

ORIGINAL ARTICLE

Antibiotic-use Patterns in an Intensive Care Unit of a Hospital in Iran: How Challenging with Patient safety?

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ABSTRACT

Antibiotics are the most widely prescribed, misused and overused drugs especially in intensive care unit. The primary objective was to evaluate the current usage of antibiotics and investigate how the current patterns challenging with patient safety in a General Intensive Care Unit (GICU) retrospectively. Case Sheets of patients admitted to GICU of tertiary care hospital during 20st March 2012 to 21st September 2012 were obtained from the Medical Record Department. The class, dose and total number of antibiotics were noted. Descriptive analysis was used to present the results. The mean age of patients was 50.55 years (SD =23.69). The average ICU stay was 18.05 days (SD=38.71). The main reasons for admission in GICU was multiple trauma (27.62%), cerebrovascular accidents (18.1%) and malignancy complications (15.24%). Mortality rate was significantly higher especially in patients that received antibiotics empirically. The most frequently prescribed antibiotics were Third-generation cephalosporins, Glycopeptides, Carbapenems and Quinolones. 58.09% of patients were given 1-3 antibiotics, 31.43% of them were given greater than 4 antibiotics and 10.43% did not received any antibiotic. Prescription of antibiotics was inappropriate for dosage and intervals of administration, adjustment for renal and hepatic current function and overlapping of antibiotics's spectrum. Average number of drugs and antibiotics per encountered was 6.98 and 2.84 respectively. Inappropriate and ineffective use of antibiotics is common in ICUs. These problems challenging with patient safety and can complicate therapeutic programs. Thus there is a rational reason to change the current prescribing practices for example, collaboration of clinical pharmacologists with therapeutic staff as a consultant and attendance of them in physician rounds in ICUs as a full member of the patient care team.

Keywords: Antibiotic, Antimicrobial prescription, patient safety, Intensive care unit

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INTRODUCTION

Antibiotics are the most widely prescribed, misused and overused drugs specially in intensive care and surgical department. A systematic review showed that 25–75% of antibiotics prescriptions in teaching hospitals in a large number of developed and developing countries were inappropriate in terms of either indication, selection, dosage, duration, or a combination of these [1]. Although countless lives and limbs have been saved by the use of antibiotics [2]. The topic of appropriate antibiotic use has many facets, including proper prescribing, patient satisfaction and perceptions of the need for antibiotics, therapeutic adherence by patients, drug-resistant pathogen development, and the effects that marketing tactics used by pharmaceutical companies have on prescribing practices [3].

It is important to know that the presence of infection is a main outcome determinant for intensive care unit (ICU) patients, since patients admitted to ICUs are at very high risk of developing severe nosocomial infections [4]. Total antibiotic consumption is approximately 10 times greater in ICUs than in general hospital wards, and this accounts for a considerable portion of the total hospital antibiotic consumption and related costs [5]. For this reason patients admitted into the ICUs are often prescribed multiple broad

spectrum antibiotics. However, these prescriptions are often empiric and based on physician comfort and prior experience, often leading to overuse or misuse of antibiotics.

Antibiotic prescription in the ICU is difficult because of the presence of poorly susceptible pathogens, and the dynamic physiology of critically ill patients, which combine to alter bacterial-antibiotic interaction leading to suboptimal treatment of infection [6].

Information about antibiotic use patterns is necessary for a constructive approach to problems that arise from the multiple antibiotics available. The aim of this study was to assess the pattern of antibiotic use in the ICUs of a tertiary teaching hospital.

METHODS

A prospective approach was used by survey of patients records. Case Sheets of patients admitted to GICU of tertiary care hospital during 20st March 2012 to 21st September 2012 were obtained from the Medical Record Department. The class, dose and total number of antibiotics were noted. Antibiotic regimens were followed from initiation through possible adaptations and possible changes until discharge or death of patients. Descriptive analysis was used to present the results.

