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The Empirical Antibiotic Use in Bacterial Infection in General Hospital Jayanagar with Reference to ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019

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Abstract: ***Introduction: Empirical treatment is prescribed typically while waiting for the culture report.Appropriate empirical antibiotic therapy has been associated with decreased mortality in patients with many different types of infection, where inappropriate empirical antibiotic therapy(IEAT) requires a change in therapy and essentially receive delayed appropriate therapy. IEAT is an important factor contributing to the emergence of antibiotic-resistant bacteria, and it is well known, that a larger proportion of administered antibiotics is prescribed without proper indication. Methodology: Prescription containing antibiotic was selected, divided in different groups as per diagnosis, and was compared with the ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019. Results: Ceftriaxone were commonly used as a empirical antibiotic therapy followed by piperacillin/tazobactam and amoxyclav. Our Study shows more variation on selection of empirical antibiotic in AFI, Infected pancreatic necrosis, and Sepsis cases between ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019 and hospital practised. Conclusion: Initiation of antimicrobial stewardship program become more important considering increasing resistance of microbes towards antibiotic.***

Keywords: Antibiotic resistant, Antimicrobial stewardship program, Empirical treatment.

1. Introduction

India is the largest overall consumer of antibiotics worldwide,[1] i.e., 13 billion standard units in 2010 and from 2000 to 2010 the per capita consumption increased by 66%[2] and also has among the higest reported rates of antibiotic resistance.[1]The consequent failure of antibiotic therapy was associated with higher mortality and morbidity and prolonged hospital stay.[3]Resistance will continue to emerge, our treatment options will continue to dwindle, and we will enter a postantibiotic era for an increasing number of infections.[4]The use of antibiotics is an important factor contributing to the emergence of antibiotic-resistant bacteria, and it is well known, that a larger proportion of administered antibiotics is prescribed without proper indication.[5]It is estimated that 50% or more of hospital antimicrobial use is inappropriate.[6]Resistance is much more likely to occur with long antibiotic courses, which are rarely indicated except when the site of infection is relatively inaccessible than premature cessation of therapy.[7]

The source of infection and the causative organisms are not always apparent during the initial evaluation of patient, and antibiotics are often given empirically to patients.[8] Empirical treatment is prescribed typically while waiting for the culture report or in situations where the facilities for doing these tests is not available.[6]Appropriate empirical antibiotic therapy(AEAT) has been associated with decreased mortality in patients with many different types of infection, where inappropriate empirical antibiotic therapy(IEAT) requires a change in therapy, patients with IEAT essentially receive delayed appropriate therapy.[9] Antibiotic treatment should have a "time-out" at 48 hour to answer these questions,[10]such as will this infection respond to antibiotics? Is the patient on the correct drug, dose, and route of administration? Can there be de-escalation to a more targeted antibiotic? How long should the patient receive this antibiotic?[11] and make appropriate changes. Hence, this study was conducted to compare the empirical antibiotic therapy use in Jayanagar General hospital with reference ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019, to assist clinician for the selection of approprite empirical treatment, and also to help in the prevention of antibiotic resistant.

2. Methodology

A prospective non interventional study was conducted in the Jayanagar General Hospital in general medical wards for the period of six month. Patient who was suffered from infectious disease or who was having the sign and symptoms of infection and received antibiotic was selected, and also divided in different groups as per diagnosis. Prescribed antibiotic was documented and was compared with the ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019. Patient was followed-up through the period of hospital stay and evaluated for appropriate empirical antibiotic therapy as per culture sensitivity report. Microsoft excel was used to analysed data.

