Prescription pattern of patients admitted in the intensive care unit of a tertiary care hospital in Puducherry, India: a cross-sectional study

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ABSTRACT

Background: Patients with varied demographic characteristics, admission criteria and heterogeneous group are admitted to medical Intensive Care Unit (ICU) and are usually associated with co-morbid illnesses. Instituting rational pharmacotherapy is the need of the hour for saving the life of critically-ill patients while irrational drug use may be life threatening. Drug use patterns and prescribing behaviour are the essential tools to measure drug use in health care facilities.

Methods: A record based, cross-sectional, observational study was done at medical ICU, IGMC and RI, Puducherry after obtaining IEC approval. Systemic random sampling was followed and data was collected for a period of one year. Data were analysed based on demographic characteristics, prescribing pattern and WHO drug use indicators.

Results: The data of 151 patients were analysed. Mean age of the patients admitted in ICU was 52.9±17.7 years. Percentage of male patients (57.6) admitted in ICU were more when compared to female patients (42.4). Infective etiology was the most common factor for ICU admission followed by cardiac disorders. Diabetes mellitus and hypertension were the most common co-morbidities. The average length of stay in ICU was 4.11±2.99 days. Duration of stay in ICU ranged from 1-5 days (78.8% patients) to 15-20 days (0.1% patients). On an average 10.6±4.3 drugs were prescribed for each patient. Percentage of drugs prescribed by generic name was 45.8%. Majority of the drugs (87.4%) were from essential medicine list. Antibiotics in the prescription was 13.8% and 44.4% of drugs were administered in parenteral route. The prescription was complete in 145 case sheets (96%). Majority of the patients (68.9%) were discharged with improvement in which for they were admitted.

Conclusions: This drug utilization study has highlighted the strengths and shortcomings of the prescription pattern of patients who were admitted in the critical care setup. The information derived from this research work will be transmitted to the stakeholders for implementing the modifications wherever applicable for the betterment of the patient and the community.

Keywords: Alcoholic, Drug utilization, Intensive care unit, Smoking

INTRODUCTION

Patients with varied demographic characteristics, admission criteria and heterogeneous group are admitted to medical Intensive Care Unit (ICU) and are usually associated with co-morbid illnesses. Chronic disease and life threatening disorders among ICU patients have resulted in medicating them with drugs from different pharmacological classes, which is further complicated by the altered physiology and multi-organ system failure. Critical illness and associated co-morbid conditions alter the absorption, distribution, metabolism, excretion and plasma concentration of drugs. This in turn alters the pharmacodynamic responses which results in sub
therapeutic, supra therapeutic or toxic effects of drugs.\(^4\) Hence, instituting rational pharmacotherapy is the need of the hour for saving the life of critically-ill patients while irrational drug use may be life threatening.

Efforts have been made by WHO to promote rational utilization of the drugs.\(^5\) Drug use patterns and prescribing behaviour are the essential tools to measure drug use in health care facilities.\(^6\)

Prescribing practices of physicians can be evaluated by drug utilization study and modifications if any can be suggested.\(^7\) This will ensure quality medical care and rational pharmacotherapy.

Rational pharmacotherapy in turn helps in cost minimization and optimal utilization of available funds. Hence the present study was conducted with the following objectives.

- To assess the prescription patterns of patients admitted in ICU.
- To evaluate the drug consumption by WHO drug use indicators.

**METHODS**

A record based, cross-sectional, observational study was done at medical ICU, IGMC and RI, Puducherry. Data were collected for a period of 1 year (June 2016-June 2017) from the records maintained in the Medical record section (MRD).

**Inclusion criteria**

Case sheets of patients who were more than 18 years of age admitted to ICU for medical intensive care were included in the study.

**Exclusion criteria**

Case sheets with incomplete information, data of patient who stayed in the ICU for <24 hours and patient who was admitted in ICU for surgical or post-operative care were excluded from the study.

**Sample size calculation**

On an average 50 cases were admitted in the ICU every month. Considering the seasonal variation of some of the diseases, the admission in ICU in a year was divided into 3 equal parts with 4 months in each. From each of these 3 equal parts, two month’s admissions were taken into account. So, the 6 months admissions in ICU was 300.

**Sampling procedure**

Systematic random sampling technique (Collecting the data from every second/alternative record) was followed and hence the sample size was 151.

**Data collection**

Data on demographic characteristics, prescribing pattern, drug consumption by drug use indicators, adverse effect if any and treatment outcome were collected in a specially designed proforma.\(^8\)

Prescribing pattern was analysed by: \(^9,10\)

- Completeness of prescription writing. (Generic or brand name, dose, frequency of administration, route of administration, date of prescription and signature of the prescriber was considered)

Drug consumption was analysed by WHO drug use indicators: \(^5\)

- Average number of drugs prescribed.
- Percentage of drugs prescribed by generic name.
- Percentage of encounter with antibiotics prescribed.
- Percentage of encounters with an injection prescribed.
- Percentage of drugs prescribed from essential drug list or formulary.

