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Original Research Article

A study comparing the change in drug utilization pattern in medical intensive care unit of a tertiary care hospital in seven years

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ABSTRACT

Background: Medical intensive care unit is a type of intensive care unit that takes care of a range of medical illnesses with patients who are seriously ill and/or suffer from severe chronic illnesses. These patients are usually prescribed multiple drugs. Use of antimicrobial agents and injectable medications in setting of MICU is high as compared with other class of drugs and other hospital settings respectively. Periodic evaluation of drug utilization pattern needs to be done to enable suitable modifications in prescription of drugs to increase the therapeutic benefit and decrease the adverse effects. There could be changes in drug utilization pattern due to changes in disease pattern, development of newer drugs, resistance to antimicrobial agents. Hence comparison of past and present data needs to be done to find out the changes that occurred in drug utilization pattern over the years.

Methods: Data was collected from June 2021 to Dec 2021 for prospective arm and June 2014 to December 2014 for retrospective arm was obtained from MICU of tertiary care hospital and Medical Record Department. Drug utilization pattern was analysed and compared with appropriate statistical tests.

Results: Most common cause of MICU admission was infective diseases (71% and 67% respectively in retrospective and prospective arm). The drug prescribed frequently was pantoprazole and antimicrobial was ceftriaxone in both the study arms. Half of the drugs were prescribed by generic names in both arms.

Conclusions: There was no change observed in drug utilization pattern and disease pattern in patients admitted to medical intensive care unit over the years in our institute.

Keywords: MICU, Drug utilization, Antimicrobial agents

INTRODUCTION

An intensive care unit (ICU) is an organized system that provides care to critically ill patients to sustain life during a period of acute organ system insufficiency.¹ Medical Intensive Care Unit (MICU) is a type of intensive care unit that takes care of a range of medical illnesses like acute respiratory distress syndrome, acute kidney injury, acute on chronic kidney diseases, acute and chronic liver diseases, acute severe asthma, chronic obstructive pulmonary disease (COPD), sepsis, septic shock,

poisonings, acute respiratory failures of various causes, congestive heart failure, acute coronary syndromes and all critically ill patients of various diseases. Patients admitted in medical intensive care unit (MICU) are usually seriously ill and suffer from severe chronic illnesses. Because of their critical condition, they are usually prescribed multiple drugs from various pharmacological classes. Use of antimicrobial agents and injectable medications in setting of MICU is high as compared with other class of drugs and other hospital settings respectively.²

Drug utilization research is defined as “marketing, distribution, prescription and use of drugs in a society with special emphasis on resulting medical, social and economic consequences”. It helps us to evaluate the pattern of drug use and early detection of irrational drug prescriptions.

Periodic evaluation of drug utilization pattern needs to be done to enable suitable modifications in prescription of drugs to increase the therapeutic benefit and decrease the adverse effects. The changes may occur in drug utilization pattern over a period due to changes in disease pattern, development of newer drugs, resistance to existing antimicrobial agents (AMA’s). And hence the study was planned with the objective to compare the past and present data of drugs prescribed in MICU and look for the changes occurred in drug utilization pattern over 7 years.³

METHODS

Permission from In-charge of MICU and Ethics Committee for Academic Research Projects (ECARP) was taken. Permission to access medical records of discharged patients was taken from dean of the institute. For retrospective arm, waiver of consent was obtained from ECARP.

For prospective arm, patients with age above 18 years and who were willing to participate in study were enrolled in the study after obtaining their written informed consent. For both prospective and retrospective study arms, indoor case papers of 269 patients each were accessed. Data was collected from 15th June 2021 to 15th December 2021 for

prospective and matching period seven years back (15th June 2014 to 15th December 2014) was data collection period for retrospective arm.

Convenient sampling technique and simple randomization technique was used for prospective and retrospective arms respectively. The demographic details, clinical details, date of admission and date of transfer from MICU or patient’s death and treatment details were taken from indoor papers. For statistical analysis appropriate statistical tests were applied wherever applicable.

