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Research Article

THE ROLES OF CLINICAL PHARMACY IN REDUCING MEDICATION ERRORS

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ABSTRACT

Potential activation of clinical pharmacist role is of great importance in reducing the medication errors which are a well- known problem in hospital. The medication errors could be prescribing errors, dispensing errors, and administering errors. In this study medication errors randomly were collected by clinical pharmacist and inpatient pharmacist from different wards at a Hospital in Dubai, UAE, from July to October 2011. The results showed that the highest percentage of medication errors was prescribing errors, followed by administering errors and then dispensing errors. Among prescribing errors, the results showed the highest percentage was stat errors, followed by pro re nata(PRN), then incomplete or unclear Rx and at the end antibiotic errors. The study shows that the clinical pharmacist play important role in reduction of medication errors evolving from pharmacist and nursing site, on the other hand, prescribing errors were reduced up to 23% with the medication review system.

KEYWORDS: Role, clinical pharmacist, medication errors.

INTRODUCTION

The role of clinical pharmacists in the care of hospitalized patients has evolved over time, with increased emphasis on collaborative care and patient interaction. Clinical pharmacists are uniquely trained in therapeutics and provide comprehensive drug management to patients and providers (includes physicians and additional members of the care team). Pharmacist intervention outcomes include economics, health-related quality of life, patient satisfaction, medication appropriateness, adverse drug events, and adverse drug reactions.[1]

Medication errors are broadly defined as incidents in which an error has occurred somewhere in the medication process, regardless of whether any harm occurred to the patients.[2] More specifically a medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use.[3] Medication errors should not be confused with adverse drug reactions.[4] An adverse drug reaction is defined as "an effect that is noxious and unintended and which occurs at doses used for prophylaxis, diagnosis, or therapy.[5]

Medication errors are a well-known problem in hospitals. Studies have shown that medication errors and adverse drug reactions are one of the main causes for adverse events in hospitals leading to disability and death in up to 6.5% of hospital admissions.[6, 7, 8, 9, 10, 11]

Medication practice encompasses the processes of prescribing, dispensing, preparing, administering, and monitoring the clinical effects of medicines. The mission for hospital pharmacy services is to ensure the safe, effective, and economic uses of medicines. Medication practice measures monitor one or more of these elements.[12] The development of medication practice measures are linked with the development of hospital pharmacy practice. Where hospital pharmacy practice has developed to provide services outside the pharmacy department, a more comprehensive set of measures can be developed. This usually involves recording pharmacist clinical interventions intended to modify medication therapy for individual patients. These interventions are usually intended to improve medicine safety, clinical effectiveness, and cost effectiveness outcomes.[13]

The purpose of this study is to prevent medication errors by strengthening the role of clinical pharmacists and through interfering in all steps of medication process. Medication process consist of five stages: Stage 1: prescribing the medicine, stage 2: dispensing the medicine (including medication reconciliation), stage 3: preparing the medicine for administration, stage 4: administering the dose using the appropriate route and method, stage 5: monitoring the effect of the medicine on the patient.[2, 14]

A prescribing error may be defined as the incorrect drug selection for a patient or errors involving wrong drug, dose, quantity, indication for use or a contraindication.[15] Prescribing errors also include illegible handwriting, misspelling of a drug with a similar name and use of abbreviations. Prescription errors are estimated as being between <1% and 11% of all written prescriptions.[16] Dispensing is carried out in a variety of settings from hospital pharmacies, community pharmacies and some rural General Practices. One common dispensing error is selection of the wrong product, usually where there are two drugs with similar proprietary names (e.g. Losec® and Lasix®), which may look similar when hand written. Other dispensing errors include wrong dose, wrong drug and wrong patient and some reports suggest typing errors in computerized labelling as a common cause of error in dispensing.[15] There is very little documented data around preparation and administration errors occurring in patients in the community. However, there is a reported wide variation in the rates of preparation and administration error within hospitals with rates varying between 3.5% and 49%.[14] The national patient safety agency (NPSA) also suggest that this wide range reflects the differences in the definitions used to record medication error, together with methods of data collection.

