



ROLE OF CLINICAL PHARMACIST IN PROVIDING EMERGENCY TREATMENT FOR POISON CASES ADMITTED IN INTENSIVE CARE UNIT BY USING DRUG UTILISATION REVIEW METHOD

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ABSTRACT

Background: Intensive Care Unit (ICU) is the specialty that cares for the care seeker, at the most vulnerable moments of their life. It faces the challenge of evaluating the early phases of the biological behavior in diseases. Urgency, unpredictability and the need to acquire skills of the entire spectrum of age, gender and the pathology are the hallmark of the specialty. The problems, challenges and practices of emergency are globally similar. Hence, this prospective and concurrent observational study was undertaken with the objectives to evaluate the drug use pattern in Intensive Care Unit (ICU). DURs serve as a means of improving the quality of patient care, enhancing therapeutic outcomes, and reducing inappropriate pharmaceutical expenditures, thus reduces overall health care costs. The research work mainly done to assess the likelihood that a drug caused an ADE; and to identify the drugs, the ADEs themselves, and the risk factors associated with hospitalization. The use of multiple medications may further increase the risk of drug-related problems, such as adverse drug reactions, interactions, patient noncompliance with treatment and medication errors. Hence, the appropriate management of these patients is a challenge for the treating physician in ICU. **Aim and Objectives:** The main aim of our study is to perform the Role Of Clinical Pharmacist In Providing Emergency Treatment For Poison Cases Admitted In Intensive Care Unit By Using Drug Utilisation Review Method in South Indian Tertiary Care Teaching Hospital (RIMS) Kadapa.

- To study the drug use pattern/prescribing pattern of drugs in ICU patients
 - The collected data was used to find the prescribing indicators like
 - a) The average no. of drugs per prescription.
 - b) The percentages of the drugs which were prescribed by their generic names.
 - c) The percentages of the drugs with antibiotics which were prescribed.
 - d) The percentages of the drugs with different route of administration.
 - e) The percentages of the drugs which were prescribed from the Essential Drugs List or the formulary.
 - To study about the various complications/morbidity patterns admitted in ICU and common drug groups prescribed for various morbidity patterns.
 - To detect and help to prevent the drug related problems.
 - To assess the reason for deaths and to find out the incidence of deaths.
- To study drug utilization metrics and their applications.

Materials and Methods: A prospective and concurrent observational study was carried out over a period of 6 months in the ICU department of RIMS after obtained approval by Institutional Review Board. Based on Inclusion and Exclusion criteria patients are included in

the study. Written **Informed Consent Form** from the patient/legal guardian was taken prior to conduct the study. All the necessary and relevant baseline information are collected by using “**Chart Review Method**”, (which is well suited for DUE) in a patient

data collection sheet which includes Patient demographic details, Past/Present medical history, Lab investigations, Diagnosis, Treatment/Physician medication order sheet (Agents, Doses, Dose intervals, Routes of Administration, Number of doses and Duration of Administration) and any other verbal communication data obtained from patients/patient caregivers. Confidentiality of the entire patient's data will be maintained. **Results and Discussion:** The highest number of patients were admitted in ICU are at the age of 50-60 years 61(24.4%) and the least number was admitted are < 20 years 18(7.2%) of age was observed in our sample size. Out of 250 patients being recruited, 122 (48.8%) were females and 128 (51.2%) are males, 204 (96.0%) patients were illiterate and 46 (18.4%) patients were literate. Socio-economic status comparison shows that out of 250 patients; 170 (68.0%) are very poor, 67(26.8%) are poor and 13 (5.2%) are middle class. The very poor patients with low economic status are more seen in our study. Out of 250 patients; 21.6% are unmarried and 78.4% were married. Based on Habituated history Female (15) and male (103) are Habituated (Smoking/Alcohol/betel-nut chewing), Female (107) and male (25) are Not Habituated. Based on patients length of stay in ICU; <5 days are about 150 (60%), 5-10 days are 50 (20%), 10-15 days are 27 (10.8%), >15 days are 13 (5.2%), and 10 (4.0%) were shifted to other ward **supported by Gangwar Singh Amit, et.al.** Majority of the new exposure diseases found in ICU ward are Super Vasmol Poisoning (46), Organo Phosphorous Poisoning (34), CVS Diseases(27), followed by the other diseases like Hepatic Diseases (18), CNS Diseases(16), Respiratory Diseases(13), Renal Diseases(10), Metabolic Disorders(02) and Tablet Poisoning(01) were observed. Among 250 cases; 81(32.40%) were Poison Cases followed by Cardio Vascular Diseases 42(16.80%)^[32], Renal Diseases 37(14.80%), Central Nervous System 30(12. 0%), Hepatic & Respiratory Diseases 28(11.20 %) and Metabolic disorders 04(1.60 %) were observed **supported by Mahendra K Patel, et.al.,** Among 81 Poisoning Cases; Females (38) and Males (08) were observed in Super Vasmol Poisoning 46(18.4%), Females (15) and Males (19) were observed in Organo Phosphorous Poisoning 34(13.6%) and Females (01) and Males (00) were observed in Tablet Poisoning. Among 34 Female SVP patients, Tracheostomy was performed in 28(82.35%) patients, and not performed in 06(17.64%) patients and **supported by Aiswarya Aravind, et.al., Rammurthy p, et.al.** Among 1518 drugs prescribed; 1198 (78.91%) were Generic Drugs and 320 (21.08%) were Branded Drugs. Among 250 prescriptions; 1518 drugs were prescribed and Maximum 220 (14.49%) are Anti-Ulcers, 190 (12.51%) are Anti-Bacterials, 150 (9.88%) are Diuretics were prescribed and followed by other drug classifications **supported by preksha a. barot, et.al.,** Minimum 02 (0.13%) were Anti-Fungal, Anti-Malarial and followed by other drug classifications. ICU monitoring parameters were not performed and performed were mentioned. Out of 250 patients, 182 patients are recommended for Laboratory

Investigations; in which 127 laboratory investigations were performed and 55 were not performed. Due to this, the percentage of prognosis was increased as proper medication is given by HCP's according to the patient investigational report analysis. Based on prognosis 40% was not progressed and 60% was progressed. Medication errors were identified in ICU Patients are 103; 67.96% are having untreated indications, 2.91% were Drug without indication and 29.12% are prescribing error are observed during the course of our work **supported by Prajapathi Aaroohi Ashokbhai,** Among 127 death cases; 37 are Poisoning Cases followed by 30 CNS Deaths, Maximum deaths occurred due to Cardio Respiratory Failure (56.69%) and Minimum deaths due to Hypoglycemic Coma (1.57%) was observed and this was **supported by Helene Goulet, Aishwarya Aravind, et.al.,** The incidence of death is calculated by using total number of deaths divided by total number of patients in ICU is 50.8% was identified. Based up on the end stage treatment given in 90 death cases; AMBU done in 75 cases and not done in 15 cases, CPR & ECG was done in 90 cases, DC Shock was done in 82 cases and not done in 08 cases was detected by using chart review method. **Conclusion:** The study concludes that a wide spectrum of drugs is utilized from various drug classes and there is scope for improving rational use of drugs. The prescription of generic drugs needs to be promoted. Role of clinical pharmacist proves significant in ICU for Drug Therapy management of cardiac ill patients. The study concludes that medication management of critically ill patients can decrease drug related problems in complex therapy as well improve the therapeutic outcome of the treatment. We can conclude by stating that poisoning is one of the leading causes of hospital admissions and mortalities. Super vasmol poisoning, Organophosphorous poisonings and Drug over dosage are the most common poisoning admissions that require intensive care admission and management. Majority of the patients recovered which indicates good emergency and intensive care management. Prevailing treatment protocols require updation on proper guidelines, cost assessment, counselling and training programs. In our project majority of the poisoning cases were SVP deaths were occurred due to Rhabdomyolysis. In conclusion, Super vasmol poisoning is a life-threatening emergency which requires emergency resuscitation and aggressive management of anaphylaxis. Early forced alkaline diuresis prevents ARF minimizing the need for dialysis. And also the time of development of renal failure following PPD intoxication is uncertain and hence all patients should be monitored in hospital for development of renal complications. In summary, more than half of early unexpected deaths after visits ICU are related to a medical error and could have been prevented. Under-detection of majority are DDI's, prescribing errors, ADR's, and delay in lab investigations, improper diagnosis, delayed Emergency treatment was a major cause of causing deaths in our research work. Due to lack of time for the Intensivists (Health Care Professionals (HCP's)). Hence, this study was carried out with the

objective to evaluate the demographics and drug utilization pattern in the medical intensive care unit of a tertiary care teaching hospital in poison cases. This study may be helpful in identifying the new concept of drug therapy management of patients in different disease conditions in critical care and also in A.P state.

KEYWORDS: DDI, ICU, ADE, DUR.

INTRODUCTION

According to the International Federation for Emergency Medicine is a field of practice based on the knowledge and skills required for the prevention, diagnosis and management of acute and urgent aspects of illness and injury affecting patients. Instituting appropriate therapy is essential for a favorable outcome of the patient and to decrease mortality and morbidity. Clinicians often face challenges in selecting, initiating and individualizing appropriate drug therapy for patients admitted in the Intensive Care Unit (ICU). A prescription based survey (drug utilization study) is considered to be one of the most effective methods to analyze the prescribing pattern of drugs and prescribing behavior of physicians. Monitoring the trends in drug utilization in emergency medicine can provide insight into major health-care problems. Most existing literature on emergency medicine has been brought forth from high income countries.