RESULTS

Mean age of patients was 32.97 ± 15.26 years and 35.82 ± 15.18 years in retrospective and prospective study arms respectively. When compared with each other it showed significant difference statistically (Mann Whitney U test with p value of 0.0026). In retrospective arm, 47% patients were male and 53% patients were female. Whereas in prospective arm, 54% patients were male and 46% patients were female. The difference was not statistically significant.

Most common cause of patients getting admitted in MICU in both arms was infective diseases, 71% for retrospective and 67% for prospective study arm. When compared using chi square test, this difference was not statistically significant. Detailed distribution of type of illness is given in Table 1 and 2. The average duration of length of stay was 5.45 ± 3.52 days in retrospective and 6.06 ± 3.70 days in prospective arm. The difference was not statistically significant.

Table 1: Distribution of infective diseases in retrospective and prospective arm (n=269).

Infective diseases	Retrospective study		Prospective study		P value
	N	%	N	%	
Febrile illness	55	29	36	20	0.0539
Gastrointestinal tract	35	18	37	21	0.606
Malaria	34	18	22	12	0.1482
RS	29	15	24	13	0.6576
Dengue	28	15	35	19	0.2684
Genitourinary tract	6	3	9	5	0.43
Total	191	100	180	100	

Table 2: Distribution of non-infective diseases in retrospective and prospective arm (n=269).

Non infective diseases	Retrospective study		Prospective study		P value
	N	%	N	%	
CVS	24	31	33	37	0.41
CNS	13	17	18	20	0.69
Endocrine	5	6	9	10	0.41
Poisonings	11	14	9	10	0.47
RS	16	21	6	7	0.01
Others	9	12	14	16	0.50
Total	78	100	89	100	

Table 3: Most common prescribed class of drugs in retrospective arm (N=2222) and prospective arm (N=2609).

Class of drugs	Retrospective study		Prospective study		P value
	N	%	N	%	
Supplementary	572	26	702	27	0.36
Anti-infective	552	25	579	22	0.03
Antacid	279	12	284	11	0.07
Antiemetic	186	8	210	8	0.68
Antipyretic	134	7	108	5	0.0027
Laxative	51	2	87	3	0.03
Antihypertensive	52	2	67	3	0.61
Others	396	18	572	22	-
Total	2222	100	2609	100	-

Table 4: Frequency of AMA's prescribed in retrospective (N=552) and prospective arm (N=579).

AMA prescribed	Retrospective arm, N (%)	Prospective arm, N (%)	P value
Ceftriaxone	119 (22)	133 (23)	0.61
Artesunate	116 (21)	99 (17)	0.09
Metronidazole	47 (9)	65 (11)	0.13
Amoxicillin + clavulanic acid	44 (8)	39 (7)	0.42
Clindamycin	38 (7)	36 (6)	0.65
Azithromycin	37 (7)	37 (6)	0.83
Piperacillin + Tazobactam	23 (4)	37 (6)	0.09
Others	128 (23)	133 (23)	0.93
Total	552	579	0.61

In retrospective part of study, average number of drugs per prescription was 8.26 ± 2.93 and in prospective part average number of drugs per prescription was 9.70 ± 3.32 . This difference was not significant statistically (compared with Mann Whitney U test). The drugs prescribed by generic name was 53% and 52% in retrospective and prospective study arms respectively. The drugs prescribed from National List of Essential Medicines was 83% and 82% in retrospective and prospective study respectively. The difference in both these categories was not statistically significant (Compared with chi square test). Regarding the dosage form, in retrospective part of study it was injectable (51%) followed by tablets (40%) while in prospective part of study it was injectable (53%) and tablets (37%). This difference did not have any statistical significance. (Compared with Chi square test).

A total of 2222 drugs from retrospective and 2609 drugs from prospective study were analyzed. Table no 3 shows the comparison of class of drugs between retrospective and prospective arms. The most commonly prescribed class of drugs were supplementary and anti-microbial drugs in both the study arms. Supplementary drugs included vitamins (B complex, vit C, vit D, vit K), Minerals (Calcium, Iron, Zinc) in both. The distribution of antimicrobial drugs is given in table no 4. The details of drugs in other category are as follows: For retrospective study, most commonly prescribed antacid was pantoprazole, prescribed by 254 times followed by ranitidine prescribed by 19 times, in antiemetic category it

was ondansetron (prescribed 181 times) and domperidone (prescribed 5 times) and paracetamol was the only drug in antipyretic category prescribed 134 times. For prospective study, in antacid category, most commonly prescribed drug was pantoprazole, prescribed by 268 times followed by ranitidine prescribed by 8 times, in antiemetic category it was ondansetron (prescribed 206 times) and domperidone (prescribed 4 times) and paracetamol was the only drug in antipyretic category prescribed 108 times.