Drug administration and preparation has been considered as an area of 'high risk' within nursing practice. The following well-known "six Rights of the Medication Use Process" should always be:

• Right patient

• Right drug
• Right dose
• Right route
• Right time
• Right outcome

Many drug administration errors are errors of omission but they also include failure to check patient identity, incorrect administration technique and administration of a wrong or expired drug.[15] The literature suggests that the medication error rate for administration of intravenous (IV) drugs may be as high as 25% and these errors have significant risk to patients.[17]

MATERIALS AND METHODS

Prescription of drugs can be divided into an intellectual part—decision making, i.e. knowledge of diagnosis, interactions, and contraindications, and a technical part including communication of essential information, i.e. drug name, dose, form of administration.[18]

This study is focused on medication errors in the technical part. It is designed as a cross sectional study of medication errors and potential role of clinical pharmacist to decrease these errors, and is examined by the use of three methods—direct observation, unannounced control visit, and chart review. The study population consisted of: (i) hospital inpatients of all ages; (ii) clinical pharmacist; (iii) inpatient(IP) pharmacist; (iv) nurses dispensing and administering medications; (v) physicians prescribing drugs or secretaries transcribing drugs into the medical record. Prescription errors in the medical record and discharge summaries could be caused by both physicians and secretaries. In this study no distinction was made between these two groups. The study included regular as well as (PRN) medications, except from PRN medications in discharge summaries. The following drugs were included: tablets, suppositories, mixtures, and injections (intravenous, intramuscular, and subcutaneous).

The study was conducted at randomly selected medical and a surgical ward at Hospital, Dubai, UAE, from July to Oct. 2011.

Physicians were responsible for prescribing drugs and secretaries for transcribing them into medical records and discharge summaries. Medical errors were diagnosed by either clinical pharmacist during daily round or by inpatient pharmacists during drug ordering processes.

After diagnosis of each medication error, clinical pharmacists interfere to solve this error along with instructions to avoid and decrease the occurrence of these errors. Medication errors could be: Prescribing errors, dispensing errors, and administering error. Prescribing errors categorized into: State errors, (PRN) errors, antibiotics errors, and incomplete or unclear prescription. An opportunity for error is defined as any drug prescribed, any unordered or omitted drug, and 'any dose given and any dose omitted'.[19]

A clinically meaningful prescribing error is defined as a prescribing decision or prescription writing process that results in an unintentional, significant reduction in the probability of treatment being timely and effective or increase in the risk of harm, when compared with generally accepted practice. Prescribing without taking into account the patient's clinical status, failure to communicate essential information, and transcription errors were all considered prescribing errors. However, failures to adhere to standards such as national guidelines or the drug's product licence were not considered errors if this reflected accepted practice.[18, 20]

RESULTS

Tables 1 and 9, show that in the month of July, among 1649 prescription received by IP pharmacy, there were 60 prescribing errors, 3 administering errors, and no any dispensing errors. Table 2 shows that among 60 prescribing errors, 28 state errors, 19 PRN errors, 3 antibiotic errors and 10 incomplete or unclear prescriptions (Rx).

By activating the role of clinical pharmacist, the results of the month of Aug., show in Table 3 and 9, indicate that among 1931 prescriptions received by IP pharmacy, there were only 37 prescribing errors, 3 administering errors, and one dispensing error. Table 4 shows that prescribing errors in the month of Aug. are divided into 20 stat errors, 10 PRN errors, 2 antibiotic errors and 5 incomplete or unclear Rx.

On Sept., as shown in Table 5 and 9, there were dramatic positive changes in the results; administering and dispensing errors were 0 %, prescribing errors were only 17 among 1771 prescription received by IP pharmacy. Table 6 shows that the prescribing errors mainly 8 stat errors, 5 PRN errors, one antibiotic error, and 3 incomplete or unclear Rx.

In the month of Oct. The results were completely different from that in July. Prescribing errors showing were only 14 among 1827 prescription received by IP pharmacy, 0 administering errors, and only one dispensing error. Table 8 showing that among 14 Prescribing errors, stat errors have the higher rate of 6 errors, while there were 4 errors PRN, one antibiotic, and 3 incomplete or unclear Rx.

DISCUSSION

It found that clinical pharmacist play an important role in the reduction of medication errors evolving from pharmacist site and nursing department. Although prescribing errors can be found in all settings, it can be reduced up to 23% with the medication review system. Identification of patterns and characteristics of medication errors will guide to preventive interventions. Factors contributing to errors, as well as drugs and error types associated with severe events, deserve further investigation.