Moreover, the study demonstrates the need to develop tools which can improve causality assessment of the causal association between the use of drugs and the development of adverse events and to validate tools with higher sensitivity to identify ADEs. It is also necessary to provide continuing education to qualify health professionals to perform pharmacovigilance activities.

In contrast, 70% of the population exists in low and middle income countries; hence, it is an urgent need of the hour to conduct scientifically sound well-designed study in Intensive Care Unit (ICU) with a focus on drug utilization in our country. Hence, this prospective direct observational study was undertaken with the objectives to evaluate the drug use pattern in Intensive Care Unit. Hence, this prospective and concurrent observational study was undertaken with the objectives to evaluate the drug use pattern in Intensive Care Unit (ICU).^[1] Neurologic disorders are prevalent among the critically ill patients in the intensive care unit (ICU), both as a primary disease or as a complication of multiple organ dysfunctions. Critically ill patients are at a high risk of developing neurologic disorders due to multiple organ failure, advancing age, prescription of psychoactive agents, and malnutrition.^{[2][3]}

POISONING CASES ADMITTED IN ICU

Poisoning or intoxication is defined as the occurrence of harmful effects resulting from exposure to a foreign chemical or a xenobiotic. Pesticides particularly Organophosphorous poisoning (OPP) are common in the

low to middle socioeconomic countries which is usually attributed to the hazardous occupational usage and unsafe storage of pesticides.^[4]

TREATMENT FOR POISONING CASES IN ICU

These notes provide only an overview of the treatment of poisoning.

Hospital Admission

Patients who have features of poisoning should generally be admitted to hospital. Patients who have taken poisons with delayed action should also be admitted, even if they appear well.

General Care

It is often impossible to establish with certainty the identity of the poison and the size of the dose. Few patients require active removal of the poison. All relevant information should be sought from the poisoned individual and from caretakers or parents. However, such information should be interpreted with care because it may not be complete or entirely reliable. Sometimes symptoms arise from other illnesses and patients should be assessed carefully.

Respiration

Respiration is often impaired in unconscious patients. An oropharyngeal or nasopharyngeal airway may be useful in patients with reduced consciousness to prevent obstruction, provided ventilation is adequate. Intubation and ventilation should be considered in patients whose airway cannot be protected or who have respiratory acidosis because of inadequate ventilation; such patients should be monitored in a critical care area. Oxygen is not a substitute for adequate ventilation, although it should be given in the highest concentration possible in poisoning with carbon monoxide and irritant gases. Respiratory stimulants do not help and should be avoided.

Blood Pressure

A systolic blood pressure of less than 70mmHg may lead to irreversible brain damage or renal tubular necrosis. Hypotension should be corrected initially by tilting down the head of the bed and administration of either sodium chloride intravenous infusion or a colloidal infusion. Hypertension, often transient, occurs less frequently than hypotension in poisoning; it may be associated with sympathomimetic drugs such as amphetamines, phencyclidine, and cocaine.

Heart

Arrhythmias often respond to correction of underlying hypoxia, acidosis, or other biochemical abnormalities. Ventricular arrhythmias that cause serious hypotension require treatment. If the QT interval is prolonged, specialist advice should be sought because the use of some anti-arrhythmic drugs may be inappropriate. Supraventricular arrhythmias are seldom life-threatening

and drug treatment is best withheld until the patient reaches hospital.

Body Temperature

Hypothermia may develop in patients of any age, who have been deeply unconscious for some hours, particularly the overdose with barbiturates or phenothiazines. It may be missed unless core temperature is measured using a low-reading rectal thermometer or by some other means. Hypothermia is best treated by wrapping the patient (e.g. in a 'space blanket') to conserve body heat. Hyperthermia can develop in patients taking CNS stimulants; Hyperthermia is initially managed by removing all unnecessary clothing and using a fan. Sponging with tepid water will promote evaporation. Both hypothermia and hyperthermia require urgent hospitalization for assessment and supportive treatment.

Convulsions

Single short-lived convulsions do not require treatment. If convulsions are protracted or recur frequently, lorazepam 4 mg or diazepam (preferably as emulsion) 10 mg should be given by slow intravenous injection into a large vein. Benzodiazepines should not be given by the intramuscular route for convulsions. If the intravenous route is not readily available, diazepam can be administered as a rectal solution or midazolam [unlicensed use] can be given by the buccal route.

Removal and Elimination

Prevention of Absorption given by mouth, activated charcoal can bind many poisons in the gastro-intestinal system, thereby reducing their absorption. The sooner it is given the more effective, but it may still be effective up to 1 hour after ingestion of the poison longer in the case of modified release preparations or of drugs with antimuscarinic (anticholinergic) properties. It is relatively safe and is particularly useful for the prevention of absorption of poisons that are toxic in small amounts, such as antidepressants.

Active Elimination Techniques

Repeated doses of activated charcoal by mouth enhance the elimination of some drugs after they have been absorbed; repeated doses are given after overdosage with: Carbamazepine, Quinine, Dapsone, Theophylline, Phenobarbital. The usual dose of activated charcoal in adults is 50 g initially then 50 g every 4 hours. Vomiting should be treated (e.g. with an antiemetic drug) since it may reduce the efficacy of charcoal treatment. In cases of intolerance, the dose may be reduced and the frequency increased (e.g. 25 g every 2 hours or 12.5 g every hour) but this may compromise efficacy.

Removal from the Gastro-Intestinal Tract

Gastric lavage is rarely required for substances that cannot be removed effectively by other means (e.g. iron), it should be considered only if a life-threatening amount has been ingested within the previous hour. It should be

carried out only if the airway can be protected adequately. Whole bowel irrigation (by means of a bowel cleansing solution) has been used in poisoning with certain modified-release or enteric-coated formulations, in severe poisoning with iron and lithium salts and if illicit drugs are carried in the gastro-intestinal tract ('body-packing').

Charcoal Activated

Indications: Reduction of absorption of poisons in the gastro-intestinal system.

Cautions: Drowsy or comatose patient (risk of aspiration); reduced gastro-intestinal motility (risk of obstruction); not for poisoning with petroleum distillates, corrosive substances, alcohols, clofenotane (dicophane, DDT), Malathion, and metal salts including iron and lithium salts.

Side-Effects: Black stools.

Dose: Reduction of absorption, Adult dose 50 g.

Tablet Poisoning (Paracetamol)

Single or repeated doses totalling as little as 10–15 g (20–30 tablets) or 150 mg/kg of paracetamol taken within 24 hours may cause severe hepatocellular necrosis and, much less frequently, renal tubular necrosis (equivalent to approx. 5 g (10 tablets) in a 70-kg patient) taken within 24 hours. Liver damage is maximal 3–4 days after ingestion and may lead to encephalopathy, haemorrhage, hypoglycaemia, cerebral oedema, and death. Acetylcysteine protects the liver if infused within 24 hours of ingesting paracetamol.

Antidote for Paracetamol Poisoning

Acetylcysteine

Indications: Paracetamol over dosage.

Cautions: Asthma (Do not delay acetylcysteine treatment).

Side-effects: Hypersensitivity.

Dose: By IV infusion, Adult initially 150 mg/kg (max. 16.5 g) over 15 minutes, then 50 mg/kg (max. 5.5 g) over 4 hours then 100 mg/kg (max. 11 g) over 16 hours Administration Dilute requisite dose in glucose IV infusion 5% as follows: Adult initially 200mL given over 15 minutes, then 500mL over 4 hours, then 1 litre over 16 hours.

Organophosphorus Poisoning

Organophosphorus insecticides are usually supplied as powders or dissolved in organic solvents. Toxicity between different compounds varies considerably, and onset may be delayed after skin exposure. Anxiety, restlessness, dizziness, headache, miosis, nausea, hypersalivation, vomiting, abdominal colic, diarrhoea, bradycardia and sweating are common features of organophosphorus poisoning. Muscle weakness and fasciculation may develop and progress to generalized

flaccid paralysis, including the ocular and respiratory muscles. Convulsions, coma, pulmonary oedema with copious bronchial secretions, hypoxia and arrhythmias occur in severe cases.^[5]

Hyperglycaemia and glycosuria without ketonuria may also be present. Further absorption of the organophosphorus insecticide should be prevented by moving the patient to fresh air, removing soiled clothing, and washing contaminated skin. In severe poisoning it is vital to ensure a clear airway, frequent removal of bronchial secretions and adequate ventilation and oxygenation; gastric lavage may be considered provided that the airway is protected. Atropine will reverse the muscarinic effects of acetylcholine and is given in a dose of 2 mg as atropine sulphate (intramuscularly or intravenously according to the severity of poisoning) every 5 to 10 minutes until the skin becomes flushed and dry, the pupils dilate and tachycardia develops. Pralidoxime chloride, a cholinesterase reactivator, is used as an adjunct to atropine in moderate or severe poisoning. It improves muscle tone within 30 minutes of administration. Pralidoxime chloride is continued until the patient has not required atropine for 12 hours.