DISCUSSION

The primary aim of this study was to compare the present drug utilization pattern of patients admitted in medical intensive care unit with drug utilization in medical intensive care unit 7 years back in a tertiary care hospital. The seven-year period was chosen because the medical record department of our hospital keeps the patients' records for seven years. A total of 269 indoor records were analysed in each of retrospective and prospective arm. The mean age observed in both retrospective and prospective study was comparatively lower than the previous studies done by Athawale et al (42.78 ± 18.14), Patel et al 44.62, Arathy et al (60.88 ± 16.87), Patanaik et al (54.3) and Maharani et al (52.9 ± 17.7). Most of these studies were carried out in ICU which would have patients with cardiac diseases which are seen in higher age group. While in our institute MICU and cardiac ICU are separate. This explains the variability of age in our study and those reported in literature.

Our study showed that the most common cause of patients getting admitted in MICU was infective diseases in both retrospective and prospective arm contributing by 71% and 67% respectively which is similar to study done by Maharani et al and it was in contrast to other studies such as Patanaik et al which showed cerebrovascular accident as most common cause (20.5%) of admission and Shobha et al which showed respiratory causes as most common cause (21.7%).^{2,4,5} Higher incidence of infective diseases in our studies may be attributed to study period which was from June to December which is a period of rainy season contributing to many vector-borne diseases such as dengue, malaria, leptospirosis. This may be the reason of higher number of infective diseases in our study. Also, no change is observed in the disease pattern and prevalence of patients admitted in medical intensive care unit in our institute over 7 years in our study.

Our study showed that half of the drugs were prescribed by generic names in both the studies. This showed that the trend of prescribing by trade names is not changed over the years. Studies done by maharani et al, and Adhikari et al showed similarity in number of drugs prescribed generic name which was 45.8% and 45.5% respectively. Prescribing drugs by brand name may generate errors of prescription like duplication which may lead to overdose or unnecessary dose. Prescribing drugs by generic name eliminates the chance of duplication of drug products, ultimately eliminating the errors of prescription. Also, it helps hospital pharmacy to have a better control of drug inventory and the errors done by pharmacists while prescribing is reduced. In order to improve prescribing by generic name physicians, education of physicians in this area needs to be done.

Around 50% of the patients in both the parts of study received injectable drugs. Studies reported in literature showed range in this aspect. Athawale et al (84.9%), Arvind et al (87.5%), Patel et al (86.5%), Thomas et al (52%), Patanaik et al (63.3%), Shobha et al (73%), Adhikari et al (68%).^{1,2,4,7-12} The number of injectable drugs prescribed depends on general condition of the patient which would vary in different studies.

Most commonly prescribed drug was pantoprazole in both retrospective and prospective arms. Patients admitted to medical intensive care unit are prone to developing aspiration pneumonia and gastrointestinal disturbances due to use of antimicrobial agents and polypharmacy. Hence, use of pantoprazole is justified. In both the studies antimicrobials were second most frequently prescribed drugs after supplementary medicines. This could be explained based on the similar the disease pattern of the patients admitted in MICU over last 7 years. In both retrospective and prospective studies ceftriaxone was most common antibacterial drug followed by metronidazole. This is similar to studies done by Adhikari et al, Divyashree et al and Shinde et al. All these studies were carried out govt medical institutes where ceftriaxone continues to become most commonly prescribed

antibacterial because of its lower toxicity, broad-spectrum activity and comparatively lower price.

CONCLUSION

To conclude we would say that there was no change observed in drug utilization pattern and disease pattern in patients admitted to medical intensive care unit over the years in our institute.

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