This study supports the use of clinical pharmacists in the inpatient setting to improve the quality, safety, and efficiency of care. This is in the agreement with the report of DC National Academy[21] which proposes that clinical pharmacists have a significant role in addressing quality issues in hospitalized patients, and the Joint Commission on Accreditation of Healthcare Organizations mandates medication reconciliation at the time of hospital admission and discharge.[22] By further developing collaborative health care, the clinical pharmacist can be an integral part of the inpatient care team. The findings of this study are supported by a large observational study by Bond et al[23] that identified 17 clinical pharmacy services in hospitals associated with improvement in mortality, drug costs, and cost of care. In a follow-up study, Bond et al[24] reported lower medication error rates as the number of clinical pharmacists increased per occupied bed. A fundamental advantage to the pharmacist interventions discussed is that most can be implemented through reallocation of existing resources to increase clinical pharmacist services. Published studies evaluating the cost of incorporating clinical pharmacists have generally demonstrated a net hospital cost benefit in terms of cost avoidance and use.[25, 26, 27] Drug monitoring and process measures were evaluated in 15 trials,[28, 29, 30] with significant improvements in anticoagulation, medication history and allergy documentation, antibiotic use, treatment response, and therapeutic drug levels. In 4 trials, clinical pharmacist recommendations led to reductions in the number of

unnecessary medications and number of daily doses, improved medication appropriateness and medications lacking an indication or known adverse drugs events ADRs, and fewer drug interactions.[31]

The addition of clinical pharmacist services in the care of inpatients generally resulted in improved care with no evidence of harm. Interacting with the health care team on patient rounds, interviewing patients, reconciling medications, and providing patient discharge counselling and follow-up all resulted in improved outcomes, such as reduced adverse drug events or medication errors; improved medication adherence, knowledge, and appropriateness; and shortened hospital length of stay.[9]

Published economic evaluations of clinical pharmacy interventions have been reviewed by De Rijdt et al.[32] Cost-saving clinical pharmacy interventions were found to comprise a small percentage of clinical pharmacy interventions, but they generated substantial savings. Clinical pharmacy interventions reduced preventable adverse drug events and prescribing errors, yielding savings related to cost avoidance. Bond and Raehl[33] reviewed data from 14 hospitals and found out that seven clinical pharmacy services were associated with reduced mortality rates: (1) pharmacist-provided drug use evaluation, (2) pharmacist-provided in-service education, (3) pharmacist-provided adverse drug reaction management, (4) pharmacist-provided drug protocol management, (5) pharmacist participation on the cardiopulmonary resuscitation team, (6) pharmacist participation on medical rounds, and (7) pharmacist-provided drug admission histories. Review of preventable and potential adverse drugs events by the physician evaluators in this study suggested that full-time, ward-based clinical pharmacists potentially could have prevented the majority of errors. Traditionally, physicians decide on drug therapy, and pharmacists and nurses implement these decisions. The presence of clinical pharmacists on work rounds may lead to more informed clinical decisions by physicians, as well as interception of errors before medication orders are finalized. Their presence on the wards should facilitate communication between clinical staff and the pharmacy. In addition, clinical pharmacists could independently monitor the transcription process, assist nurses with drug preparation and administration, and monitor the drug preparation, storage, and distribution systems. They also could be involved in developing education programs and drug therapy protocols.[34]

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Table 1: Medication errors data July 2011

Category / Type	No of Errors	% of errors
Prescribing Errors	60	3.64
Administering Errors	3	0.18
Dispensing Errors	0	0

Table 2: Prescribing errors data July 2011

Errors classified in prescribing	No of Errors	% of errors
Stat Errors	28	46.67
PRN Errors	19	31.67
Antibiotic Errors	3	5
Incomplete or Unclear Rx	10	16.67

Table 3: Medication errors data August 2011

Category / Type	No of Errors	% of errors
Prescribing Errors	37	1.91
Administering Errors	3	0.16
Dispensing Errors	1	0.05

Table 4: Prescribing errors data August 2011

Errors classified in prescribing	No of Errors	% of errors
Stat Errors	20	54
PRN Errors	10	27
Antibiotic Errors	2	5.41
Incomplete or Unclear Rx	5	13.51

Table 5: Medication errors data September 2011

Category / Type	No of Errors	% of errors
Prescribing Errors	17	0.95
Administering Errors	0	0
Dispensing Errors	0	0

Table 6: Prescribing errors data September 2011

Errors classified in prescribing	No of Errors	% of errors
Stat Errors	8	47
PRN Errors	5	29.41
Antibiotic Errors	1	5.89
Incomplete or Unclear Rx	3	17.64

Table 7: medication errors data October 2011

Category / Type	No of Errors	% of errors
Prescribing Errors	14	0.766
Administering Errors	0	0.00
Dispensing Errors	1	0.054

Table 8: Prescribing errors data October 2011

Errors classified in prescribing	No of Errors	% of errors
Stat Errors	6	43
PRN Errors	4	28.5
Antibiotic Errors	1	7.1
Incomplete or Unclear Rx	3	21.4