Antidote for Organo Phosphorus Poisoning (Pralidoxime Chloride)

Indications: Adjunct to atropine in the treatment of poisoning by organophosphorus insecticide or nerve agent.

Cautions: Renal impairment, myasthenia gravis.

Contra-indications: Poisoning with carbamates or with organophosphorus compounds without anticholinesterase activity.

Side-effects: Drowsiness, dizziness, disturbances of vision, nausea, tachycardia, headache, hyperventilation, and muscular weakness.

Dose: By intravenous infusion, Adult initially 30 mg/kg over 20 minutes, followed by 8 mg/kg/hour; usual max. 12 g in 24 hours.

Super Vasmol Hair Dye

Super vasmol 33 is one of the widely used hair dyes in India, hair dye poisoning is not rare, but is an emerging poisoning in India. The active ingredients include paraphenylenediamine (PPD), propylene glycol, liquid paraffin, cetostearyl alcohol, sodium lauryl sulfate and resorcinol; the main component of super vasmol hair dye causing toxicity is paraphenylenediamine (PPD) and can cause rhabdomyolysis, laryngeal edema, severe metabolic acidosis, acute renal failure (ARF) and myocarditis. PPD is the major toxin amongst these and produces both local as well as systemic toxic effects. Systemic features of PPD poisoning occur in three phases.^[6]

Phase 1 is an acute presentation with edema of neck, airway obstruction, gastritis and severe vomiting.

Phase 2 is a sub acute presentation with acute renal failure (ARF), rhabdomyolysis and hemolysis.

Phase 3 progresses to multiorgan failure. Main stay of management is early recognition and supportive measures as there is no specific antidote.

SVP ingestion leading to a wide variety of complications. The extent of renal involvement in poisoning varies between transient proteinuria and oliguric ARF. PPD is a coal-tar derivative, which on oxidation produces Bondrowski's base, which is allergenic, mutagenic and highly toxic.

Rhabdomyolysis

The mechanism of Rhabdomyolysis is due to leakage of calcium ions from the smooth endoplasmic reticulum, followed by continuous contraction and irreversible change in the muscle's structure. Rhabdomyolysis is the main cause of ARF and the morbidity and mortality are high once renal failure develops. The respiratory syndrome following the ingestion of PPD is represented by asphyxia and respiratory failure secondary to inflammatory edema involving cricopharynx and larynx.

Myoglobinuric ARF

Myoglobinuric ARF is observed in the tropics after a variety of conditions, such as crush syndrome, burns, heat stroke, electrical injury, eclampsia, prolonged labor, poisoning with mercuric chloride, zinc or aluminium phosphide, status epilepticus, viral myositis and status asthmaticus. The diagnosis is established by the demonstration of myoglobin in urine and elevated levels of creatine phosphokinase and aldolase in the serum. Since, myoglobin is a small molecule with a molecular weight of 17 kDa and binds only lightly to the plasma proteins, it escapes easily in the urine. There is no specific antidote for hair dye poisoning and treatment is mainly supportive.^[7]

Drug Utilization Reviews (DUR)

Drug Utilization Reviews (DUR), also referred to as Drug Utilization Evaluations (DUE) or Medication Utilization Evaluations (MUE), are defined as an authorized, structured, ongoing review of healthcare provider prescribing, pharmacist dispensing and patient use of medication.^[3] DURs involve a comprehensive review of patients' prescription and medication data **before**, **during**, and **after** dispensing to ensure appropriate medication decision making and positive patient outcomes.^[8]

DURs are classified into three categories

- Prospective
- Concurrent
- Retrospective

PROSPECTIVE DUR

A Prospective DUR involves evaluating a patient's planned drug therapy *before* a Medication is dispensed. Clinical Pharmacists routinely perform prospective reviews in their daily practice by assessing a prescription medication dosage and directions and reviewing patient information for possible drug interactions or duplicate therapy.^[9]

Issues Commonly Addressed by Prospective DUR

- Drug-disease contraindications
- Therapeutic interchange
- Generic substitution
- Incorrect drug dosage
- Inappropriate duration of drug treatment
- Drug-allergy interactions
- Clinical abuse/misuse

CONCURRENT DUR

A Concurrent DUR is performed during the course of treatment and involves the *ongoing* monitoring of drug therapy to ensure positive patient outcomes. It presents pharmacists with the opportunity to alert prescribers to potential problems and to intervene in areas such as drug-drug interactions, duplicate therapy, over or underutilization, and excessive or insufficient dosing.^[9]
[10] [11]

Issues Commonly Addressed by Concurrent DUR

- Drug-drug interactions
- Drug-disease interactions
- Drug-gender precautions
- Duplicate therapy
- Over and underutilization
- Drug-pregnancy precautions
- Excessive doses
- Drug-age precautions
- High or low dosages

The use of multiple medications may further increase the risk of drug-related problems, such as adverse drug reactions, interactions, patient noncompliance with treatment and medication errors. Hence, the appropriate management of these patients is a challenge for the treating physician in ICU.

CLINICAL PHARMACIST

Clinical pharmacist can be defined as 'the practice of pharmacy by the beside of patients, in close association with doctors, nurses and other Health Care Professionals (HCP's) with the objective of promoting rational and prudent use of medicines'.^{[10] [11]}

ROLES OF CLINICAL PHARMACISTS IN DUE^[10] [11] [12] [13] [14] [15]

- Program development, supervision and coordination.
- Education of hospital staff about DUE in conceptual and practical terms.
- Promotion of the goals and objectives of DUE.

- Development/review of audit criteria, guidelines, study protocols and educational material.
- Development of data collection instruments.
- Pilot testing, data collection, analysis and report writing.
- Documentation of program outcomes, effectiveness and cost benefits.
- Participation on hospital committees concerned with quality assurance in general and drug usage.
- Presentation of DUE results at meetings and conferences.
- Publication of results in peer-reviewed journals.

Drug Related Problems (DRPS)

Role of pharmacist in Drug therapy Management (DTM) can prove to be the best to achieve therapeutic goals in patients and improves treatment outcomes by effective drug use and patient safety. Advancements in diagnostic testing, technological interventions and pharmacotherapy provides great benefits to patients with life-threatening acute illness. ICU clinicians are faced with making many important drug dosing decisions each day, even when the correct medication is chosen although, few drug related problems (DRPs) are not preventable as they are unpredictable because of their idiosyncratic nature.^[16]

Complex pharmacotherapy, simultaneous use of drugs in critically ill patients in ICU often require close monitoring as their safety is of paramount importance. Raising health care costs, combined with decrease in medical care formulas for hospitalized patients have focused on transitions of care and preventing re admission. Desired outcomes of DTM are appropriate drug use; enhanced patient understanding of appropriate drug use, increased patient adherence, reduced risk of adverse effects (AEs) associated with drugs, and reduced need for other costly medical services.

Hence, the current project was designed to monitor the current practice of clinicians for treatment of critically ill patients in Intensive Care Unit. The results also help to monitor the progress and to identify opportunities for strategic initiatives and policies to improve practice.

AIM AND OBJECTIVES

AIM

The main aim of our study is to perform the Role Of Clinical Pharmacist In Providing Emergency Treatment For Poison Cases Admitted In Intensive Care Unit By Using Drug Utilisation Review Method in South Indian Tertiary Care Teaching Hospital (RIMS) Kadapa.

OBJECTIVES

- To study the drug use pattern/prescribing pattern of drugs in ICU patients
- The collected data was used to find the prescribing indicators like
 - a) The average no. of drugs per prescription.
 - b) The percentages of the drugs which were prescribed by their generic names.

- c) The percentages of the drugs with antibiotics which were prescribed.
- d) The percentages of the drugs with different route of administration.
- e) The percentages of the drugs which were prescribed from the Essential

Drugs List or the formulary.

- To study about the various complications/morbidity patterns admitted in ICU and common drug groups prescribed for various morbidity patterns.
- To detect and help to prevent the drug related problems.
- To assess the reason for deaths and to find out the incidence of deaths.
- To study drug utilization metrics and their applications.

RESEARCH METHODOLOGY

MATERIALS

1. Patient Data Collection Form ICU (Annexure -I)
2. Inform Consent Form (ICF) (Annexure -II)
3. Pharmacist Intervention Form (Annexure -III)
4. Medication Error Reporting Form (Annexure -IV)
5. Adverse Drug Reaction Reporting Form (Annexure -V)
6. List of essential medicines and their availability in ICU.

METHODOLOGY

A prospective and concurrent observational study was carried out over a period of 6 months in the ICU department of RIMS after obtained approval by Institutional Review Board. Based on Inclusion and Exclusion criteria patients are included in the study. Written **Informed Consent Form** from the patient/legal guardian was taken prior to conduct the study. All the necessary and relevant baseline information are collected by using “**Chart Review Method**”, in a patient data

collection sheet which includes Patient demographic details, Past/Present medical history, Lab investigations, Diagnosis, Treatment/Physician medication order sheet (Agents, Doses, Dose intervals, Routes of Administration, Number of doses and Duration of Administration) and any other verbal communication data obtained from patients/patient caregivers. Confidentiality of the entire patient's data will be maintained.

Study design

A Prospective and Concurrent observational study.

Study site

Rajiv Gandhi Institute of Medical Sciences, Kadapa.

Study duration: 6 - months.