Adverse reactions occurred during ICU stay were also documented.

**Statistical analysis**

The data were entered using epidata version 3.1, data processing and analysis was done by MS Excel 2013 and SPSS 20. Continuous data were expressed as Mean \(\pm\) S.D or median (inter quartile range) wherever applicable. Categorical data were expressed as frequency and percentage wherever applicable.

**RESULTS**

The data of 151 patients admitted in ICU over a period of one year were analysed. Mean age of the patients admitted in ICU was 52.94\(\pm\)17.7 years. Preponderance of admissions were in the age group greater than 65 years. Percentage of male patients admitted in ICU was more when compared to female patients. Majority of admitted patients were married. Nearly 21.2\% of admitted patients were smokers and 43.1\% of patients were alcoholic (Table 1).

Infective etiology was the most common factor for ICU admission followed by cardiac disorders (Table 2). Acute gastroenteritis, viral fever, TB meningitis, DM with sepsis, pyelonephritis, diabetic foot and septic shock were the infective etiology for which the patients were provided with ICU care. Cardiac causes ranged from acute coronary syndrome, dilated cardiomyopathy, left ventricular failure, arrhythmias and pulmonary edema. Cardiac incidence was high among female patients. Decompensated liver disease with ascites, alcoholic liver disease, hepatic encephalopathy was the hepatic reasons and it was more among male patients. Bronchopneumonia, chronic obstructive pulmonary disorders, bronchial asthma and...
pleural effusion were the pulmonary causes. Common CNS disorders for ICU admission was seizures, stroke, pontine haemorrhage, alcohol dependent seizures and encephalopathy.

**Table 1: Socio-demographic profile of patients (151 patients).**

| Bio-social characteristics          | Number (n=151) | Percentage |
|------------------------------------|----------------|------------|
| Age (years)                        |                |            |
| <35                                | 30             | 19.9       |
| 36-45                              | 21             | 13.9       |
| 46-55                              | 31             | 20.5       |
| 56-65                              | 31             | 20.5       |
| >65                                | 38             | 25.2       |
| Mean±SD                            | 52.9±17.7      |            |
| Range                              | 18-90          |            |
| Gender                             |                |            |
| Male                               | 87             | 57.6       |
| Female                             | 64             | 42.4       |
| Marital status                     |                |            |
| Married                            | 141            | 93.4       |
| Unmarried                          | 10             | 6.6        |
| Smoking history                    |                |            |
| Smoker                             | 32             | 21.2       |
| Non-smoker                         | 119            | 78.8       |
| Alcoholic history                  |                |            |
| Alcoholic                          | 65             | 43.1       |
| Non-alcoholic                      | 86             | 56.9       |
| SD- Standard deviation             |                |            |

Preponderance was observed in males. Renal disorders for which ICU care was provided were chronic kidney disease and hypertensive nephropathy. Few critical cases of carbamate, rat killer poison and drug overdose was also treated in ICU.

**Table 2: Etiology for ICU admission.**

| Diagnosis                        | Sex Male | Female | %  | Total |
|----------------------------------|----------|--------|----|-------|
| Infective etiology               | 17       | 17     | 22.5| 34    |
| Cardiac disorders                | 9        | 16     | 16.6| 25    |
| Hepatic disorders                | 20       | 4      | 15.9| 24    |
| Pulmonary disorders              | 12       | 9      | 13.9| 21    |
| Electrolyte imbalance            | 9        | 5      | 9.3 | 14    |
| CNS disorders                    | 10       | 2      | 7.9 | 12    |
| Others                           | 6        | 5      | 7.3 | 11    |
| Chronic kidney disease           | 2        | 3      | 3.3 | 5     |
| Acute poisoning                  | 2        | 3      | 3.3 | 5     |
| Total                            | 87*      | 64*    | 100 | 151   |

Chi-square test; DOF=5; * - p value=0.0064 (<0.05)

Diabetes mellitus and hypertension were the most common co-morbidities found among patients admitted to ICU (Table 3). Some patients had more than one co-morbid condition.

**Table 3: Associated co-morbid conditions.**

| Co-morbidity                        | No. of patients | Percentage |
|-------------------------------------|-----------------|------------|
| Diabetes mellitus                   | 60              | 39.7       |
| Hypertension                        | 47              | 31.1       |
| Alcoholic and chronic liver disease | 8               | 5.3        |
| Chronic obstructive pulmonary diseases | 6             | 3.9        |
| Coronary artery disease             | 2               | 1.3        |
| Chronic kidney disease              | 2               | 1.3        |
| Others                              | 20              | 13.2       |
| No co-morbidity                     | 53              | 35.1       |

The average length of stay in ICU was 4.11±2.99 days. Duration of stay in ICU ranged from 1-5 days (78.8% patients) to 15-20 days (0.1% patients) (Table 4).

