

Evaluation of the Pattern of Intravenous Ceftriaxone Used in Tuanku Mizan Armed Forces Hospital

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ABSTRACT

INTRODUCTION Intravenous (IV) Ceftriaxone is widely prescribed by the physicians in Tuanku Mizan Armed Forces Hospital (TM AFH). It has become the most frequently prescribed IV antibiotics in the hospital, recording a distinctive high number of prescription orders. Almost 400 patients were prescribed with IV Ceftriaxone from the first half of 2015, two-times higher than the second most prescribed IV antibiotic (Ampicillin/Sulbactam). The wide use of third-generation Cephalosporin, including Ceftriaxone, has been associated with the emergence of extended-spectrum beta-lactamases (ESBLs) presenting concerns for bacterial resistance in therapeutics. Therefore, the high number of recorded prescriptions raise an issue whether those prescribed IV Ceftriaxone are appropriately utilized.

METHODS This retrospective study reviews the IV Ceftriaxone use in TM AFH, comparing it with the guidelines proposed by the National Antibiotic Guideline (NAG). Data were collected from the bed head ticket archive of all of the patients who were prescribed with IV Ceftriaxone from March to June 2015, and the appropriateness of the use were determined according to the guideline.

RESULTS Treatment of respiratory tract infection accounted for 47% of the use while surgical prophylaxis recorded 18%. The overall rate of concordance with indications recommended in NAG was 48% which is considered as low.

CONCLUSION Potential areas for intervention include empirical treatment of respiratory tract infection and use in surgical prophylaxis.

KEYWORDS Intravenous (IV) Ceftriaxone, Tuanku Mizan Armed Forces Hospital, Prescription Orders, National Antibiotic Guideline (NAG).

INTRODUCTION

Bacterial resistance to antimicrobial agents due to the increasing use of antimicrobial agents has become a worldwide concern. Over the past several decades, the increased prevalence of known resistant organisms and the emergence of newly resistant organisms such as penicillin-resistant pneumococci, methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci,

extended-spectrum beta-lactamase-producing *Escherichia coli*, *Klebsiella pneumoniae*, and imipenem-resistant gram-negative bacilli, have resulted in delays in effective therapy and the length of hospitalization, and have led to increased costs for patients ^{1,2}.

Meanwhile, appropriate use of antibiotics is central to limiting the development and the spread of resistant bacteria in hospitals and communities ³. The hospital setting is particularly conducive to the development of antibiotic resistance as patients who are severely ill, immuno-compromised or have devices and/or implants in them are likely to receive frequent courses of empirical or prophylactic antibiotic therapy ^{4,5}.

In Tuanku Mizan Armed Forces Hospital (TM AFH), IV Ceftriaxone is widely prescribed by the physicians. It has become the most frequently prescribed IV antibiotics in the hospital. Therefore, the high number of recorded prescriptions raise an issue whether those prescribed IV Ceftriaxone are appropriately utilized. Hence this study was carried out to evaluate the pattern of use of Ceftriaxone by physicians in various wards of TM AFH. Feedback from the current study gives a review of the prescribing practices to prescribers which can be modified if necessary to facilitate better health care delivery

METHOD

Setting

In Armed Forces Health Services (PKAT), health care is delivered through armed forces hospitals, medical centres and infirmaries. At those health care institutes, eligible patients undergo investigations and receive treatment without cost. There are 5 armed forces hospitals and several medical centres and infirmaries facilities where patients can access medical care. TM AFH is the Malaysian's major armed forces health care institute and receives military medical referrals from all over the country including Sabah and Sarawak. This hospital is a 240-bed institute providing out-patient services and health care for warded patients for all servicemen and ex-servicemen including their parent and family. Students undergoing training at the National University of Defence Malaysia, also referred to this hospital.

Patients

Between March to June 2015, we conducted a study of all in-patients who had received IV Ceftriaxone as medication. The Hospital Pharmacy identified warded patients from the respective services based on the prescriptions dispensed. Patient's information, clinical data and medication charts were obtained from the prescription sheets. While we did consider the course of antibiotic duration in defining appropriateness of therapy, we did not analyse data based on use per patient days because these data were not clearly available from the records.

Criteria for appropriate prescription

The appropriateness of antibiotic therapy was determined using The National Antibiotic Guideline (2008). Therapy was deemed to be inappropriate based on any of the following parameters: indications, and the dose.

RESULT

Figure 1 shows the number of patient prescribed with IV Antibiotics from March to June.

