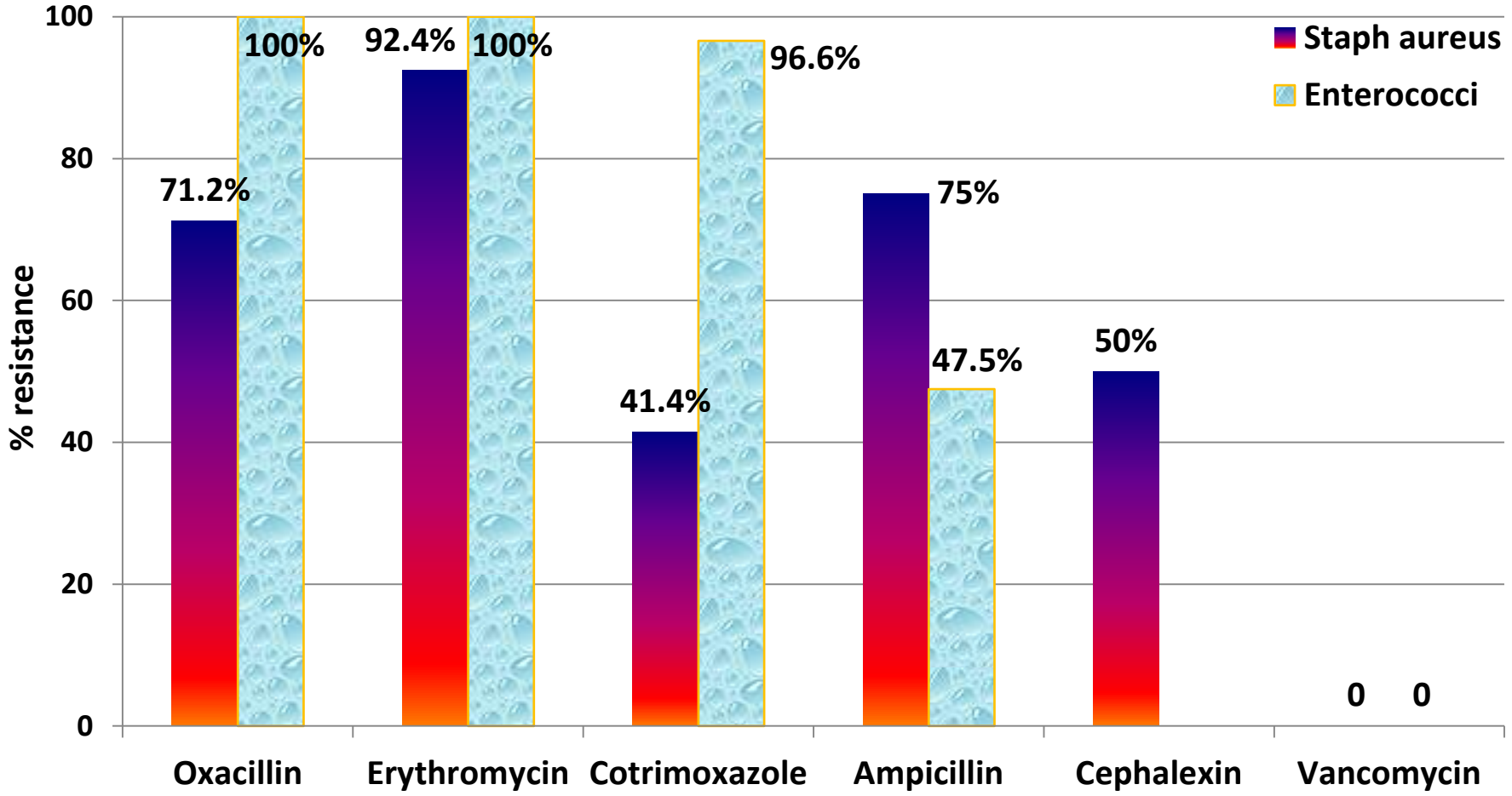
(* % indicates number of organisms/total isolates in respective sample in respective year)

Enterococci spp (n=38)

	Res. Sec.	Blood	Urine	Total
2004	01 (2.1%)	0	04 (9.7%)	05
2006-07	01 (0.2%)	0	10 (5.8%)	11
2008-09	0	0	09 (12.8%)	09
2011	0	0	02 (2.2%)	02
2015-16	02 (2.2%)	04 (4.2%)	05 (8.1%)	11

(* % indicates number of organisms/total isolates in respective sample in respective year)

Antibiogram of Major Gram Positive Organisms



Conclusion

we're not scared of antibiotics!
there's just no stopping us...
realivze health

- **High prevalence of drug resistant organisms.**

- **Strict infection control policies & antibiotic stewardship program must be implemented in hospitals & in ICUs to combat this problem.**

Thank You All

Acknowledgement

Dept of Microbiology, BIRDEM

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Thank You All