Sample size: 250 Patients who are admitted in ICU.

Inclusion criteria

Patients who are admitted in ICU.

Exclusion criteria

1. Pregnancy and Lactating Women's, Pediatrics, Surgeries,
2. Patients who are admitted more than once in ICU,
3. HIV& Cancer Patients,
4. Accident & Burns Patients.

RESULTS

DEMOGRAPHIC DETAILS

BASED ON AGE

Out of 250 patients; 18(7.2%) patients were found below the age of <20 years, 43(17.2%) were 20-30 years, 32(12.8%) were 30-40 years, 49(19.6%) were 40-50 years, 61(24.4%) were 50-60 years, 47(18.8%) were above the age of 60 years; and the results are shown in Table 1 and Figure: 1.

Table 1: Based on Age

Age (years)	No. of Patients (n=250)	Percentage (%)
<20	18	7.2
20 - 30	43	17.2
30 - 40	32	12.8
40 - 50	49	19.6
50 - 60	61	24.4
>60	47	18.8

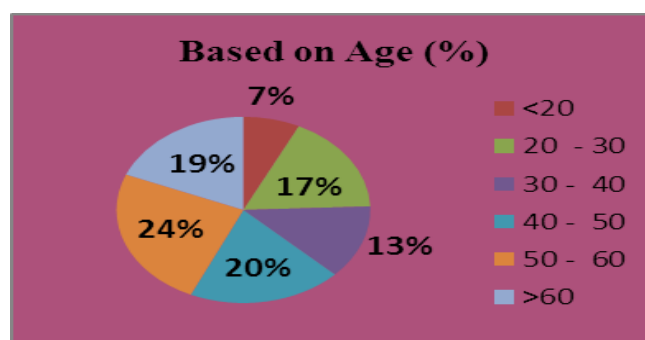


Figure 1: Demographic Details based on age

BASED ON GENDER

Out of 250 patients being recruited, 122 (48.8%) were female and 128 (51.2%) are male; results were shown in Table: 2. and Figure: 2.

Table 2: Based on Gender

Gender	No. of Patients (n=250)	Percentage (%)
Female	122	48.8
Male	128	51.2

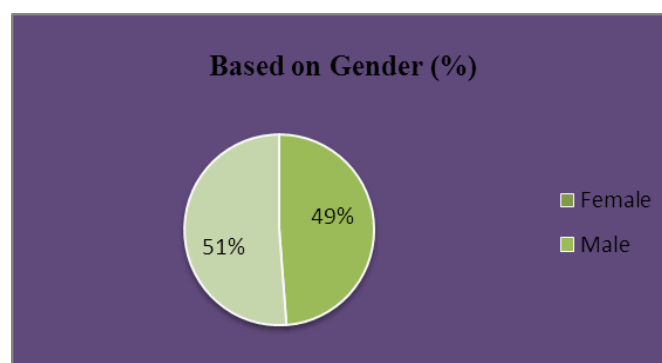


Figure 2: Demographic Details based on gender

BASED ON LITERACY

Out of 250 patients 204 (96.0%) were illiterate and 46 (18.4%) were literate and shown in the Table: 3 and Figure: 3.

Table 3: Based on Literacy

Literacy	No. of Patients (n=250)	Percentage (%)
Illiterate	204	81.6
Literate	46	18.4

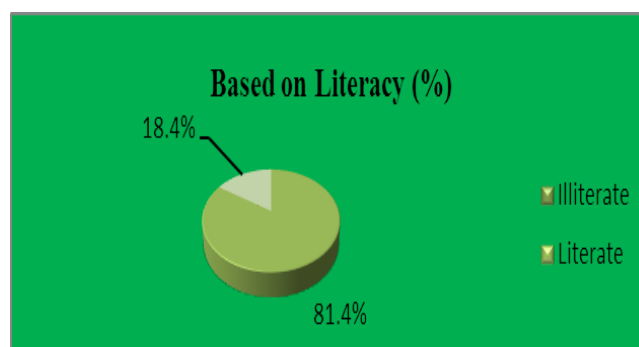


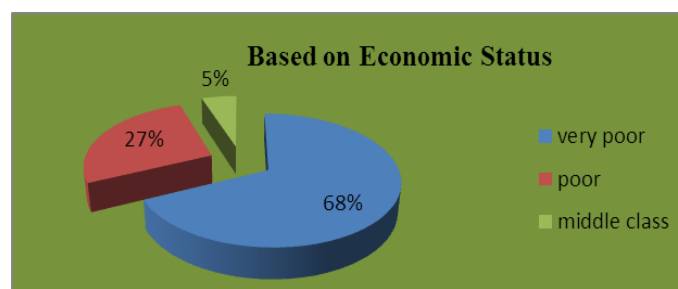
Figure 3: Demographic Details based on literacy

BASED ON SOCIO-ECONOMICAL STATUS

Out of 250 patients based on economic status; 170(68.0%) are very poor, 67(26.8%) are poor and 13(5.2%) are middle class and shown in the Table: 4 and Figure: 4.

Table 4: Based on Socio-Economical Status

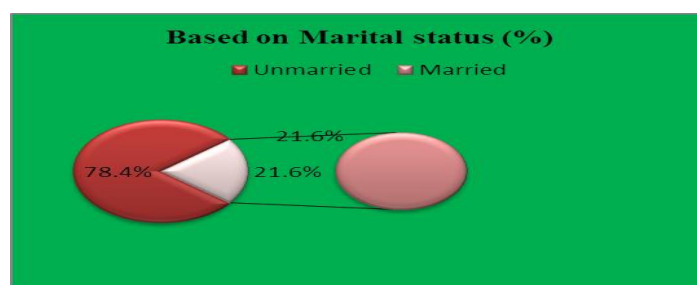
Economic Status	Female	Male	Total (n=250)	Percentage (%)
Very Poor	98	72	170	68.0
Poor	20	47	67	26.8
Middle Class	05	08	13	5.2

**Figure 4: Demographic Details based on socio-economical status****BASED ON MARITAL STATUS**

Out of 250 patients; 21.6% are unmarried and 78.4% were married and shown in the below Table: 5 and Figure: 5.

Table 5: Based on Martial Status

Marital Status	Female	Male	Total (n=250)	Percentage (%)
Unmarried	21	33	54	21.6
Married	93	103	196	78.4

**Figure 5: Demographic based on marital status****BASED ON HABITUAL HISTORY OF PATIENTS IN ICU**

Among 250 patients, Female (15) and male (103) are Habituated (Smoking/Alcohol/betel-nut chewing), Female (107) and male (25) are Not Habituated are shown in the Table: 6 and Figure: 6.

Table 6: Based on Habitual History of Patients in ICU

Based on Habitual History	Female	Male	Total (n=250)	Percentage (%)
Habituated (smoking/alcohol/Betel-nut chewing)	15	103	118	47.2
Not Habituated	107	25	132	52.8

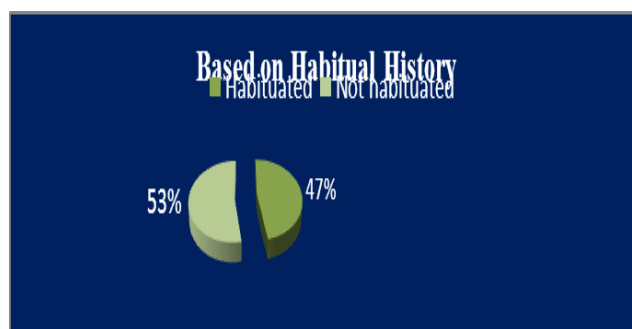


Figure 6: Demographic based on habitual history of patients in ICU

LENGTH OF HOSPITAL STAY IN ICU

Based on patients length of stay in ICU; <5 days are about 150(60%), 5-10 days are 50(20%), 10-15 days are

27(10.8%), >15 days are 13(5.2%), and 10(4.0%) were shifted to other ward are shown in the given Table: 7 and Figure: 7.

Table 7: Length of hospital stay in ICU

Length of Stay In ICU	Total (n=250)	Percentage (%)
<5 Days	150	60
5-10 Days	50	20
10-15 Days	27	10.8
>15 Days	13	5.2
Shifted To Other Ward	10	4.0

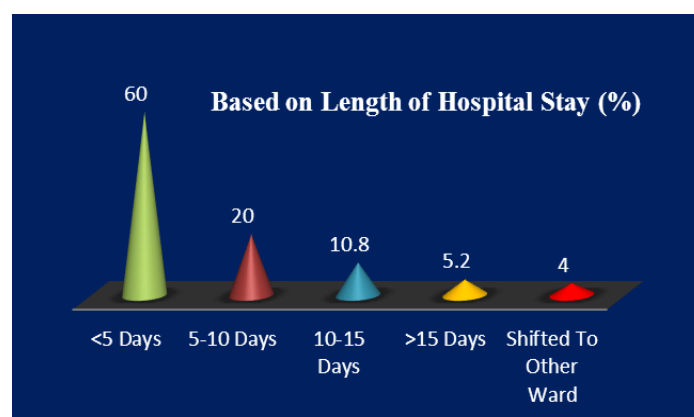


Figure 7: Length of Stay in ICU

PERCENTAGE OF ROUTES OF ADMINISTRATION

Based on routes of administration; the no. of dosage forms used in ICU patients are; 1025 (67.57%) are Intravenous, 153(10.07%) are Intramuscular, 25 (1.64%) are Sub-cutaneous, 266(17.51%) are Tablets, 44(2.89%)

are Syrups and 05(0.32%) are Capsule. Maximum value of dosage forms used in ICU was Intravenous 1025(67.57%) and Minimum value is Capsules 05(0.32%) is shown in the following Table: 8 and Figure: 8.