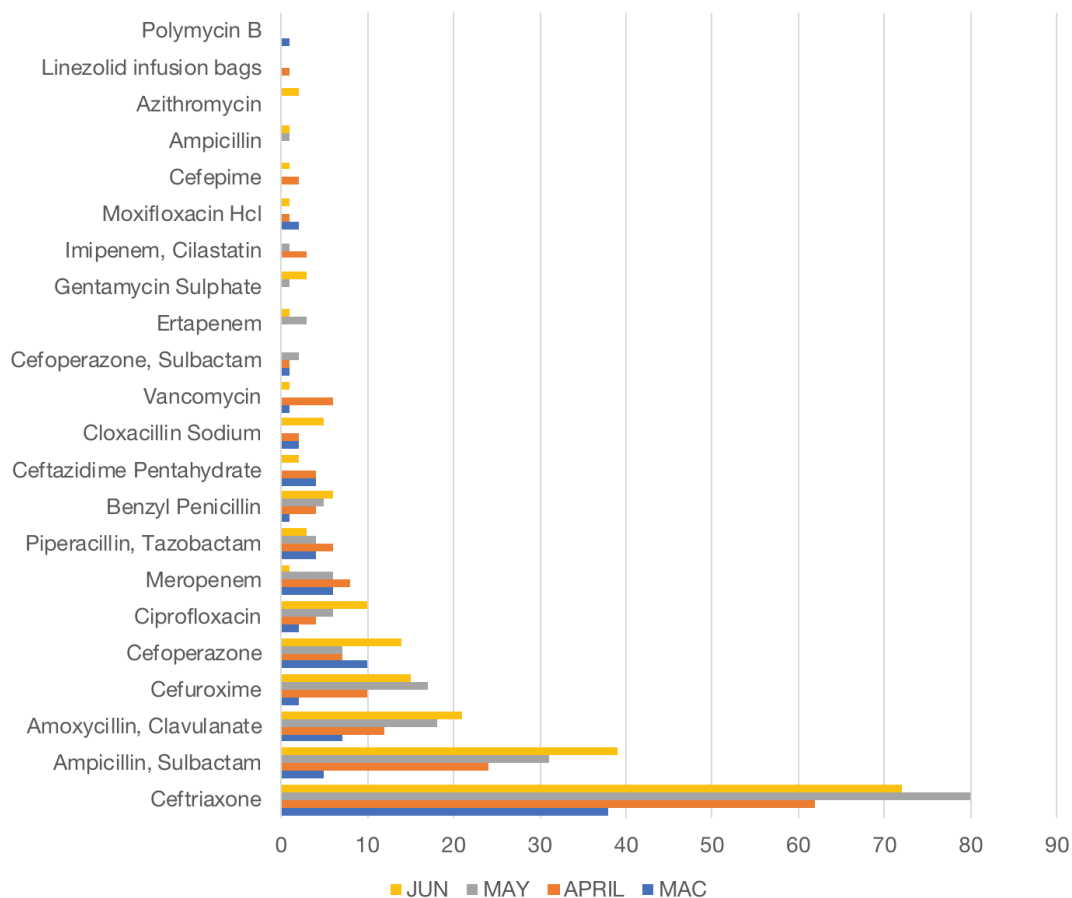


Figure 1. Number of Patient Prescribed with IV Antibiotics from March to June

IV Ceftriaxone was dispensed to 252 patients for various indications. The number recorded was more than 2 times higher than the second highest, IV Unasyn (Ampicillin + Sulbactam), which recorded 101 patients.

Figure 2 shows the distribution of all the patient prescribed with IV Ceftriaxone respective to the ward of origin. Orthopaedic ward recorded the highest number of patient prescribed with IV Ceftriaxone, followed by medical and surgical ward respectively.

Figure 3 shows the classes of infections of which the patients were prescribed with IV Ceftriaxone. 72 of them were prescribed for respiratory infection, the highest among the classes. 24 patients were classified as unknown as we unable to detect the indication.

An analysis of variables that were associated with the inappropriate use of IV Ceftriaxone in the patient sample is shown in Table 1.

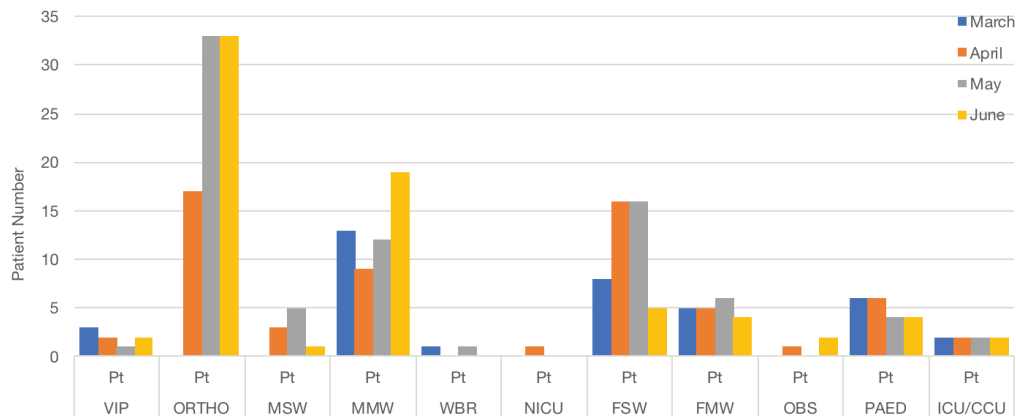


Figure 2. Distribution of All The Patient Prescribed With IV Ceftriaxone Respective to the Ward of Origin

