



ANALYSIS OF DE-ESCALATION PATTERN OF ANTIBIOTICS IN CRITICALLY ILL PATIENTS WITH INFECTIOUS DISEASE IN A QUATERNARY CARE HOSPITAL: A RETROSPECTIVE OBERVENTIONAL STUDY

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Article Received on
14 Sept. 2017,

Revised on 03 October 2017,
Accepted on 24 October 2017

DOI: 10.20959/wjpps201711-10433

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ABSTRACT

Background: Antibiotic de-escalation is a process for judicious use of antibiotics which helps to reduce the emergence of drug-resistant microorganisms. Objective of the study is to analyze whether de-escalation was done in critically ill patients with infectious disease in quaternary care hospital. **Methodology:** A retrospective interventional study was carried out at a quaternary care hospital in Haryana, North India between February 2016 to April 2017 in which 50 patients meeting the inclusion criteria were selected and analyzed whether de-escalation was done on those patients based on antibiogram of the institution, patient condition and microbiological report. **Results and Discussion:** Out of 50 patients included in the study, except for one

patient the culture was sent within 72 hours after starting antibiotics. Antibiotic de-escalation must be done in both culture positive and culture negative patients, 86% of culture positive and 71% of culture negative patients have undergone de-escalation in this study. **Conclusion:** Inappropriate use of antibiotics leads to emergence of resistance, worsen the clinical condition and increased healthcare costs. Therefore it should be mandatory to obtain reliable specimens from the infection site of the patient in order to de-escalate antibiotics.

KEYWORDS: De-escalation, Antibigram, Antibiotics, Resistance.

INTRODUCTION

Infectious diseases accounts to one third of total hospital admissions and are the most prevalent causes of admission to intensive care units (ICU) worldwide.^[1] Multi-drug-resistant organisms have become more common while the development of new antimicrobial agents has slowed.^[2] The emergence of multidrug-resistant (MDR) pathogens is a major challenge for health care settings and is directly correlated with irrational use of antibiotics. Therefore; the key to stemming the increasing rates of multi-drug-resistant infections is optimizing the use of antibiotics.^[3] The judicious use of antibiotics can be promoted by antibiotic de-escalation which is a subset of antibiotic stewardship programme.^[4]

Antibiotic de-escalation is defined as a practice of starting with broad-spectrum empirical antibiotics and changing it to the narrower-spectrum or fewer agents after thorough re-assessment of the condition, inflammatory markers and microbiological data of the patient.^[5] The rational use of antibiotics is crucial as it may aid long-term solution to limit the emergence of resistant organism. The de-escalation process is based on microbiology results around the day 3 therapy point; the empiric antibiotic(s) that were started are stopped or reduced in number and/or narrowed in spectrum.^[6]

Inappropriate antibiotic therapy refers to the use of an antibiotic to which the identified pathogen was resistant or as the failure to provide coverage against the documented pathogen. After culture and susceptibility data became available the adequacy of antibiotic therapy is determined.^[7] The literature points out that antibiotic de-escalation as an appropriate practice, which leads to cost reduction and decreased bacterial resistance.^[5]

A practical clinical bedside approach to de-escalation:

Around the day 3 therapy point, a full assessment of investigation results and clinical progress should be performed and an appropriate choice should be made to.

- discontinue the treatment (E.g.: If no infection is present)
- Narrow the spectrum of the therapy
- Trim down the number of antibiotics being used, for example, there is redundancy in the therapy or such clinical development that multiple agents active against the same pathogen(s) are not necessary.

Not to de-escalate, for example, the specific reason for not de-escalating is documented (E.g.: lack of microbiology results, lack of clinical improvement)

- Every day afterwards a positive decision to stop, change, or continue the therapy should be made against specific reasons.

Aim of our study is to analyze the de-escalation pattern of antibiotics in critically ill patients with infectious disease. Identifying the percentage of cases in which de-escalation was done, checking whether culture was sent within 72 hours after starting antibiotics and to determine the re-culture interval for patients who is on antibiotics were the objectives of our study.