Table 8: Percentage of Routes of Administration

Based on Routes of Administration	No. of Dosage Forms (n=1518)	Percentage (%)
Intravenous	1025	67.57
Intramuscular	153	10.07
Subcutaneous	25	1.64
Tablets	266	17.51
Syrups	44	2.89
Capsules	05	0.32

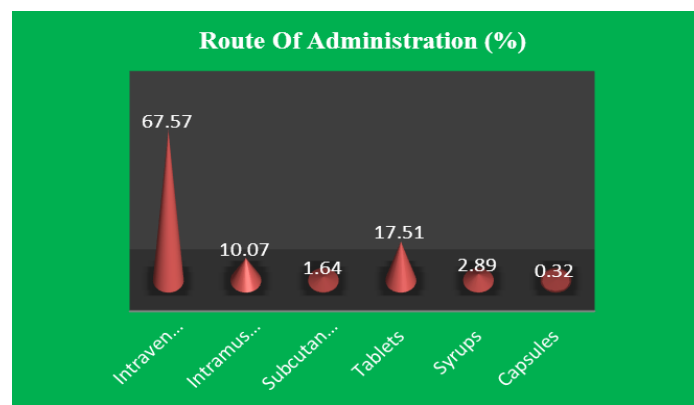


Figure 8: Percentage of routes of administration

BASED ON DISEASE EXPOSURE

Based upon the disease exposure in ICU; 167(66.80%) are new exposure and 83(33.20%) are past exposure were observed and shown in the following Table: 9 and Figure: 9.

Table 9: Based on Disease Exposure

Based on Disease Exposure	Total (n=250)	Percentage (%)
No. of New Exposure	167	66.80
No. of Past Exposure	83	33.20

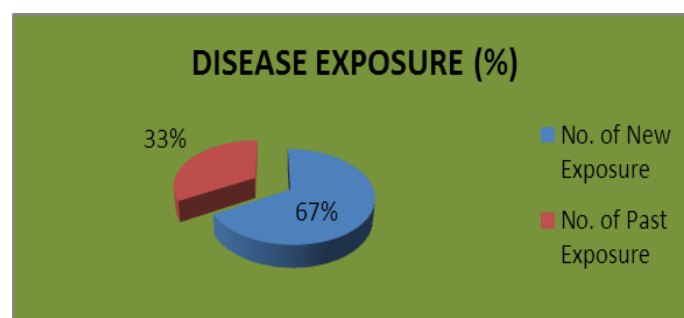


Figure 9: Disease Exposure

BASED ON NEW EXPOSURE OF DISEASE

Majority of the new exposure diseases found in ICU ward are Super Vasmol Poisoning (46), Organo Phosphorous Poisoning (34), CVS Diseases(27), followed by the other diseases like Hepatic Diseases

(18), CNS Diseases(16), Respiratory Diseases(13), Renal Diseases(10), Metabolic Disorders(02),and Tablet Poisoning(01) were observed and shown in the following Table: 10 and Figure: 10.

Table 10: Based on New Exposure of Disease

Name of the Diseases	No. of New Exposure
CNS Diseases	16
CVS Diseases	27
Renal Diseases	10
Hepatic Diseases	18
Metabolic Disorders	02
Respiratory Diseases	13
Super Vasmol Poisoning	46
Tablet Poisoning	01
Organo Phosphorous Poisoning	34
Total	167

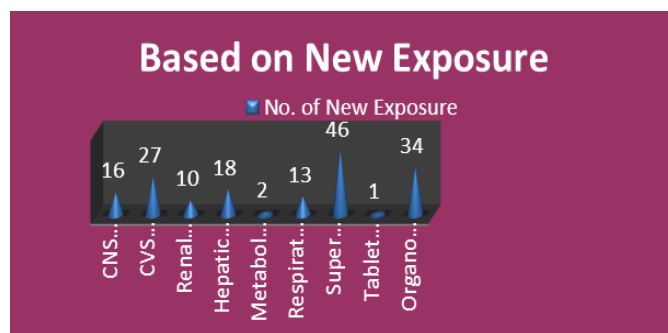


Figure 10: New Exposure of Disease

BASED ON PAST EXPOSURE OF DISEASE

Majority of the past exposure diseases found in ICU ward are Renal Diseases (27), CVS Diseases (15) and

Respiratory Diseases (15), CNS Diseases (14), Hepatic Diseases (10), Metabolic Disorders (02) were observed and shown in the following Table: 11 and Figure: 11.

Table 11: Based on Past Exposure of Disease

Name of the Diseases	No. of Past Exposure
CNS Diseases	14
CVS Diseases	15
Renal Diseases	27
Hepatic Diseases	10
Metabolic Disorders	02
Respiratory Diseases	15
Super Vasmol Poisoning	00
Tablet Poisoning	00
Organo Phosphorous Poisoning	00
Total	83

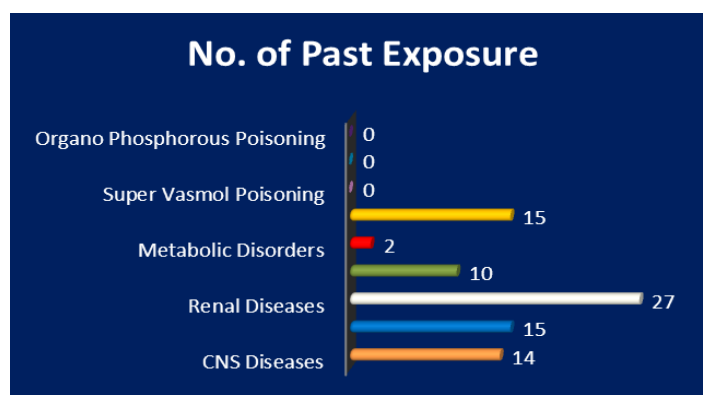


Figure 11: Past exposure of disease

DISORDERS FOUND IN ICU

Among 250 cases; Poison Cases were 81(32.40%) followed by Cardio Vascular Diseases 42(16.80%), Renal Diseases 37(14.80%), Central Nervous System

30(12.0%), Hepatic & Respiratory Diseases 28(11.20%) and Metabolic disorders 04(1.60%) were observed and shown in the following Table: 12 and Figure: 12.

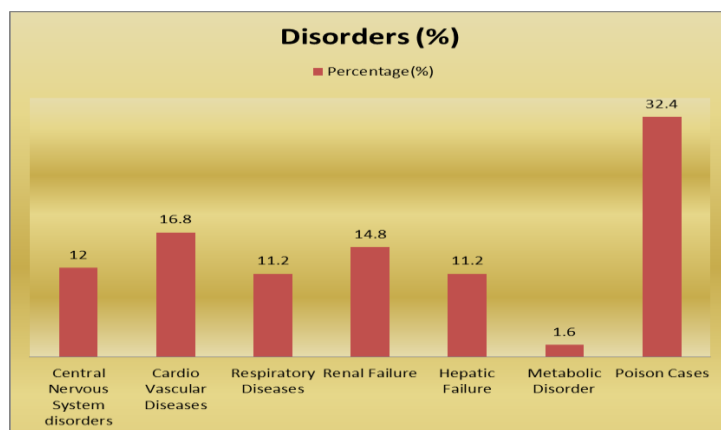


Figure 12: Disorders found in ICU

Table 12: Disorders Found in ICU

Name of the Diseases	Total (n=250)	Percentage (%)
Central Nervous System	30	
Cerebro vascular Accident	20	12.0
Epilepsy	09	
Psychosis	01	
Cardio Vascular Diseases	42	
Hypertension	20	16.80
Left Ventricular Failure	04	
Congestive Heart Failure	10	
Myocardial Infraction	08	
Respiratory Diseases	28	
Bronchial Asthma	04	11.20
Chronic Obstructive Pulmonary Disease	10	
Pulmonary Tuberculosis	10	
Pneumonia	04	
Renal Diseases	37	
Acute Renal Failure	20	14.80
Chronic Kidney Failure	17	
Hepatic Diseases	28	11.20
Jaundice	03	
Alcoholic Liver	10	
Chronic Liver Disease	10	
Liver Cirrhosis	05	
Metabolic Disorders	04	1.60
Diabetes Mellitus	04	
Poison Cases	81	32.40
Super Vasmol Poisoning	46	
Organophosphorous Poisoning	34	
Tablet Poisoning	01	

NUMBER OF POISON CASES FOUND IN ICU

Among 81 Poisoning Cases; Females (38) and Males (08) were observed in Super Vasmol Poisoning 46(18.4%), Females (15) and Males (19) were observed

in Organo Phosphorous Poisoning 34(13.6%) and Females (01) and Males (00) were observed in Tablet Poisoning and shown in the following Table: 13 and Figure: 13.

