

Impact of an Antimicrobial Stewardship Intervention in India: Evaluation of Post Prescription Review and Feedback as a Method of Promoting Optimal Antimicrobial Use



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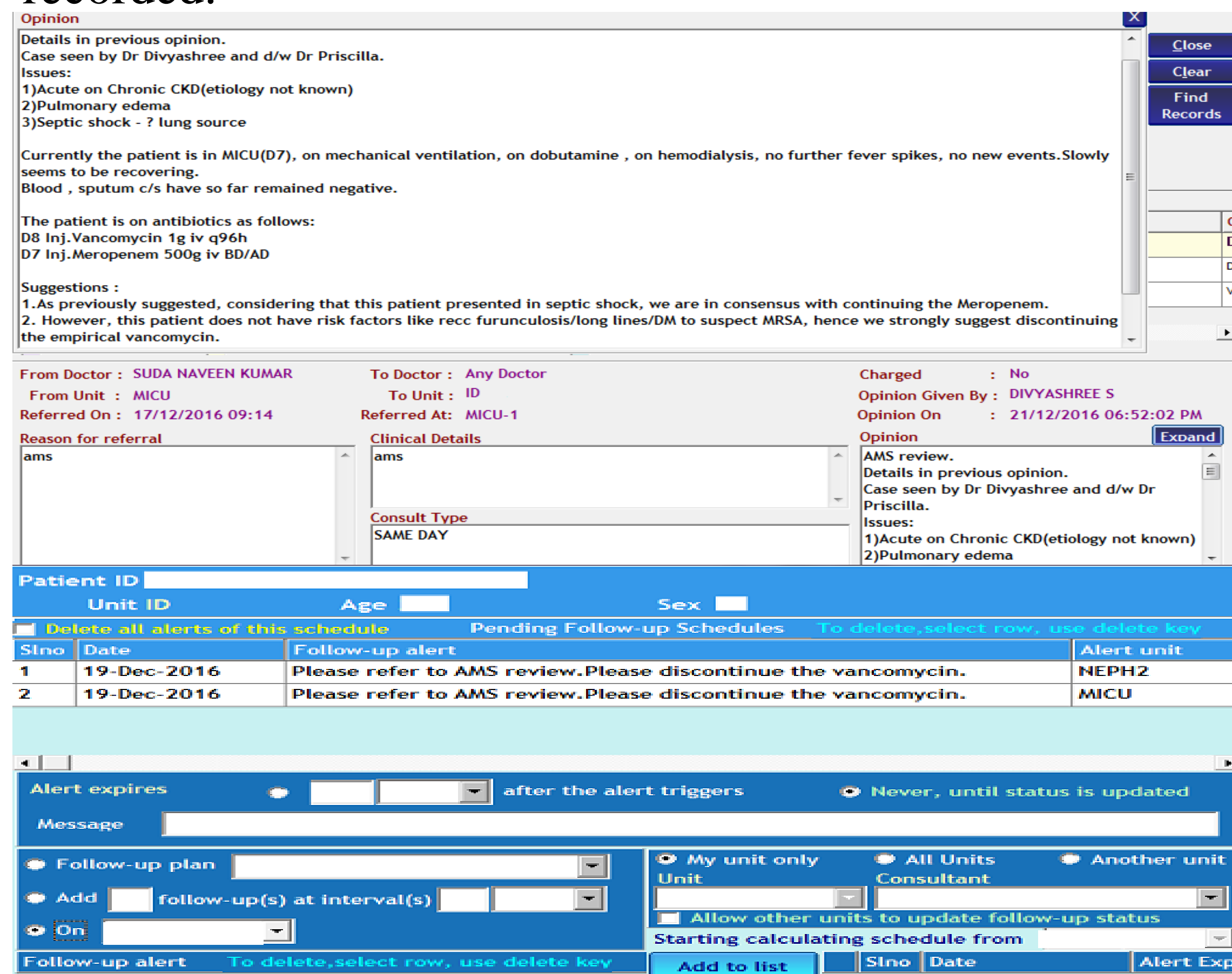
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Introduction

Antimicrobial stewardship programs (AMSP) are effective in developed countries. This study assessed the effectiveness of AMSP in a low middle-income country like India.