MATERIALS AND METHODS

A retrospective observational study on Analysis of de-escalation pattern of antibiotics in critically ill patients with infectious disease was carried out in all ICU's at Fortis Memorial Research Institute, Gurgaon from March 1 to April 15, 2017. All ICU patients with infectious disease were included in the study. 50 patient case files were analyzed and patient's demographic details, Diagnosis, Culture and Sensitivity Report, Date at which Culture and Sensitivity was sent and received, Antibiotics given prior to receiving Culture and Sensitivity report, Change in the antibiotics after receiving Culture and Sensitivity report, Dose, frequency and route of the antibiotics given were recorded in data collection form. Analysed whether de-escalation was done based on antibiogram of the institution, patients condition and microbiological report.

RESULTS AND DISCUSSION

Sixty five patients with infectious disease who were given with antibiotics were selected. Among that 15 patients were not eligible for de-escalation. Thus 15 patients were excluded from the study.

Patient demographic and characteristic details

Out of 50 patients 29 (58%) were males and 21(42%) were females. Most of the patients in our study were aged between 50 to75 years and least patients were from age group 0 – 25 years. In our study majority of the patients had blood stream infections (63%) followed by UTI (15%) and RTI (11%). In this many patients had multiple infections.

Table 1: Patient demographic and characteristic details.

	No. Of patients	Percentage
Sex		
Male	29	58%
Female	21	42%
Age		
0-25 years	2	4%
25-50 years	15	30%
50-75 years	24	48%
>75 years	9	18%
Type of infection*		
Blood stream infections (BSI)	36	63%
Urinary tract infections (UTI)	15	26%
Respiratory tract infection (RTI)	6	11%

*some patients had multiple infections

Culture sent within 72 hours after starting antibiotic

According to antimicrobial stewardship programme of the hospital culture should be ideally sent within 72 hours after starting antibiotics for infectious disease. Out of 50 patients included in the study, except for one patient the culture was sent within the specified time period.

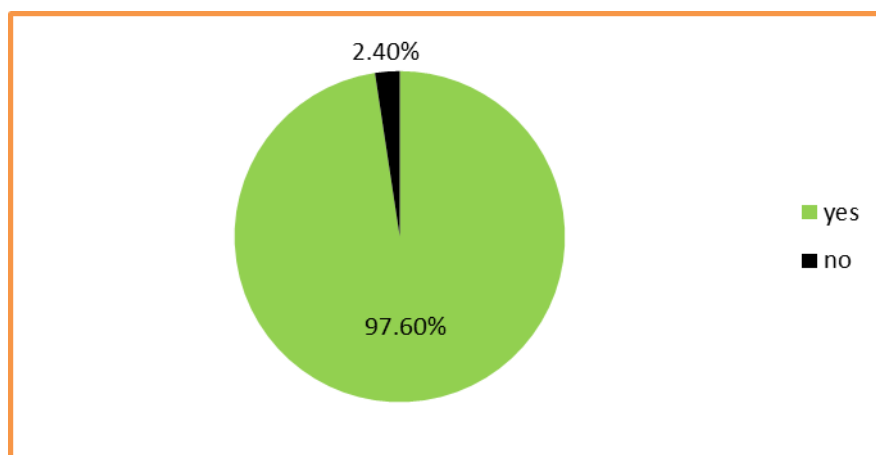


Figure 1: Culture sent within 72 hours after starting antibiotic.