Table 9: Medication error comparative studies on data collected month wise

Category / Type of errors	July	August	September	October
Prescribing Errors	60	37	17	14
Administering Errors	3	3	0	0
Dispensing Errors	0	1	0	1
Total errors	**63**	**41**	**17**	**14**
Total Medication orders	1649	1931	1771	1827
Total % of errors	**3.82 %**	**2.12 %**	**0.96%**	**0.77%**

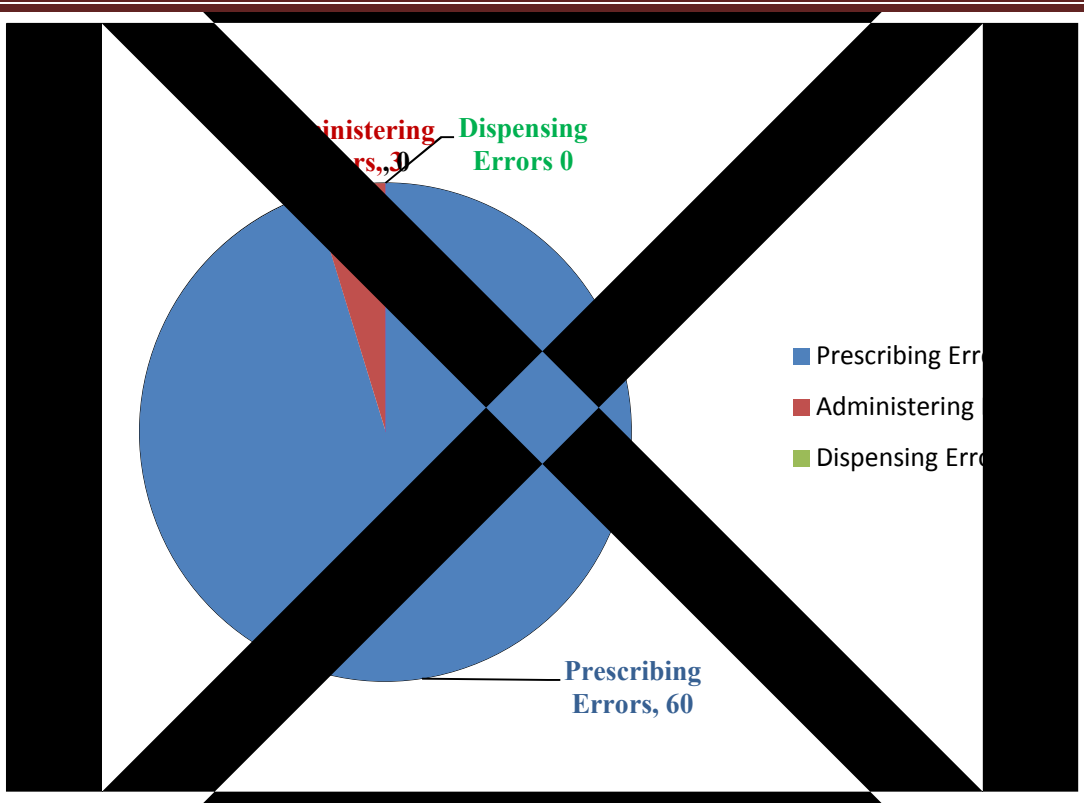

Fig. 1: Medication errors July 2011

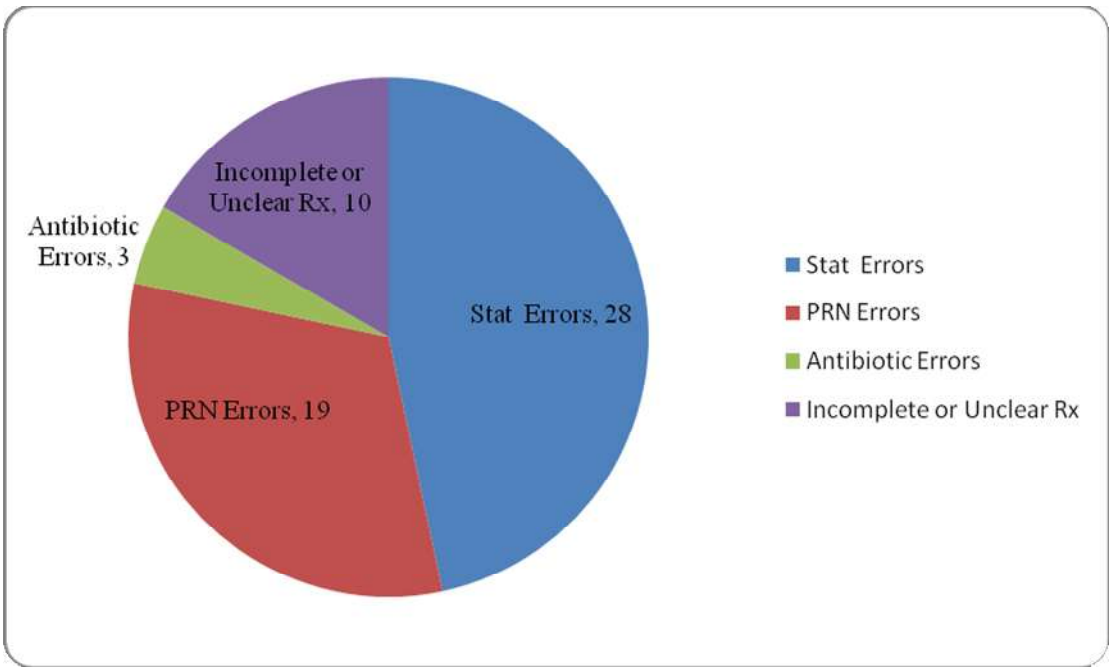