3. Result and Discussion

Data of 122 case, 64(52.45%) patients were female and 58(47.55%) were male where 41.80% RTI followed by AFI(25.41%), IAI (13.93%) and UTI (9.02%) and remain were others (Typhoid, CNS infection and sepsis). Out of 186 antibiotic prescription, (42.47%) of prescription contain Ceftriaxone followed by Piperacillin/tazobactam (24.73%), metronidazole (7.52%),Amoxyclav (4.83%), Azithromycin (4.3%) and others. 19.67% (24) case were sent for culture sensitivity test(CST), where 50%(12) shown growth. Microorganism identified in CST were Citobacter Diversus, Cons, Klebsiella pneumoniae, Klebsilla toxytoca, and Pseudomonus aeruginosa. And these isolated microorganism developed resistance to ampicillin/sulbactam, azithromicin, cefixime, ceftriaxone, ciprofloxacin, cotrimoxazole, doxycycline, imipenem, linezolid, meropenem, piperacillin/tazobactam, and ofloxacin. Ceftriaxone were commonly used as a empirical antibiotic therapy followed by piperacillin/tazobactam and amoxyclav. 31.14% empirical antibiotic were adjusted during treatment where 68.86% were not adjusted. We compared empirical antibiotic used in Jayanagar General Hospital with reference of National Antimicrobial Guideline 2019(NAG 2019). In case of RTI, guideline suggested to used Ceftriaxone with macrolide/doxycyline as empirical therapy and we were using Ceftriaxone/ amoxclav ± Azithromycin or Piperacillin/tazobactam or Ceftriaxone with levofloxacin. In case of IAI, guideline suggested to used Cefoperazone/sulbactam or piperacillin/tazobactam with metronidazole (liver abscess), Imipenem-cilastatin and vancomycin (Infected pancreatic necrosis, pancreatic abscess), and *Shigella*-ciprofloxacin, *Amoebiasis*-Metronidazole and *Aeromonas*- Ciprofloxacin (Diarrhea) and we were practising ceftriaxone ± metronidazole (liver abscess), ceftriaxone ±levofloxacin (Infected pancreatic necrosis, pancreatic abscess), andcombination of ceftriaxone or ciprofloxacin or ofloxacin or norfloxacin ± metronidazole (Diarrhea) were used to cover maximum possible pathogen. In case of CNS (Hematogenous spread), Ceftriaxone and metronidazole with/ without vancomycin was suggested, and Piperacillin/tazobactam or Meropenem or Ceftriaxone+ vancomycin were practised. Similarly in Sepsis, Imipenem-Cilastatin +/- Amikacin was suggested and Ceftriaxone or Amoxicillin/clavulanate ±metronidazole were in practised. In UTI(Acute Pyelonephritis), Piperacillin – tazobactam or Ertapenem were suggested and Ceftriaxone or Piperacillin/tazobactam were in practised. In typhoid, Oral: cotrimoxazole or azithromycin and Parenteral: ceftriaxone were suggested, and Ceftriaxone or Piperacillin/tazobactam ± Azithromycin were in practised. And in AFI, Doxycycline was suggested and Amoxclav or Ceftriaxone or piperacillin/tazobactam were in practised. Our study shown more variation on selection of empirical antibiotic in AFI, Infected pancreatic necrosis and sepsis cases between ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2019 and hospital practised.

In our study, empirical antibiotic therapy was unable to explain the adequate coverage of pathogen. 80.33% case were not sent for CST and those specimen which were sent for CST was also not properly collected. Limited availibility of antibiotic in government hospital also shrink the wide selection of antibiotic.

Table 1: Comparision of empirical antibiotic use

Diagnosis		ICMR guideline 2019		Practice	
		Empirical	Alternate	Empirical	Alternate
RTI		Ceftriaxone with macrolide/doxycyline	Cefotaxime/ amoxclav with macrolide/doxycycline	Ceftriaxone/ amoxclav ± Azithromycin Piperacillin/tazobactam Ceftriaxone with levofloxacin	Meropenem
IAI	Liver Abscess	Cefoperazone/sulbactam or piperacillin/tazobactam with metronidazole to cover for possible bacterial and amoebic etiology		Ceftriaxone ± metronidazole	Piperacillin/tazobactam Meropenem
	Infected pancreatic necrosis, pancreatic abscess	Imipenem-cilastatin and vancomycin		Ceftriaxone ±levofloxacin	
	Diarrhea	*Shigella*- Ciprofloxacin *Amoebiasis*- Metronidazole *Aeromonas*- Ciprofloxacin	*Shigella*-Ceftriaxone *Aeromonas*- Norfloxacin	Ceftriaxone/Ciprofloxacin /Ofloxacin/Norfloxacin ± metronidazole	Piperacillin/tazobactam Doxycycline
CNS (Hematogenous spread)		Ceftriaxone and metronidazole with/ without vancomycin		Piperacillin/tazobactam Meropenem Ceftriaxone+ vancomycin	
Sepsis		Imipenem-Cilastatin +/- Amikacin	Meropenem or Cefoperazone –Sulbactam	Ceftriaxone or Amoxicillin/clavulanate ±metronidazole	Piperacillin/tazobactam
UTI(Acute Pyelonephritis		Piperacillin – tazobactam Ertapenem	Imipenem Meropenem Amikacin	Ceftriaxone Piperacillin/tazobactam	Amikacin
Typhoid		Oral: cotrimoxazole or azithromycin Parenteral: ceftriaxone	Cefixime or chloramphenicol or ciprofloxacin	Ceftriaxone Piperacillin/tazobactam ± Azithromycin	

AFI/FUO	Doxycycline for patients with undifferentiated fever and negative rapid diagnostic tests for malaria and dengue is an option for the clinician		Amoxclav Ceftriaxone Piperacillin/tazobactam	

AFI= Acute Febrile Illness, CNS= Central Nervous System, FUO=Fever of nnknown origin,
IAI= Intra abdomenal infection, RTI= Respiratory tract infection.

4. Conclusion

The proper collection of specimen prior initiating antibiotic may help in rational use of antibiotic and also may prevent from developing antibacterial resistant. Initiation of antimicrobial stewardship program becomes more important considering increasing resistance of microbes towards antibiotic.The active participation of Clinical Pharmacologist or Clinical Pharmacist is necessary to optimize the use of antibiotics, and decrease antibacterial resistance in hospitalized patients.We suggest continuation of the study to maintain supervision over quality, decerase resistance, and monitor the need for intervention in different wards.

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