RESULTS

The mean age of patients was 50.55 years (SD =23.69). The average ICU stay was 18.05 days(SD=38.71). The main reasons for admission in GICU was multiple trauma (27.62%),cerebrovascular accidents (18.1%) and malignancy complications (15.24%)(Table-1).

Table-1-Demographic profile of 105 in-patients hospitalized during the period under review

Demographic profile of 105 in-patients hospitalized during the period under review	
Age/Year	
Mean±SD	50.55±23.69
Sex: Male	68(64.76)
Female	37(35.24)
Outcome of hospitalization:	
Died	62
Discharged	40
Referred	1
Voluntary discharge	2
Average number of drugs per encounter	6.98
average ICU stay ±SD	18.05±38.71

Figure-1-Comparison of mortality in imprical and culture-based treatment

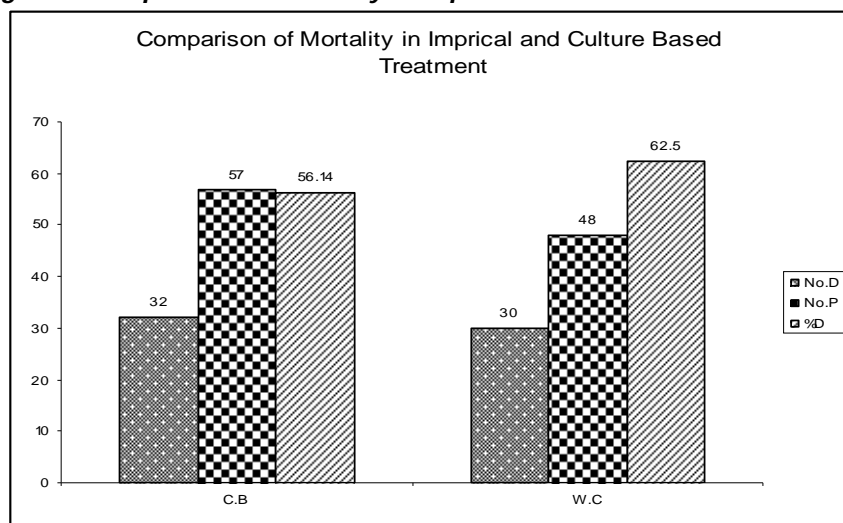
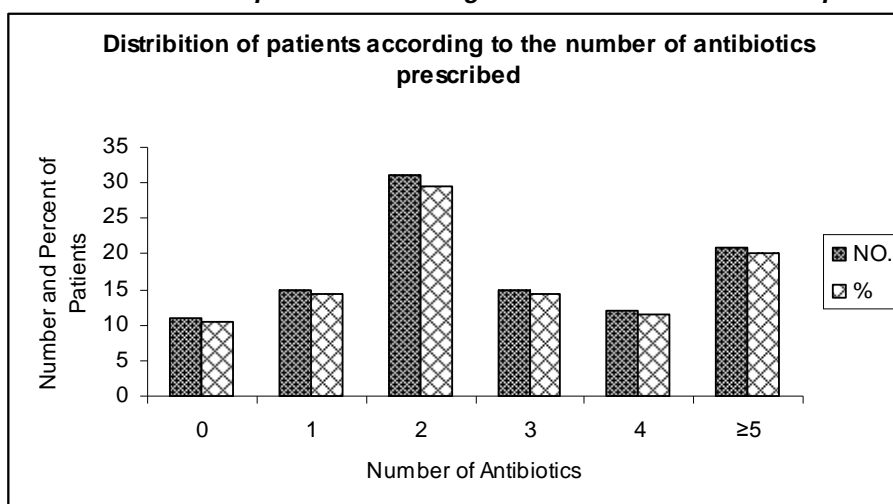


Figure-2-Distribution of patients according to the number of antibiotics prescribed

Mortality rate was significantly higher specially in patients that received antibiotics empirically (Figure-1). The most frequently prescribed antibiotics were Third-generation cephalosporins, Glycopeptides, Carbapenems and Quinolones. 58.09% of patients were given 1-3antibiotics, 31.43% of them were given greater than 4 antibiotics and10.43% did not received any antibiotic(Figure-2). Prescription of antibiotics was inappropriate for dosage and intervals of administration, adjustment for renal and hepatic current function and overlapping of antibiotics's spectrum. Average number of drugs and antibiotics per encountered was 6.98 and 2.84 respectively.