Fig. 2: Prescribing errors July 2011

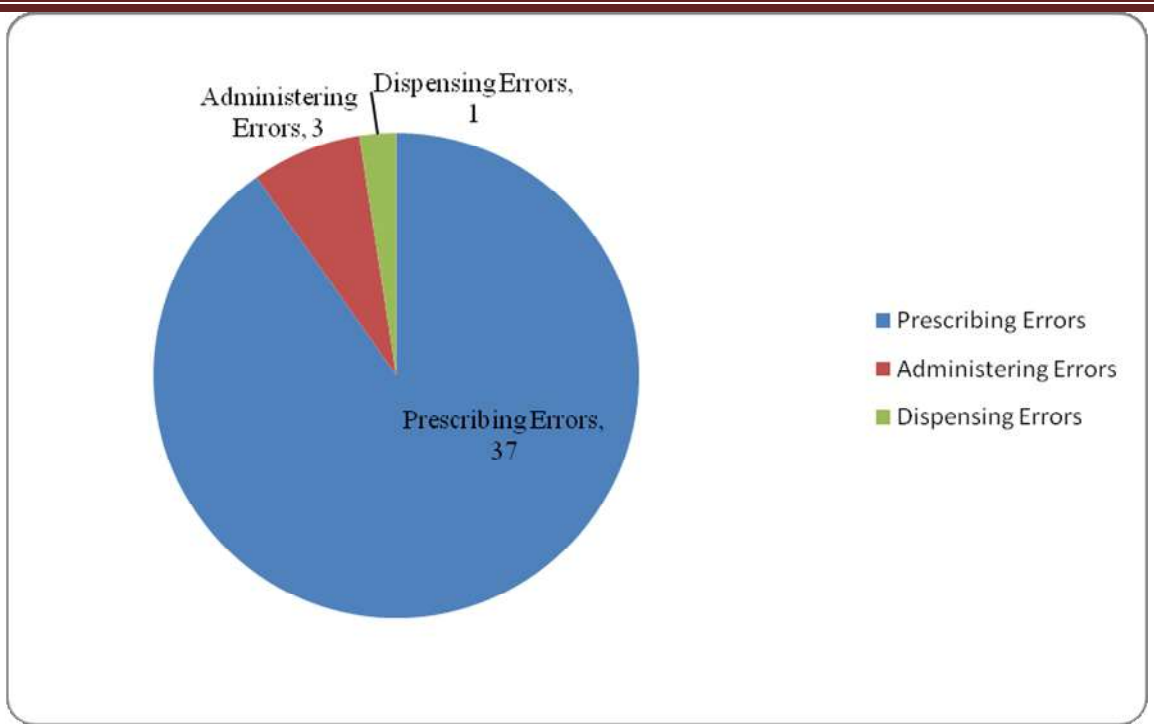

Fig. 3: Medication errors data August 2011

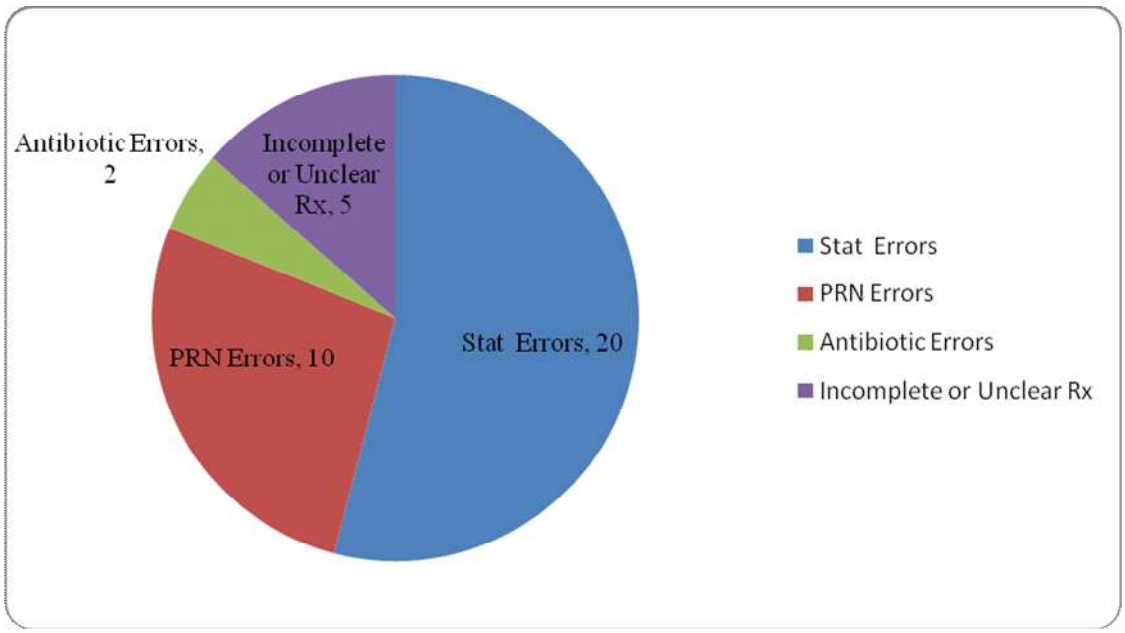

Fig. 4: Prescribing errors August 2011

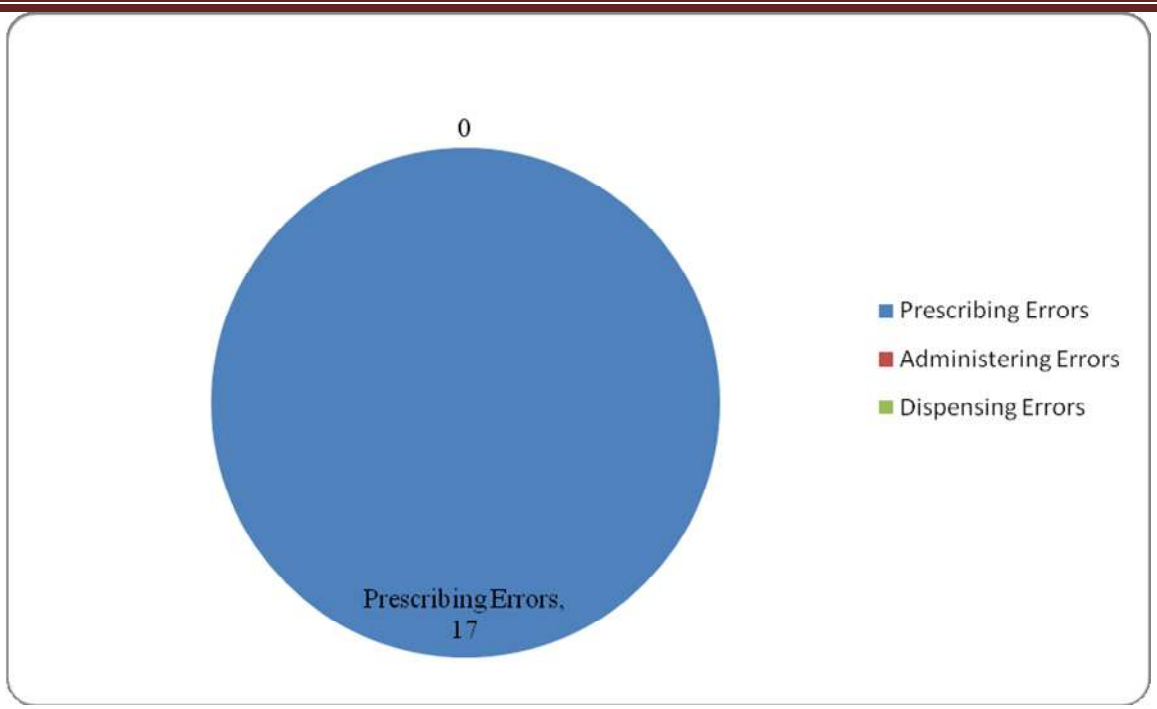