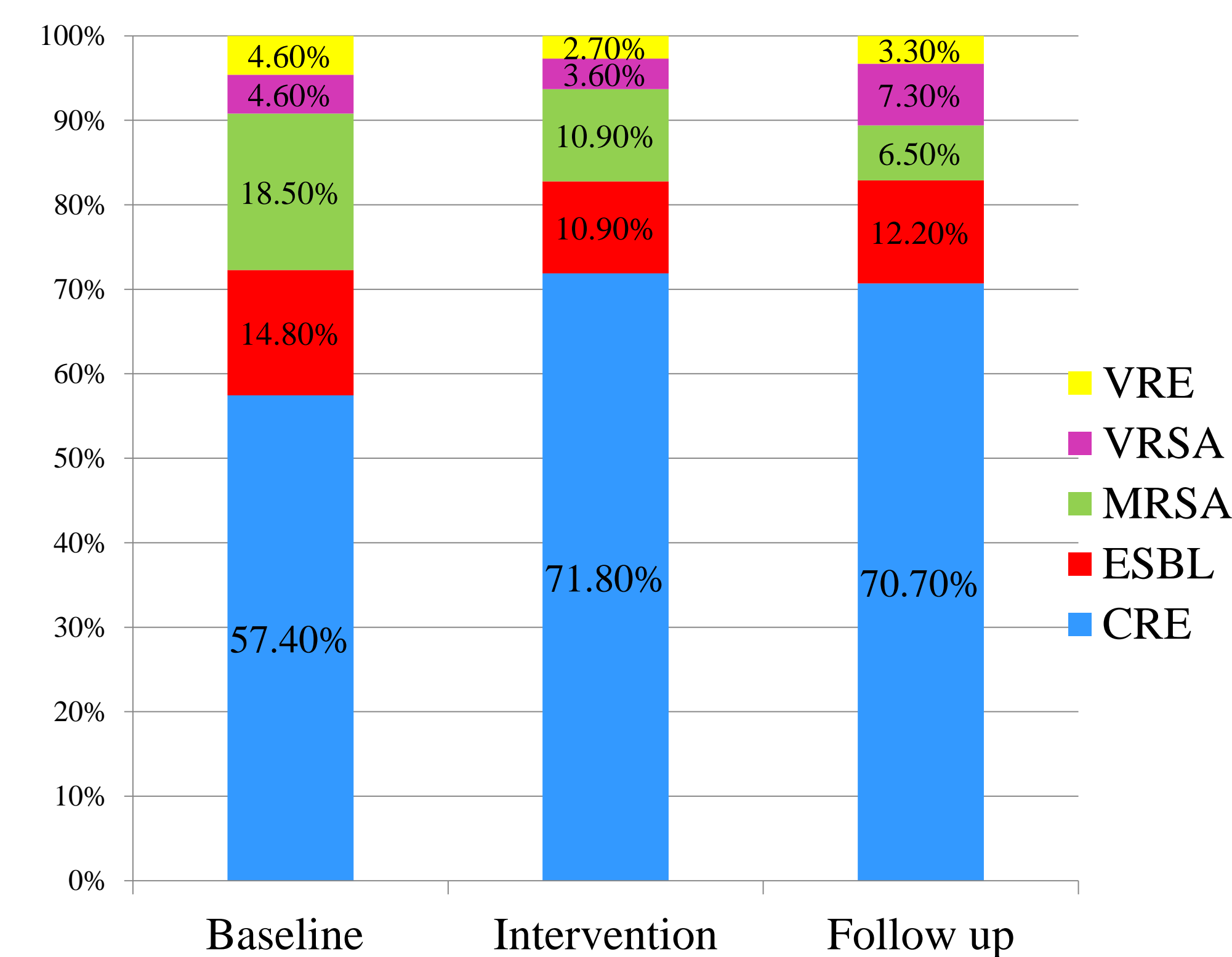
Methodology

- An Infectious Diseases (ID) physician-driven prospective audit and feedback strategy to evaluate the effectiveness of an AMSP in 2 intensive care settings of a tertiary care hospital was performed from January 2016 to July 2017 in 3 phases: baseline, intervention and follow up each consisting of 6 months.
- Primary outcome: Days on antimicrobial therapy (DOT).
- Secondary outcomes included proportion of prescriptions with inappropriate choice of antibiotic use.
- Process measures included rates of de-escalation according to culture susceptibility and clinical evaluation; intervention rate (defined as the number of courses of therapy in which a modification is recommended divided by the total number of courses) and acceptance rate (calculated as the number of recommendations accepted divided by the number of recommendations made).
- In the intervention phase a patient on antibiotics for > 48 hours was assessed by an ID physician and recommendations made.
- The recommendations were discussed with both the ICU and treating teams with individual alerts sent to the entire team as reminders.
- In the baseline and follow up period relevant data were recorded.



- A total of 401, 381 and 379 patients were recruited in the baseline, intervention and follow up phases. Baseline characteristics of the 3 groups were similar.
- Antimicrobial use decreased from 831.5 during baseline to 717 DOT per 1000 patient days in the intervention (p value<0.0001) and the effect was sustained in the follow-up period (713.6 DOT per 1000 patient days).
- Compliance to hospital-based antibiotic guidelines significantly improved in intervention and follow up phases compared to the baseline (19.5%, 21.8%, 33.2%; p<0.0001).
- Among the study antimicrobials, DOTs were significantly lower in the intervention vs. baseline phase for Quinolones (21.5vs.33.3) Carbapenems (340.2 vs.426.0) and Colistin (131.5vs.155.9) (p<0.0001).
- De-escalation according to culture susceptibility was significantly higher in the intervention group compared to the baseline (42.7% vs.23.6%-p<0.0001).
- We found that 70.3% of antibiotic prescriptions were inappropriate and commonly occurred in the absence of an appropriate clinical indication.
- Recommendations by the ID team were accepted in 60.7% of the cases.
- All-cause hospital mortality rates were 22.4% and 27.6% in the baseline and intervention phases respectively (p=0.093).

