ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 03 | March - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DRUG UTILIZATION STUDY OF ANTIMICROBIALS AMONG VENTILATOR-ASSOCIATED PNEUMONIA PATIENTS IN INTENSIVE CARE UNIT OF A TERTIARY CARE HOSPITAL.

Pharma

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ABSTRACT

Background: Among nosocomial hospital acquired infections Ventilator associated pneumonia (VAP) is the most frequently acquired infections, particularly in patients on ventilators. **Aim:** To evaluate the use of antimicrobials among ventilator associated pneumonia patients in intensive care unit of a tertiary care hospital. **Material & method:** The study is cross-sectional, observational, prospective & analytical type. 207 patients were analyzed for the period of August 2021 to Dec 2022, on a pre-designed format. **Result:** A total of 207 patients who fulfilled the inclusion criteria were analyzed. 134(65.05%) were males and 72(34.95%) were females. Commonly prescribed AMA's were ceftriaxone (76.33%), metronidazole (62.32%), piperacillin-tazobactum (37.68%) and vancomycin (35.26%). **Conclusion:** From the following study, an initial data is being provided for a positive enhancement of rational prescribing of antimicrobial drugs in patients with Ventilator Associated pneumonia in a tertiary care hospital.

KEYWORDS

Antimicrobials, Intensive care unit, Ventilator- associated Pneumonia (VAP), prescription, Rational.

INTRODUCTION

Ventilator associated pneumonia (VAP) is a common nosocomial hospital acquired infection and is a baseline threats to patient admitted in intensive care unit (ICU) and receiving mechanical ventilation.

VAP is defined as hospital acquired pneumonia for the patients who were on ventilator for more than 48 hours particularly mechanical ventilation. There are chances of antimicrobial resistance, adverse effects and patient mortality [1]. Now-a-days, for evaluation of health-care systems, drug utilization studies have being playing a major role[2].

Ventilators can be life- saving, but they also increases chances of getting pneumonia as the patient's lungs are now easily available for germs. For enhanced patient safety, improving the use of AMA's is important. It is a public health issues as well as a national priority [3].

For the, patients on ventilators in intensive care unit, AMA's are profoundly used, so, needs a critical appraisal. Approximately ten times higher AMA's are consumed in ICU's than in general hospital wards[4].

So, for screening of AMA's, ICU is an ideal venue, a widespread use of board spectrum AMA's, invasive medical devices, critically ill patients favor the resistance development as well as spread of resistant organisms.

MATERIAL & METHODS:

It is a prospective, cross-sectional, observational study that was conducted in department of Pharmacology and MICU of RNT Medical College & associated group of hospitals, Udaipur, Rajasthan. Prior approval was taken from institutional ethics committee (IEC) via order no. No. RNT/IEC/2021/488, dated 4/08/2021.

AIM:

The main aim of the study is to evaluate the utilization and outcomes of AMA's for the patients who developed VAP in MICU of a tertiary care hospital in Udaipur, Rajasthan.

Sampling Unit

206 patients (as per sample size calculated by using formula $n=z^2pq/d^2$) were analyzed. Informed consent was taken from all the patients

Inclusion criteria:

Patients between age 20-70 years of either gender admitted in MICU and on Ventilator support & receiving AMA's.

Exclusion Criteria:

1. Patients below 20 yrs & above 70 yrs.
2. HIV & HBsAg +ve cases.
3. Patient who refused to participitate.

The prescriptions were analyzed for:-

a) Patient's demographic details.
b) Diagnosis for which he/she has been admitted to MICU.
c) Any co-morbid conditions
d) Antimicrobial agents prescribed, there dose, route, frequency and duration of administration.
e) Change in antimicrobial if any after VAP and reason foe same.
f) Outcome of patients.

The patients were enrolled in the study in accordance with the inclusion and exclusion criteria.

RESULTS

S.No	Sex	No. of prescription (207)
1	Male	134(65.05%)
2	Female	72(34.95%)
	Total	207(100%)

Table No. 1:- Sex Ratio

Diagnosis	No. of Patients (%)
CVS related conditions (MI, Angina, Valver heart disease etc.)	36(17.39%)
CNS Related conditions (Altered sensorium, cva infract, meningitis, stroke, encephalopathy etc.)	51(24.64%)
Blood related (Malaria, scrub typhus)	15(7.25%)
Liver related diseases (Liver cirrhosis, liver abscess)	9(4.35%)
Respiratory tract infection (Aspirational/ Bilateral pneumonia, Hemmorrahgic pleural infusion etc)	57(27.54%)
Poisoning	21(10.14%)
Others(Diabetic ketoacidosis, Dengue IgM+ve, Hypovolemic shock etc.)	18(8.69%)
Total	207(100%)

Table No. 2 :- Diagnosis for hospitalization in MICU.

Co-morbid conditions	No. of Patients (%)
Diabetes	52(25.24%)
Hypertension	51(24.76%)
Coronary artery diseases(CAD)	34(16.50%)
Chronic kidney diseases (CKD)	18(8.74%)
COPD	16(7.77%)
Alcoholic	13(6.31%)
Smoker	9(4.37%)
Others(BPH, Neurological etc)	8(3.88%)
NIL	6(2.43%)
Total	207(100%)

Table No. 3:- Co-morbid conditions found in patients.