Fig. 5: Medication errors September 2011

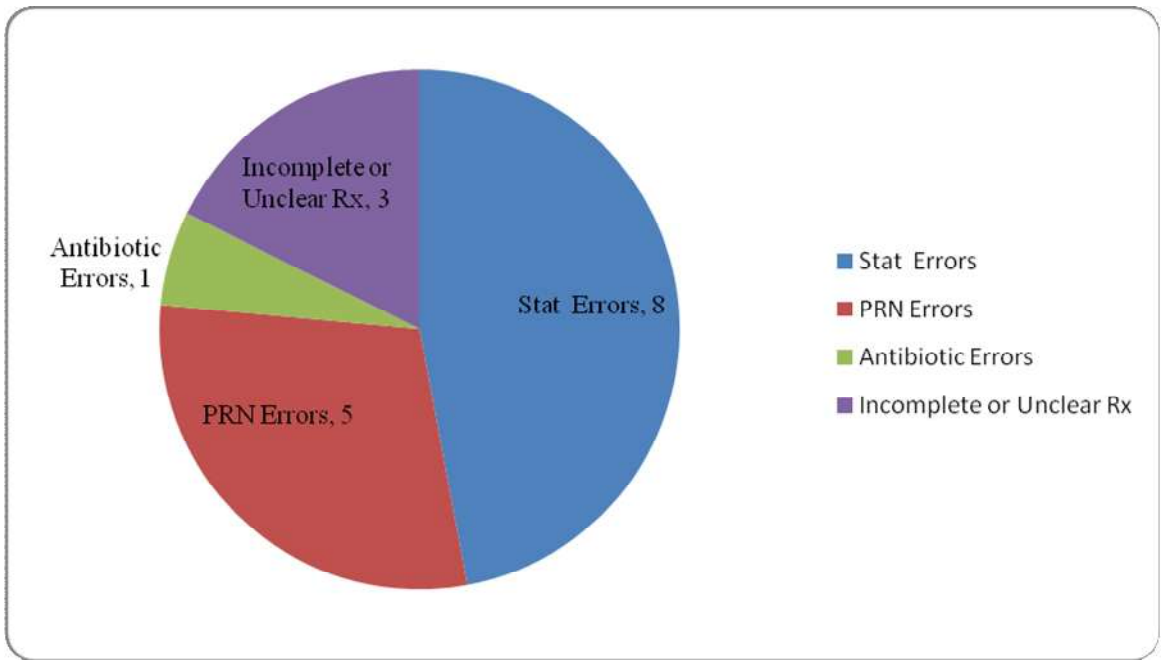

Fig. 6: Prescribing errors September 2011

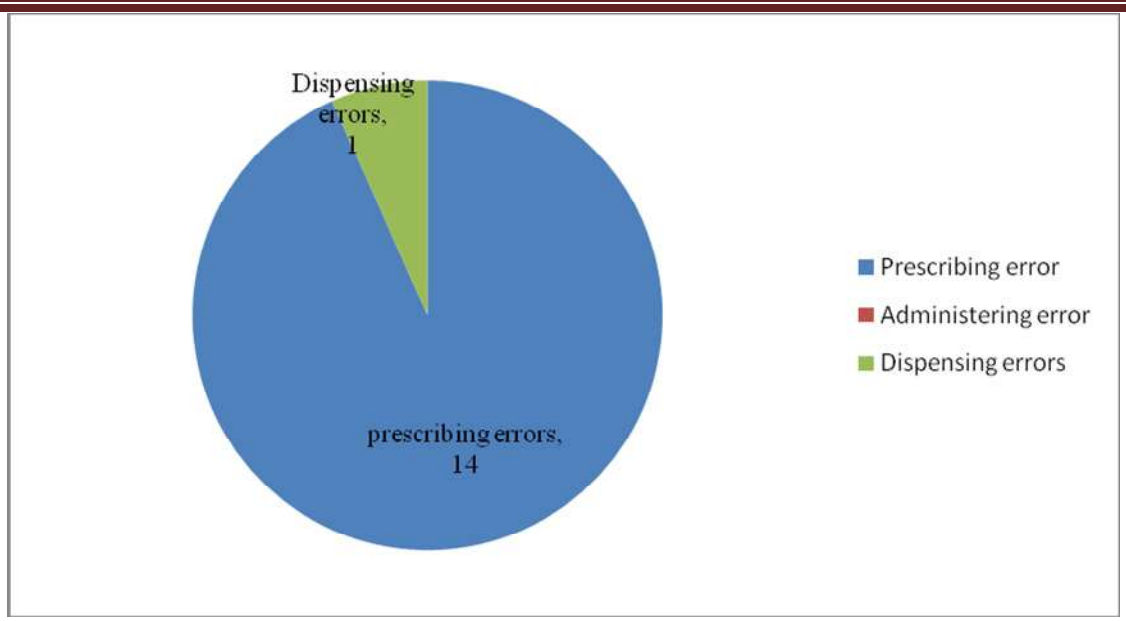

Fig. 7: Medication errors October 2011