Table 13: Number of Poison Cases Found in ICU

Name Of The Poison	Male	Female	Total(n=81)	Percentage (%)
Super Vasmol Poisoning (SVP)	8	38	46	18.4
Organo Phosphorous Poisoning (OP)	19	15	34	13.6
Tablet Poisoning (Paracetamol)	00	01	01	0.4

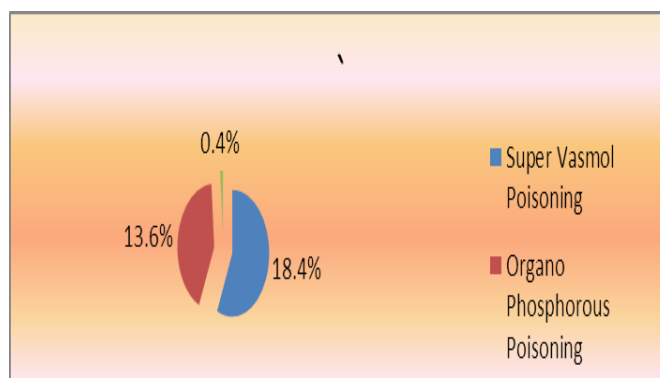


Figure 13: Number of poison cases found in ICU

TRACHEOTOMIES IN SVP CASES IN ICU

Among 34 Female SVP patients, Tracheotomy was performed in 28(82.35%) patients, and not performed in 06 (17.64%) patients Table: 14 and Figure: 14.

Table 14: Tracheotomies in SVP Cases in ICU

Tracheotomy (SVP Cases)	Female (n=34)	Percentage (%)	Male (n=0)	Percentage (%)
Performed	28	82.35	00	00
Not Performed	06	17.64	00	00

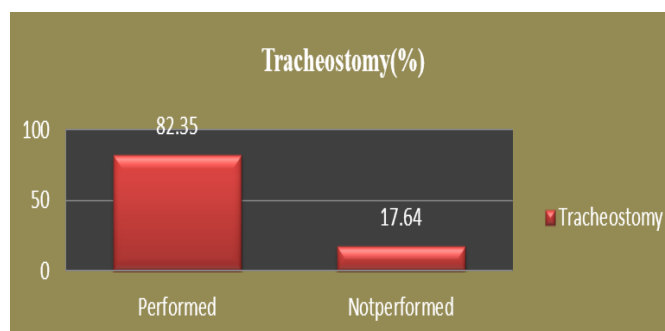


Figure 14: Tracheostomies in svp cases in ICU

BASED ON ICU MONITORING PARAMETERS

Out of 250 patients; ICU monitoring parameters were not performed and performed were mentioned in the following Table: 15.

Table 15: Based on ICU Monitoring Parameters

ICU Monitoring Parameters	Not Performed	Percentage (%)	Performed	Percentage (%)
Temperature	35	14	215	86
Vital Signs				
Blood Pressure	47	18.8	203	81.2
Pulse Rate	34	13.6	216	86.4
Physical Examinations	56	22.4	194	77.6
Systemic Examinations	25	10	225	90
Nebulisation (SPO₂)	70	28	180	72
Measurement Of Fluids Intake	128	51.2	122	48.8
Measurement Of Urine Output	134	53.6	116	46.4

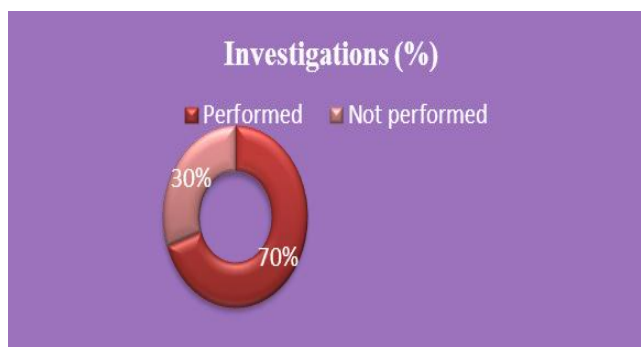
LABORATORY INVESTIGATIONS IN ICU

Out of 250 patients, 182 patients are recommended for Laboratory Investigations; in which 127 (69.78%)

laboratory investigations were Performed and 55(30.22%) were not performed in ICU and shown in the following Table: 16 and Figure: 15.

Table 16: Laboratory Investigations in ICU

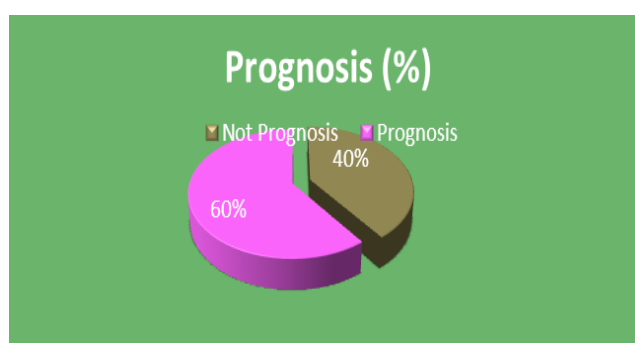
Laboratory Investigations	Total No. of Laboratory Investigations (n=182)	Percentage (%)
Performed	127	69.78
Not Performed	55	30.22

**Figure 15: Laboratory investigations in ICU****BASED ON PROGNOSIS OF THE PATIENT IN ICU**

Among 250 Patients; 100(40%) were not progressed and 150(60%) were progressed and shown in the following Table: 17 and Figure: 16.

Table 17: Based on Prognosis of the Patient in ICU

Prognosis of the Patient	Total (n=250)	Percentage (%)
Not Prognosis	100	40
Prognosis	150	60

**Figure: 16 Based on prognosis of the patient in ICU****PERCENTAGE OF DRUG RELATED ISSUES**

Among 103 Medication Errors; untreated indication are 70 (67.96%), Drug without indication are 03 (2.91%) and

Prescribing Error were 30 (29.12%) were observed and shown in the following Table: 18.

Table 18: Percentage of Drug Related Issues

Variable	Total(n=250)	Percentage (%)
Medication Error In ICU		
Untreated Indication	70	67.96
Drug without Indication	03	2.91
Improper drug selection	10	4.0
Prescribing Error	30	29.12

Safety		
Adverse Drug Reaction's	05	2.0
Drug Interaction's Possible		
Major	01	
Moderate	29	
Minor	00	
Total	30	12.0
Observed		
Major	02	
Moderate	07	
Minor	00	
Total	09	3.60
Outcome		
Shifted to other ward	10	4.0
Discharged (from the hospital)	60	24.0
Absconded	50	20.0
Continuation bedding	03	1.20
Death	127	50.8
Pharmacist Interventions		
Irrational therapy	100	40
Rational therapy	150	60

MEDICATION ADHERENCE IN ICU

Based on Medication Adherence in ICU Patients; Regular 85 (34%) and Irregular 165 (66%) at past and

Regular 150 (60%) and Irregular 100 (40%) were observed and shown in the following Table: 19 and Figure: 17.

Table 19: Medication Adherence in ICU

Medication Adherence In ICU	Regular	Percentage (%)	Irregular	Percentage (%)
Past	85	34	165	66
Observed	150	60	100	40

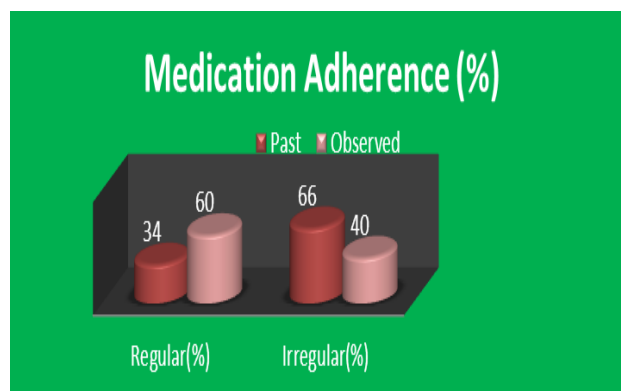


Figure 17: Medication Adherence in ICU

INCIDENCE OF DEATH

The percentage for incidence of death is calculated by using total number of deaths in ICU divided by total number of patients who are admitted in ICU.

$$\text{Incidence of deaths (\%)} = \frac{\text{No. of deaths (127)}}{\text{Total No. of Patients in ICU (250)}} = 50.8\%$$

REASON FOR DEATHS IN ICU

Among 127 Death cases; Maximum deaths occurred due to Cardio Respiratory Failure 72(56.69%) and Minimum deaths due to Hypoglycemic Coma 02(1.57%) were observed and shown in the given Table: 20 and Figure: 18.

Table 20: Reason for Deaths in ICU

Reason For Death	Total (n=127)	Percentage (%)
Renal Failure	09	7.08
Cardiac Arrest	07	5.54
Hypoglycemic Coma	02	1.57
Cardio Respiratory Failure	72	56.69
Super Vasmol Poisoning	20	15.74
Organophosphorous Poisoning	17	13.38

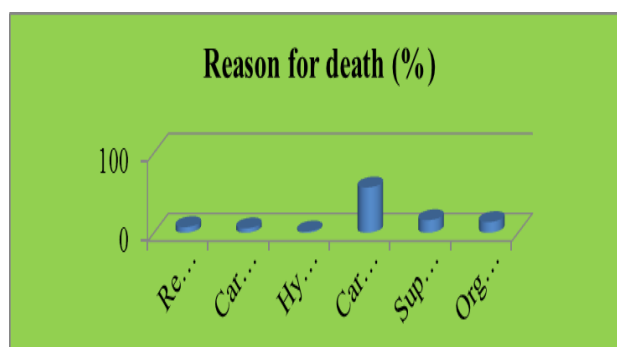


Figure 18: Reason for deaths in ICU

TREATMENT AT THE TIME OF END STAGE

Among 90 death cases; AMBU done in 75(83.33%) cases and not done in 15(16.66%), CPR & ECG done in

90(100%) cases, DC Shock done in 82(91.11%) cases and not done in 08(8.88%) was observed and shown in the given Table: 21 and Figure: 19.