DISCUSSION

In this study, 89.52% of patients received antibiotics during their ICU stay. Empirically started antibiotics accounted for 41.9% of therapeutic antibiotic use. The high prevalence of nosocomial infections in critically ill patients treated in ICUs is associated with high antibiotic consumption. Total antibiotic consumption is approximately 10 times greater in ICUs than in general wards. As most antibioticsand broad-spectrum antibiotics are usually used in ICUs [7].

The mean age of participants was higher in this study compared to other studies (66.55 vs. 50) [8]. The mortality rate was not comparable to other studies, because it was very high in our study. It seems that this can results from: first, the average age of our patients was higher, second, our ICU was a general that majority of them have multiple trauma. In contrast with other studies, this study showed no significant relationship between patients' sex and mortality. The contrast may be explained by the small sample size of this study.

The average number of drugs that each patient received at admission was higher than what was observed in another study conducted in a hospital in India [9].

Prevalence of antibiotic use in the ICU setting in our study was 89.52%. In order to improve these antibiotic prescription patterns, it is well-established that the precise knowledge of the pathogens associated with the disease allows a rational antibiotic selection [10].

In our patients the percentage of death in group that received antibiotic empirically was greater than the group that treatment was based on culture (62.5 vs. 52.14). In a large European study which included 20 hospitals, Ansari *et al.* have recently published that samples for bacterial culture were obtained before therapy only in 43 % of cases[11]. In our study this was 54.29% that shows treatment in our hospital is more evidence based.

Third-generation cephalosporins, Glycopeptides (vancomycine) and Carbapenems were the antibiotics that were most frequently used .

Cephalosporins were also the most prescribed antibioticsin previous studies [12-14]. A recent announcement was made by the Food and Drug Department of the Ministry of Health inIran regarding the adverse drug reactions to ceftriaxone. A total number of reports were received for ceftriaxone, ofwhich 51 cases were fatal [15]. Prescription of this drug therefore, should be limited to situations when it is essential and be administered with very caution.

The implementation of programmes such as providing information on the proper utilization of antibiotics, the most up-to-date antibiotic costs and prevention of avoidable prescriptions, providing information on clinical symptoms, diagnosis and management of infectious diseases, changing predominant prescription preferences in the hospital, evaluating antibiotic prescriptions on the basis of

guidelines, and regular feedback regarding antibiotic costs are programs that will help to reduce the expense of antibiotics and the whole drug expenditure of a hospital [16].

These programmes can be accomplished by a trained pharmacist or clinical pharmacologist.

One study showed a 66% decrease in adverse drug reactions after the intervention of clinical pharmacists in a critical care unit [17]. The presence of clinical pharmacists has accounted for safer medication administration, better patient outcomes and lower use and therefore lower costs of drugs; in addition, their presence has led to a higher quality of patient education and provision of more complete information for patients [18]. In Iran, the professional movement of pharmacists and their efficient inclusion in hospital wards has just begun and needs to gather momentum [19].

CONCLUSION

Antibiotic prescription in the ICU is difficult because of the presence of poorly susceptible pathogens and the dynamic physiology of critically ill patients, so inappropriate and ineffective use of antibiotics is common in ICUs. These problems challenge with patient safety and can complicate therapeutic programs. Thus there is a rational reason to change the current prescribing practices for example, collaboration of clinical pharmacologists with therapeutic staff as a consultant and attendance of them in physician rounds in ICUs as a full member of the patient care team.

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