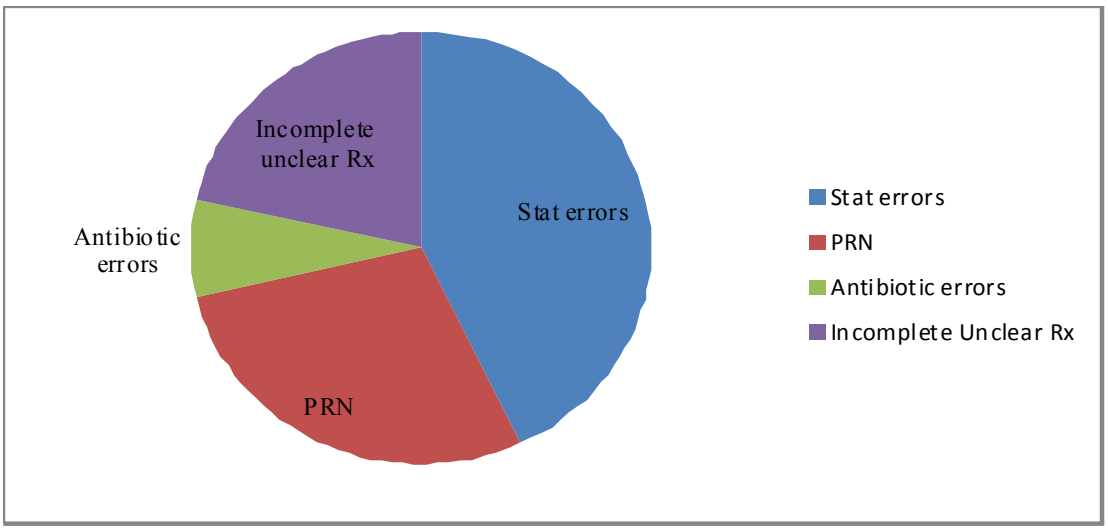

Fig. 8: Prescribing errors October 2011

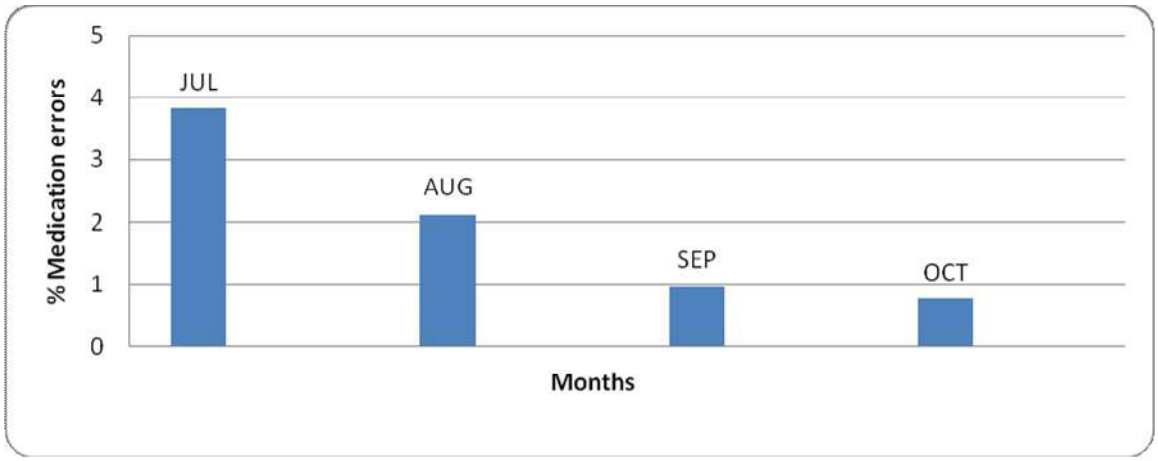

Fig. 9: medication error comparative studies on data collected month wise

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