Figure1.Prevalence of Multidrug Resistant Organism



Results

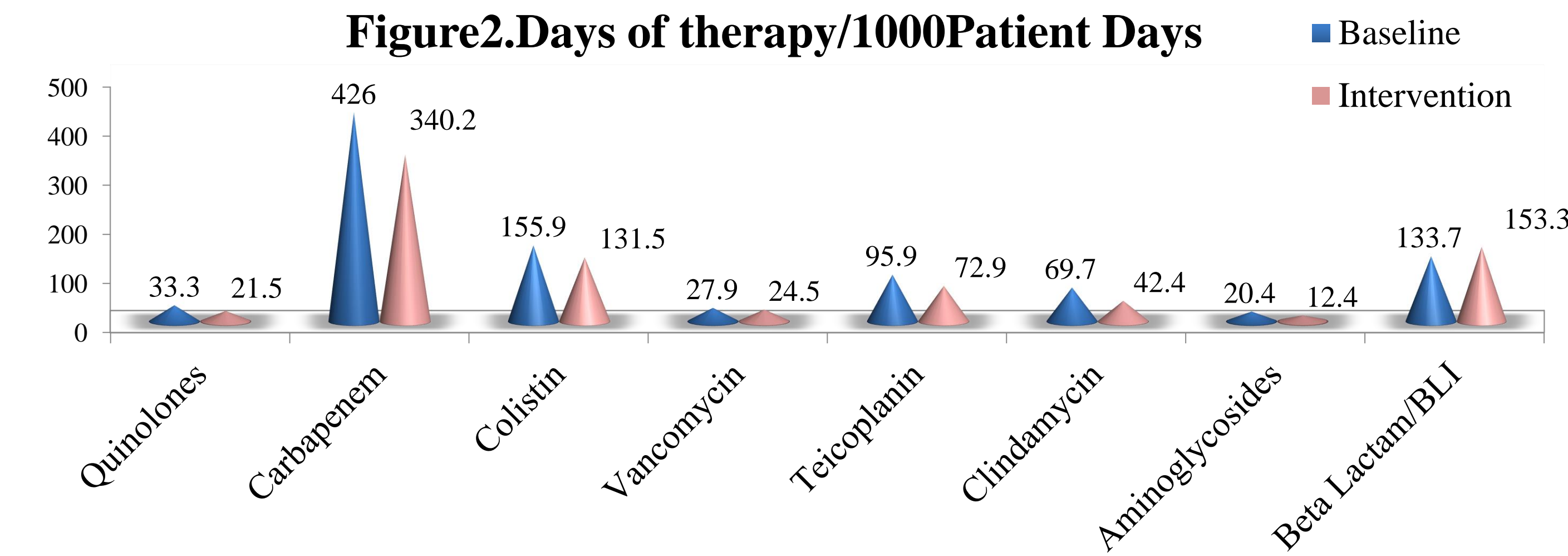


Figure3. Acceptance of recommendation given by the ID physician during Intervention phase

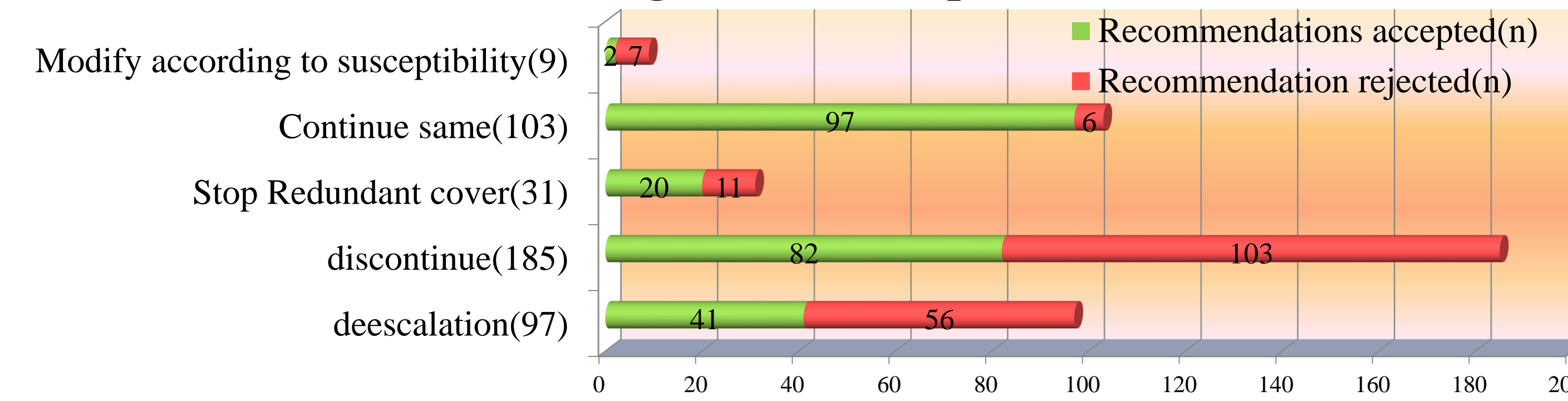


Table 1·Baseline characteristics of patients enrolled under Baseline, Intervention and Follow up Phases