Table 21: Treatment at the Time of End Stage

Treatment at End Stage	Done (n=90)	Percentage (%)	Not Done (n=90)	Percentage (%)
AMBU	75	83.33	15	16.66
CPR	90	100	00	00
DC Shock	82	91.11	08	8.88
ECG	90	100	00	00

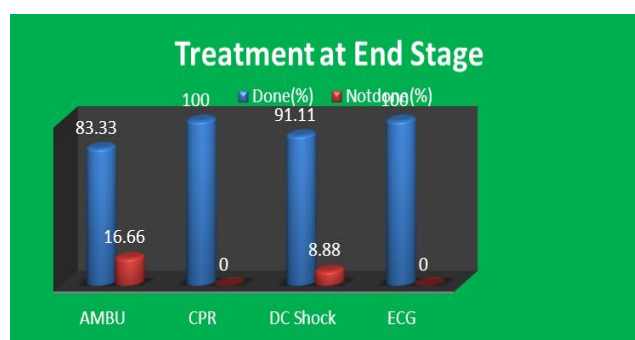


Figure 19: Treatment at the time of end stage

DEATH CASES IN ICU

Among 127 death cases; 37(29.13%) were Poison Cases followed by Central Nervous System disorders 30(23.62%), Respiratory Diseases 22(17.32%), Hepatic

Failure 20(15.74%) Renal Diseases 09(7.08%), Cardio Vascular Diseases 07(5.54%) and followed by metabolic disorders 02(1.57%) were observed and shown in the following Table: 22 and Figure: 20.

Table 22: Death Cases in ICU

Deaths Caused In ICU	Total (n=127)	Percentage (%)
Central Nervous System disorders	30	23.62
Cerebro Vascular Arrest	28	
Epilepsy	02	
Cardio Vascular Diseases	07	5.54

Left Ventricular Failure	03	
Congestive Heart Failure	02	
Myocardial Infraction	02	
Respiratory Diseases	22	
Bronchial Asthma	08	
Chronic Obstructive Pulmonary Disease	10	17.32
Pulmonary Tuberculosis	04	
Renal Failure	09	
Chronic Kidney Failure	09	7.08
Hepatic Failure	20	
Alcoholic Liver	07	
Chronic Liver Disease	11	15.74
Liver Cirrhosis	02	
Metabolic Disorder	02	
Diabetes Mellitus	02	1.57
Poison Cases	37	
Super Vasmol Poisoning	20	29.13
Organophosphorous Poisoning	17	

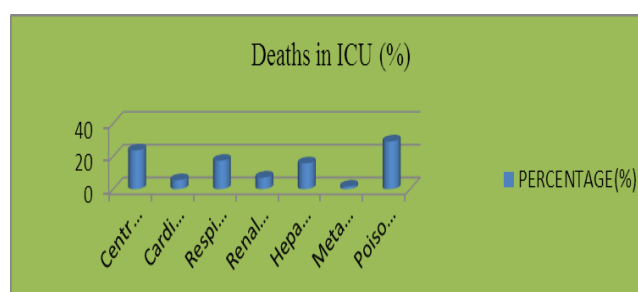


Figure 20: Death Cases in ICU

DISCUSSION

Drugs play an important role in protecting, maintaining and restoring health, but they are not sufficient alone to provide adequate healthcare.

Critically ill patients are at a high risk of developing neurologic disorders due to multiple organ failure, advancing age, prescription of psychoactive agents and malnutrition. Altered sensorium, raised intracranial pressure, cerebrovascular thrombosis, seizures and bacterial meningitis are the common central nervous system (CNS) disorders noted among the critically ill.^[2]

Poisoning or intoxication is defined as the occurrence of harmful effects resulting from exposure to a foreign chemical or a xenobiotic, it can occur by means of ingestion, inhalation or contact; unintentionally or intentionally. Poisonings comprise an important health issue in developing countries resulting in health threats and hospitalization leading to huge financial burden on victims and an immense strain on hospital services. The WHO statistics estimate around 346,000 people worldwide die from unintentional poisoning, more than 90% of these occur in developing countries.^{[3][4]}

Pesticides particularly Organophosphorous poisoning (OPP) from occupational, accidental and intentional exposure is common in the low to middle socioeconomic countries which is usually attributed to the hazardous

occupational usage and unsafe storage of pesticides. According to a community study, the high number of pesticide self-poisonings was an impulsive response to economically or psychosocially stressful events facilitated by easy access to pesticides.^{[4][5]}

While physiologic stabilization is taking place, intensivists attempt to gather important background medical information to supplement the real-time assessment of the patient's current physiologic conditions.

The study of drug prescribing patterns helps to evaluate and suggest modifications in prescribing practices of physicians. This practice ensures rational pharmacotherapy and assures quality medical care to the patients. Hence, this prospective observational study was undertaken to evaluate the drug use pattern in Intensive Care Unit (ICU). DUR play a key role in helping managed health care systems understand, interpret and improve the prescribing, administration and use of medications. Pharmacists play a key role in this process because of their expertise in the area of pharmaceutical care.^[1]

Once these concepts are understood, the discussion of specific medications can begin.

The highest number of patients were admitted in ICU are at the age of 50-60 years 61(24.4%) and the least number was admitted are < 20 years 18(7.2%) of age was observed in our sample size. Out of 250 patients being recruited, 122 (48.8%) were females and 128 (51.2%) are males, 204 (96.0%) patients were illiterate and 46 (18.4%) patients were literate. Socio-economic status comparison shows that out of 250 patients; 170 (68.0%) are very poor, 67(26.8%) are poor and 13 (5.2%) are middle class. The very poor patients with low economic status are more seen in our study. Out of 250 patients; 21.6% are unmarried and 78.4% were married. Based on Habitual history Female (15) and male (103) are Habituated (Smoking/Alcohol/betel-nut chewing), Female (107) and male (25) are Not Habituated.

Based on patients length of stay in ICU; <5 days are about 150 (60%), 5-10 days are 50 (20%), 10-15 days are 27 (10.8%), >15 days are 13 (5.2%), and 10 (4.0%) were shifted to other ward **supported by Gangwar Singh Amit, et.al.,**

Based on routes of administration; the no. of dosage forms used in ICU patients are 1025 (67.57%) are Intravenous, 153 (10.07%) are Intramuscular, 25 (1.64%) are Sub-cutaneous, 266 (17.51%) are Tablets, 44 (2.89%) are Syrups and 05 (0.32%) are Capsule. Maximum value of dosage forms used in ICU is Intravenous 1025 (67.57%) and Minimum value is Capsules 05 (0.32%).

Based upon the disease exposure in ICU; 167(66.80%) are new exposure and 83(33.20%) past exposure were identified in our study. Majority of the new exposure diseases found in ICU ward are Super Vasmol Poisoning (46), Organo Phosphorous Poisoning (34), CVS Diseases(27), followed by the other diseases like Hepatic Diseases (18), CNS Diseases(16), Respiratory Diseases(13), Renal Diseases(10), Metabolic Disorders(02) and Tablet Poisoning(01) were observed. Majority of the past exposure diseases found in ICU ward are Renal Diseases (27), CVS Diseases (15) and Respiratory Diseases (15), CNS Diseases (14), Hepatic Diseases (10), Metabolic Disorders (02) were observed.

Among 250 cases; 81(32.40%) were Poison Cases followed by Cardio Vascular Diseases 42(16.80%)^[32], Renal Diseases 37(14.80%), Central Nervous System 30(12. 0%), Hepatic & Respiratory Diseases 28(11.20 %) and Metabolic disorders 04(1.60 %) were observed **supported by Mahendra K Patel, et.al.,**^[17]

Among 81 Poisoning Cases; Females (38) and Males (08) were observed in Super Vasmol Poisoning 46(18.4%), Females (15) and Males (19) were observed in Organo Phosphorous Poisoning 34(13.6%) and Females (01) and Males (00) were observed in Tablet Poisoning. Among 34 Female SVP patients, Tracheostomy was performed in 28 (82.35%) patients and not performed in 06(17.64%) patients and **supported by Aiswarya Aravind, et.al.,**^[15], **Rammurthy p**^[6], **et.al.**

Among 1518 drugs prescribed; 1198 (78.91%) were Generic Drugs and 320 (21.08%) were Branded Drugs. Among 250 prescriptions; 1518 drugs were prescribed and Maximum 220 (14.49%) are Anti-Ulcers, 190 (12.51%) are Anti-Bacterials, 150 (9.88%) are Diuretics were prescribed and followed by other drug classifications **supported by preksha a. barot, et.al.,**^[11]. Minimum 02 (0.13%) were Anti-Fungal, Anti-Malarial and followed by other drug classifications.