**Table 4: Length of ICU stay of patients.**

| Duration in days       | Number of patients(n=151) | Percentage |
|------------------------|---------------------------|------------|
| 1-5                    | 119                       | 78.8       |
| 6-10                   | 26                        | 17.3       |
| 11-15                  | 5                         | 3.3        |
| 15-20                  | 1                         | 0.6        |
| Mean±SD                | 4.11±2.99                 |            |

SD- Standard deviation

Analysis based on WHO drug use indicators had shown an average 10.6±4.3 drugs were prescribed for each patient. Totally 1608 drugs were utilized for treating 151 patients. Percentage of drugs prescribed by generic name was 45.8%. Majority of the drugs (87.4%) were from essential medicine list. Antibiotics in the prescription was 13.8% and 44.4% of drugs were administered in parenteral route (Table 5).

**Table 5: WHO drug use indicators.**

| Indicator                              | Percentage |
|----------------------------------------|------------|
| Average number of drugs prescribed     | 10.6       |
| Percentage of generic drugs            | 45.8       |
| Percentage of antibiotics              | 13.8       |
| Percentage of Injections               | 44.4       |
| Percentage of drugs from EML           | 87.4       |

Nearly 221 antibiotics were utilized and cefotaxime was the most common antibiotic used followed by metronidazole (Figure 1).

Among the 151 case sheets analysed, the prescription was complete in 145 case sheets (96%). Majority of the patients...
(68.9%) were discharged with improvement in the condition for which they were admitted (Figure 2). Adverse events to the drug administered was noted in only one patient and the ADR was allergy to cefotaxime.

Figure 1: Antibiotics utilization percentage.

Figure 2: Outcome of ICU stay.

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DISCUSSION

Prescriptions of 151 patients admitted in ICU over a period of one year was analysed to know the prescription pattern and drug utilization pattern with special emphasis on WHO drug use indicators. Mean age of the patients admitted in ICU was 52.9±17.7 years. Number of patients aged above 65 years admitted in ICU was more when compared to other age group and it contradicts the observation done by authors in which the admissions was more in the age group of 40-50 yrs.11

Morbidity and mortality due to various diseases is more common in this age group because of natural process of aging and various illnesses. Nearly 43.1% of admitted patients were alcoholic and 21.2% were smokers which reflects the higher incidence hepatic disorders, pulmonary disorders and CNS disorders in males when compared to other illnesses which had higher incidence in females. Diabetes and hypertension were the two most common associated co-morbid illnesses and it is in accordance with the study done by author.12

The average length of ICU stay was 4.11±2.99 days and majority of the patients were treated in the ICU for 1-5 days. It was in accordance with the study done by author13

Infecitve etiology was the most common diagnosis in the analysed case sheets. Nearly 68.9% of the patients were discharged with improvement in the condition for which they were admitted. This indicates better health care and good prognosis of the patient.

Analysis based on WHO drug use indicators had shown on an average 10.6±4.3 drugs were prescribed for each patient. The percentage of drug used was very high when compared to other studies which were 6.35±1.56 and 7.82±1.25 respectively and less compared to the study (13.54±1.6).8,14,15

Extensive polypharmacy may be to treat the disease per se and the co-morbidities. But the number of drugs can be kept low to avoid drug interactions, adverse reactions and reduce expenditures. Percentage of drugs prescribed by generic name was 45.8% when compared to 100% advised by WHO.6 But generic drug prescriptions was better when compared to other studies which stood around 17.9%.16

Adhering to more generic drug prescribing helps in reducing the expenditures spent on drugs. Majority of the drugs (87.4%) were from essential medicine list which is more compliant than WHO recommendation of 70%.6 Antibiotics in the prescriptions was 13.8% which was considerable less when compared to the study conducted in Karnataka (20%).17 Cephalosporins and metronidazole were the more commonly used antibiotics as they cover both aerobic and anaerobic infections in ICU.

Completeness of prescription was around 96% which indicates proper documentation of the therapy provided in the ICU. Adverse events observed during the study period was negligible.

This study has few limitations. It was conducted in a single centre, so the results cannot be extrapolated to the general population. Drug interaction among the prescribed drugs was not accounted. Pharmacoeconomic calculation of expenditures was not done.

CONCLUSION

This drug utilization study has highlighted the strengths and shortcomings of the prescription pattern of patients who were admitted in the critical care setup. This has also highlighted the differences in patient care in different parts of India as well as globally. The information derived from this research work will be transmitted to the stakeholders for implementing the modifications wherever applicable for the betterment of the patient and the community.
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