S.No	Generic Name & Dose	No. of prescription (%)
1.	Beta-Lactams a) Penicillins I) Piperacillin+Tazobactum (2.25g & 4.45g) ii) Inj Amoxyclave 1.2g b) Cephalosporins I) Inj Ceftriaxone 1g/2g ii) Inj Cefoperazone+Sulbactam 1.5g c) Carbapenems I) Inj Imipenem+Cilastatin 500mg ii) Inj Meropenem 1g	 78(37.68%) 9(4.35%) 158(76.33%) 5(2.42%) 15(7.25% 43(20.77%)
2.	Macrolides- Inj azithromycin 500mg	29(14.01%)
3.	Aminoglycosides a) Inj Amikacin 500mg b) Inj Gentamicin 3-5mg/kg	 18(8.69%) 9(4.35%)
4.	Metronidazole (1-1.5g & 400 mg oral)	129(62.32%)
5.	Fluroquinolones a) Inj ciprofloxacin 0.5- 1gm b) Tab levofloxacin 750gm	 31(14.98%) 7(3.38%)
6.	Inj Linezolid 600mg	34(16.43%)
7.	Inj Vancomycin 1g	81(39.13%)
8.	Inj Clindamycin 600mg	19(9.18%)
9.	Others (Anti- tubercular, Artesumate 120mg)	26(12.56%)

Table No. 4:- Antimicrobial prescribed with doses

Change in AMA's	Total(%)
Change/Substituted	68(32.85%)
No change	139(67.15%)

Table No. 5:- Showing the change made in AMA's therapy.

Antimicrobial agents added/ Substituted	No. of prescription (%)
Piperacillin+Tazobactum(2.25g – 4.5g)	16
Metronidazole 1-1.5g	13
Vancomycin 600mg	10
Inj Amoxyclav 1.2gm	1
Inj Meropenem 1g	5
Inj Imepenem+Clistatin 500mg	5
Inj Ceftriaxone 2gm	18

Table No.6:- Shows The AMA's Substituted Or Added

Reason for modification in AMA's Agent	No. patients(%)
Laboratory report	25(36.76%)
Inadequate Clinical Response	22(32.35%)
Both	21(30.88%)
Total	68(100%)

Table No. 7:- Reasons for modification in AMA's therapy.

Outcome of the patients	Total No. Of Patients
Shifted/Discharged	136(65.70%)
Expired	45(21.74%)
LAMA	26(12.56%)
Total	207(100%)

Table No. 8:- Outcome of the patients

DISCUSSION

The incidence of occurance of VAP in our institute is approximately 22%, which is in accordance to the 15 to 30% [5,6]. in other studies, which may be attributed to early management of possible complication as well as advanced diagnosis.

Among 207 patients who developed VAP, in our study, 73(35.27%) were females and 134 (64.73%) were males, the same was find in other studies khirasaria et al.[7]Biswal et al.[8].

The most diagnosed condition of the patients who developed VAP were Respiratory tract infection 57(27.54%), which includes pneumonia, ARDS etc followed by CNS related conditions 51(24.64%) like CVA infracts, meningitis, stroke etc, CVS related conditions 36(17.39%) like Acute attack of MI, Angina, Valver heart disease etc., Poisioning 21(10.14%) was also a major cause for being brought to MICU which is mainly suicidal, requiring ventilator support, for maintaining the vitals.

The most common AMA's agent used in our study was ceftriaxone (76.33%) followed by metronidazole (62.32%), Vancomycin & Piperacillin+tazobactum, 39.18% & 37.68% respectively, which is same as found by other studies like the study done by Athawale SS et al, Mamatha et al, Gupta,Drupad et al [9,10,11]. As the anaerobic infection is quite common in hospital acquired infections, it might be the reason of prescribing metronidazole along with other AMA's.

Only in 68 (32.85%) cases there was change or substitution made in AMA's prescription this is approximately similar to study done by Malacarne P et al[12] where it was found that 37.6% cases AMAs has to be changed or added based on reports or response or both. Among 68, 25(36.76%) changes were due to Laboratory reports, 22(32.35%) were due to no clinical response and 21 (30.88%) were due to both.

It was a positive point that 65.70% of the patients were either discharged or shifted to general wards after recovering. 12.56%(26) left the treatment without any medical advice. The overall mortality rate is 21.74% which is very less as compared to the study done by Khirasaria et al[7]. where mortality rate is 42%, and nearby 19% which is found in another study[13]. This may be attributed to better patient and doctor compliance, along with correct diagnosis and proper treatment as well as implication by nursing staff as prescribed by doctor.

The most common co-morbid condition found is Diabetes 52(25.24%) and hypertension 51(24.76%) followed by CAD, Chronic kidney disease & COPD etc which is same as found in other study [7,8], and contribute in influencing the choice of AMAs, prolong ventilator support duration as well as make the patient more prone of getting nosocomial infections hence increasing the mortality rate.

CONCLUSION

As a very few study is available which focus on AMAs utilization pattern in VAP patients so the data collected and analyzed as well as recommendations can be considered in the future, that can aid physician to obtain the better clinical outcomes in VAP patients in Intensive care units as well as cut off the chances of developing antimicrobial resistance.

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