Microorganisms present in culture report

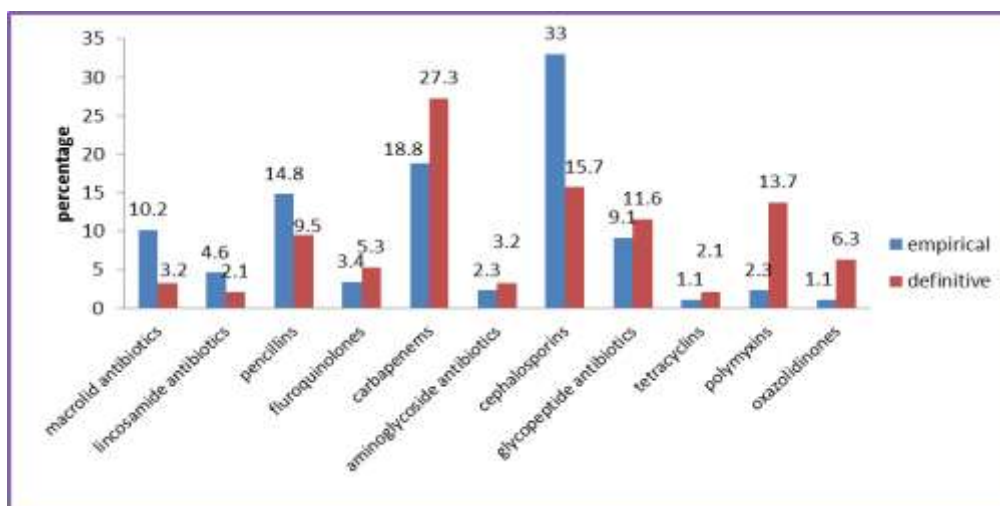
E-coli(20%) was the most commonly found micro organism followed by E-Faecium(17%), P. Aeruginosa (16%) and K. Pneumoniae(16%).

Table 2: Microorganisms present in culture report.

Microorganism	No. Of patients	Percentage(%)
E.coli	14	19.7%
E. Faecium	12	16.9%
P.aeruginosa	11	15.5%
K. Pneumoniae	11	15.5%
E.faecalis	5	7.1%
P. Mirabilis	4	5.6%
A. Baumanii	3	4.2%
E. Cloacae	3	4.2%
Others	8	11.3%

Use of antibiotics as empirical and definitive therapy

Empirical therapy is treatment based on observation and experience, which is given prior receiving culture sensitivity report. Cephalosporin was highly used when comparing with other antibiotics. Tetracyclines, Polymyxins, Oxazolidinones(1%) were the least used antibiotics. Whereas in definitive treatment carbapenems(27.3%) are mostly used followed by cephalosporin. Lincosamide antibiotics and tetracyclins were least used antibiotics. In this study carbapenems and cephalosproine use were higher when compared were with other antibiotics.

**Figure 2: Use of antibiotics as empirical and definitive therapy.**

De-escalation in culture positive and culture negative patients

In culture positive patients, 40(86%) patients from 45 had undergone de-escalation while 5 (14%) out of 45 did not undergone de- escalation process. In culture negative patients also de-escalation must be done. There was only 7 patients with culture negative results. 6 patients from that underwent de-escalation while 1 patient did not.

Table 3: De-escalation in culture positive and culture negative patients.

Culture results		Percentage
Culture positive(86%)	De-escalation done	86%
	De-escalation not done	14%
Culture negative(14%)	De-escalation done	71%
	De-escalation not done	29%

CONCLUSION

High antibiotic resistance is observed in ICU patients who develop infections, therefore the antibiotic therapy for ICU patients should be selected carefully. Antibiotic de-escalation is a process for judicious use of antibiotics which helps to reduce the emergence of drug-resistant microorganisms. It also reduces the patients' health care costs and length of stay in the hospital. Culture should be ideally sent within 72 hours after starting empirical therapy for an infectious disease, in our study for 98% of patients the culture was sent within 72 hours. Cephalosporins and carbapenems were the antibiotics which were vastly used in empirical and definitive treatment for the patients. Antibiotic de-escalation must be done in both culture positive and culture negative patients, 86% of culture positive and 71% of culture negative patients have undergone de-escalation in this study. In order to minimize the spread of antibiotic resistance de-escalation must be done for every patient with infectious disease.

ACKNOWLEDGEMENT

We would like to thank Dr. Savitaa Sharma Head, Department of quality, Fortis Memorial Research Institute and faculties of Nandha College of Pharmacy for helping us to complete this project.

CONFLICT OF INTEREST

No conflict of interest is declared.

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