Characteristics	Baseline n (%)	Intervention n (%)	P-value	Follow up n (%)
Total number of patients	401	381		379
Age(years ±SD)	46.21 ± 17.07	46.04 ± 16.6	0.578	47.14±17.3
Gender, male	243 (60.8)	235 (61.4)	0.863	239(63)
Co-Morbid conditions				
Diabetes Mellitus	131(32.7)	115(30.2)	0.452	100(26.4)
Hypertension	137(34.2)	114(29.9)	0.198	98(25.9)
End- stage renal disease	50(12.5)	26(6.8)	0.007	42(11.1)
Bone Marrow transplant	6(1.5)	5(1.3)	0.812	12(3.2)
Organ transplant	5(1.2)	4(1)	0.789	12(3.2)
Chemotherapy	39(9.7)	38(10)	0.888	33(8.7)
Surgery prior to the current ICU admission	102(25.4)	128(33.6)	0.012	105(27.7)
Severity of Illness				
(Apache II score above 15)	177(44.1)	188(51.9)	0.029	205(55.1)
Type of patients				
Medical	139(34.7)	145(38.1)	0.323	137(36.1)
Surgical	262(65.3)	236(61.9)	0.323	242(63.9)
Primary source of Infection				
None, undetermined	158(39.4)	127(33.3)	0.076	159(42.1)
Catheter-related	4(1)	3(0.8)	0.768	3(0.8)
Skin or wound	63(15.7)	77(20.2)	0.101	45(11.9)
Endocarditis	4(1)	1(0.3)	0.227	0
Intra-abdominal	79(19.7)	73(19.2)	0.860	66(17.4)
Respiratory	43(10.7)	41(10.8)	0.964	44(11.6)
Urinary tract	21(5.2)	11(2.9)	0.104	10(2.6)
Central Nervous System	7(1.7)	6(1.6)	0.913	2(0.5)
Others	40(10)	52(13.6)	0.118	50(13.2)
Origin of onset of Infection				
Community-onset	157(60.2)	182(63.2)	0.388	112(43.6)
Healthcare associated & Hospital acquired	104(39.8)	106(36.8)	0.388	145(56.4)
Discharge Diagnosis				
Infections	98(24.4)	81(21.3)	0.302	70(18.5)
Non-Infectious cause	119(29.7)	109(28.6)	0.735	119(31.4)
Combination of the above	184(45.9)	191(50.1)	0.240	190(50.1)

Table 2·Review of Antibiotic therapy by the ID Team at Day 3

Variable	Baseline n (%)	Intervention n (%)	P-value	Follow up n (%)
Indication for Antimicrobial therapy				
Definite Infection#	203(50.6)	196(51.7)	0.758	168(44.3)
Probable Infection##	96(23.9)	101(26.6)	0.385	125(33)
Prophylaxis	102(25.4)	82(21.6)	0.211	81(21.4)
Compliance to Hospital Infection Control guidelines				
Yes	78(19.5)	83(21.8)	0.427	126(33.2)
No	160(39.9)	210(55.1)	<0.001	170(44.9)
Not applicable	163(40.6)	88(23.1)	<0.001	83(21.9)
Antimicrobial use				
Justified	90(22.4)	113(29.7)	0.020	157(41.4)
Unjustified	311(77.6)	268(70.3)	0.020	222(58.6)
Reason for unjustified antibiotics*				
Inappropriate Choice	294(70.3)	214(56.2)	<0.001	209(55.1)
Inappropriate Route of administration	2(0.5)	0	0.167	0
Reason for Inappropriate choice of antibiotics				
Narrow spectrum antibiotics available	40(10)	96(25.2)	<0.001	52(13.7)
Clinically not indicated	181(45.1)	134(35.2)	0.005	135(35.6)
Redundant Coverage	121(30.2)	52(13.6)	<0.001	59(15.6)
Others**	15(3.7)	11(2.9)	0.532	1(0.3)

* The percentages do not add up as there is overlap **Pathogen-antibiotic mismatch
 #Definite Infection is defined as a clinically documented infection with microbiological confirmation.
 ##Probable Infection is defined as a clinically documented infection without microbiological confirmation.

Table 3. Secondary Outcomes at Discharge

Variable	Baseline n (%)	Intervention n (%)	P-value	Follow up n (%)
De-escalation rate according to culture susceptibility	37(23.6)	67(42.7)	<0.001	53(33.8)
Mortality	90(22.4)	105(27.6)	0.093	85(22.4)
Length of stay(days ±SD)				
Hospital	19.19±17.4	20.2±17.2	0.415	20.3±15.9
Intensive care unit	8.3±6.2	8±7.6	0.545	8.7±8.3
Unintended consequences of antibiotic use				
C-difficile	6(1.5)	2(0.5)	0.163	0
Candidemia	5(1.2)	7(1.8)	0.489	6(1.6)
Drug induced adverse effect	0	1(0.3)	0.272	2(0.5)

Conclusion

ID physician-driven antimicrobial stewardship program was successful in reducing antibiotic utilization without compromising patient safety in low and middle-income countries; however this needs further validation.

Reference

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Acknowledgments

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