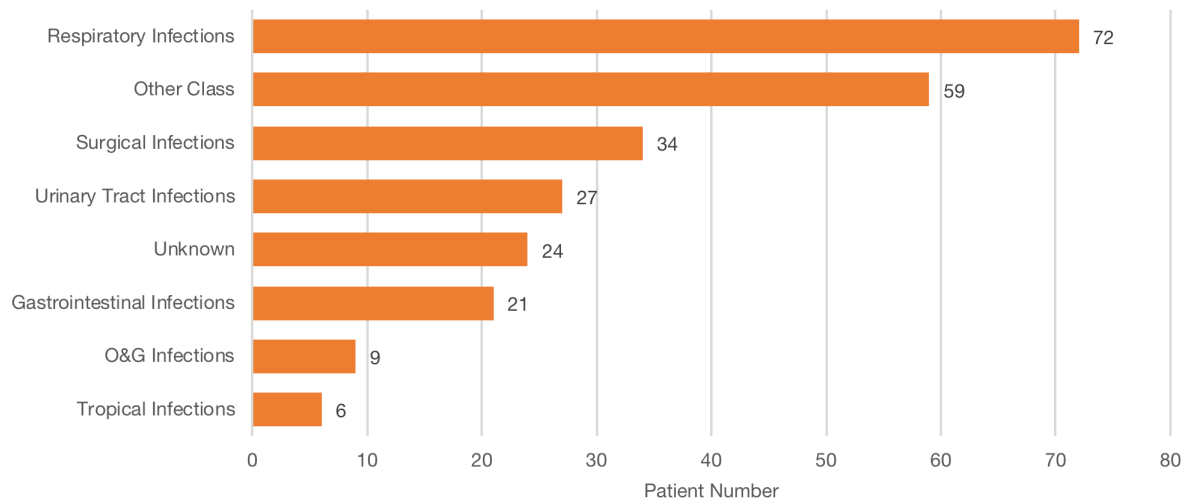


Figure 3 . Classes of Infections Where Patients Were Prescribed with IV Ceftriaxone

DISCUSSION

According to NAG 2014, utilization of Ceftriaxone for 2013 is the highest among all antibiotic agents ⁶. The same trend occurs in TMAFH, of which the utilization of the drug is remarkably high. Our data reveals that overall inappropriate use of the drug is 34.6%, which is lower compared to other studies. This difference may be attributable to the fact that the justification of use criteria were stricter and our study allowed more acceptable cases for empirical therapy ^{7,8}. Common reasons for inappropriate use of ceftriaxone included continued empiric use for presumed infections, prophylactic perioperative injection and empiric therapy for fever ^{9,10}.

Potential limitations of our study are (i) the prescription scripts we refer might not depict the actual justification and plan of the physicians in the ward; (ii) the duration of the regiment isn't stated in the prescription (iii) the study focused on the use of IV Ceftriaxone for all indications, but did not evaluate the use of other antibiotics for those

indications; and (iv) use of IV Ceftriaxone was compared with prescribing guidelines, which cannot provide appropriate advice for all patients.

CONCLUSION

Appropriate use (65.4%) of IV Ceftriaxone was higher than inappropriate use (34.6%) at TM AFH. Potential areas for intervention include empirical treatment of respiratory tract infection and use in surgical prophylaxis. Intensification of educational programs and antibiotic control systems for IV Ceftriaxone is needed to improve the suitability of antimicrobial use ¹¹.

Table 1 . Distribution of Appropriate and Inappropriate use of IV Ceftriaxone

Variables	Appropriate Use (%)	Inappropriate Use (%)
Overall	149 (65.4)	79 (34.6)
Gender		
Male	103 (69.1)	46 (30.9)
Female	46 (58.2)	33 (41.8)
Ward Services		
VIP	6 (75.0)	2 (25.0)
ORTHO	39 (61.9)	24 (38.1)
MSW	6 (66.7)	3 (33.3)
MMW	32 (64.0)	18 (36.0)
WBR	2 (100)	0 (0)
NICU	1 (100)	0 (0)
FSW	26 (59.1)	18 (40.9)
FMW	14 (70.0)	6 (30.0)
OBS	3 (100)	0 (0)
PAED	16 (80.0)	4 (20.0)
ICU/CCU	4 (50.0)	4 (50.0)
Type Of Infection		
Tropical Infections	6 (100)	0 (0)
O&G Infections	6 (66.7)	3 (33.3)
GI Infections	15 (71.4)	6 (28.6)
UTI	19 (70.4)	8 (29.6)
Surgical Infections	23 (67.6)	11 (32.4)
Other Class	21 (35.6)	38 (64.4)
Respiratory Infections	59 (81.9)	13 (18.1)

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