Out of 250 prescriptions; Average number of drugs per each prescription was between 7-14 drugs. The total number of drugs for 250 prescriptions was 1518. The average number of total drugs per 250 prescriptions (607.2). Out of 250 prescriptions, 190 (76%) were Antibiotics.^{[1][32][33][34][37][38]} Maximum 89 (46.84%) were Cephalosporin's and Minimum 03 (1.57%) are Macrolides. 1518 were total drugs, 1289 (84.92%) were from Essential drugs and 229 (15.08%) remaining are others.

ICU monitoring parameters were not performed and performed were mentioned in the (Table: 15). Out of 250 patients, 182 patients are recommended for Laboratory Investigations; in which 127 laboratory investigations were performed and 55 were not performed. Due to this, the percentage of prognosis was increased as proper medication is given by HCP's according to the patient investigational report analysis. Based on prognosis 40% was not progressed and 60% was progressed.

Medication errors were identified in ICU Patients are 103; 67.96% are having untreated indications, 2.91% were Drug without indication and 29.12% are prescribing error are observed during the course of our work. (Table: 16) **supported by Prajapathi Aarohi Ashokbhai,**^[16]

Adverse Drug Reactions occurred in ICU are 05. Among them by using Casualty Assessment scales, 04 are possible and 01 was probable, based on severity scale all are moderate.^{[16][18]}

Drug interactions occurred in ICU, 30 possible drug interactions are seen in 250 prescriptions; 01 was major and remaining 29 were moderate. In Observed drug interactions 09 were identified and among them 02 are major and remaining 07 are moderate.^{[16][17][19]} these were identified and the problem is rectified by using software and discussed with HCP's.^[20]

The pt in need of TDM for Narrow therapeutic drug due to 2.91% of having drug without indication was given.

Medication Adherence in ICU Patients; 34% are Regular and Irregular 66% are at past and 60% are Regular and 40% are Irregular in our prospective and concurrent observational study.

Among 127 death cases; 37 are Poisoning Cases followed by 30 CNS Deaths, Maximum deaths occurred

due to Cardio Respiratory Failure (56.69%) and Minimum deaths due to Hypoglycemic Coma (1.57%) was observed and this was **supported by Helene Goulet, Aishwarya Aravind, et.al.,**. The incidence of death is calculated by using total number of deaths divided by total number of patients in ICU is 50.8% was identified. Based up on the end stage treatment given in 90 death cases; AMBU done in 75 cases and not done in 15 cases, CPR & ECG was done in 90 cases, DC Shock was done in 82 cases and not done in 08 cases was detected by using chart review method.

CONCLUSION

This project has attempted to highlight many of the problems frequently encountered in the ICU environment as a starting point in this effort. Although demanding and requiring a high level of commitment of those individuals accepting the challenge of providing care for the critically ill, the rewards can be personally and professionally gratifying. In addition, the demand for critical care pharmacy services is likely to be steadily increasing for the indefinite.

We can conclude by stating that poisoning is one of the leading causes of hospital admissions and mortalities. Super vasmol poisoning, Organophosphorous poisonings and Drug over dosage are the most common poisoning admissions that require intensive care admission and management. Majority of the patients recovered which indicates good emergency and intensive care management. Prevailing treatment protocols require updation on proper guidelines, cost assessment, counselling and training programs.

In our project majority of the poisoning cases were SVP deaths were occurred due to Rhabdomyolysis. In conclusion, Super vasmol poisoning is a life-threatening emergency which requires emergency resuscitation and aggressive management of anaphylaxis. Early forced alkaline diuresis prevents ARF minimizing the need for dialysis. And also the time of development of renal failure following PPD intoxication is uncertain and hence all patients should be monitored in hospital for development of renal complications.

This research project concludes the role of common household products being used in the wrong manner in the society. Moreover, as there are numerous toxic components in a single product a single specific antidote cannot make a difference. combinations of drugs are to be used.

It is essential to understand the general and specific interventions and management of various diseases, as these studies can inform health policy decision making and guide the investment and management at different levels of the health-care system to optimize the use of resources. Hence, this study was carried out with the objective to evaluate the demographics and drug

utilization pattern in the medical intensive care unit of a tertiary care teaching hospital.

In summary, more than half of early unexpected deaths after visits ICU are related to a medical error and could have been prevented. Under-detection of majority are DDI's, prescribing errors, ADR's, and delay in lab investigations, improper diagnosis, delayed Emergency treatment was a major cause of causing deaths in our research work. Due to lack of time for the Intensivists (Health Care Professionals (HCP's)).

As we know ICU is an Emergency Department where patients admitted with different disorders it makes the challenging role for HCP's to take the appropriate decision at appropriate time for a particular patient for particular condition to maintain drug therapy rational and to maximize the positive outcomes of the patients from life threatening condition to normal condition.

FUTURE SCOPE

- ✓ The further explore of this research work, a study was conducted to assess potential drug interactions in ICU patients. Studies on drug interactions focusing on nursing clinical practice are important as a useful tool for decision making during the drug administration process.
- ✓ Therapeutic Drug Monitoring (TDM) of narrow therapeutic drugs is necessary for every hospital especially in critical ill patients, even a small increase in dose may also cause decrease in the life span of the patient.
- ✓ In order to avoid drug related problems (MOR's, DDI's, ADR's) every hospital especially in Intensive Care Unit (ICU) a clinical pharmacist is needed.

"Treating a patient can save one's life; creating awareness can save entire society".

CONFLICT OF INTEREST

The authors have no conflicts of interest.

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REFERENCES

1. Preksha A. Barot, Supriya D. Malhotra, Department of Pharmacology, Smt. NHL Municipal Medical College, Ahmedabad, Gujarat, India Vol. 4 | Issue 4 | September-November 2013.
2. Lisha Jenny John, Padmini Devi, Journal of Neurosciences in Rural Practice are provided here courtesy of Medknow Publications. 2011 Jul-Dec; 2(2): 119-123.
3. Fauci, Braunwald, Kasper, Harrison's principles of internal medicine, 17th edition, published by Mc Grow Hill Companies. 30-35 section.
4. A text book of British National Formulary 57 March 2009 Published jointly by BMJ Group Tavistock Square, London WC1H 9JP, UK and RPS publishing is the wholly-owned publishing organization of the Royal Pharmaceutical Society of Great Britain Lambeth High Street, London, SE1 7JN, UK.
5. Aiswarya Aravind, Mohandas Rai, Department of Pharmacology, A J Institute of Medical Sciences and Research Center, Mangalore-575004, Karnataka, India, International Journal of Pharmaceutical Sciences and Drug Research, 2014; 6(3): 239-242.
6. Rammurthy p, Associate Professor, Postgraduate Student, Dept. of General Medicine Vijayanagara Institute of Medical Sciences (VIMS), Bellary, Karnataka, Indian Journal of Clinical Practice, December 2014; 25: 7.
7. Ananda Kumar L, Assistant Professor, Dept. of Forensic Medicine, RIMS, Kadapa, Andhra Pradesh, India. International Journal of Medical and Health Sciences, Int J Med Health Sci. April 2012; 1(2): ISSN: 2277-4505.
8. Lucienne TQ Cardoso, Cintia MC Grion, Impact of delayed admission to Intensive Care Units on mortality of critically ill patients – A cohort study. critical care, 2011; 15-R 28.
9. K.G. Revikumar B.D. Miglani, A Textbook of pharmacy practice, CAREER Publications.
10. G. Parthasarathi Karin Nyfort-Hansen-Milap C Nahata, A Textbook of pharmacy practice, 2nd Edition, Universities Press.
11. H.P. Tipnis Amrita Bajaj, A Textbook of pharmacy practice, 2nd Edition, CAREER Publications.
12. Cotterell CC, Dombroske L, Fishermann EA. Comprehensive drug-use evaluation program in a health maintenance organization. Am J Hosp Pharm, 1996; 26: 247.
13. Dartnell JGA. Understanding, Influencing and Evaluating Drug Use. Therapeutic Guidelines Limited, Melbourne, 2001.
14. George J, Kumar ABS, Suresh B. Impact of a drug utilization evaluation program on ranitidine in a South Indian Hospital. Ind J Pharmacol, 2001; 33: 43.
15. McGuire TM, Petrie GM 'A hitchhiker's guide to establishing a drug utilization evaluation program' Aust J Hosp Pharm, 1995; 25: 315-322.
16. Prajapati Aarohi Ashokbhai, Deshpande Shrikalp, Department of Clinical Pharmacy and Pharmacology, KBIPER, Gandhinagar-382023 Gujarat, INDIA. Indian Journal of Pharmacy Practice, Jan-Mar, 2015; 8(1).
17. Mahendra K Patel, Drug utilization among older inpatients in a teaching hospital in Western Nepal, Singapore, Int J Crit Illn Inj Sci. 2013 Oct-Dec; 3(4): 250-255.
18. Rhanna Emanuela Fontenele Lima, Potential drug interactions in intensive care patients, Cassiani SHB. Rev Latino-am Enfermagem 2009 março-abril; 17(2): 222.
19. Essential drug list from World Health Organization, in Intensive Care Unit.
20. MICROMEDEX 2.0 VERSION.