Reduction Of Medication Errors – A Quality Initiative

A dissertation submitted in partial fulfillment of the requirements for the award of

Post-Graduate Diploma in Health and Hospital Management

By

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Jan - April 2011

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Certificate Of Approval

The following dissertation titled **Reduction Of Medication Errors – A Quality Initiative** is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post- Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation

Name Signature

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Certificate from Dissertation Advisory Committee

This is to certify that Dr. Prachi Tyagi. a participant of the Post- Graduate Diploma in Health and Hospital Management, has worked under our guidance and supervision.She is submitting this dissertation titled **To Reduce Medication Errors – A Quality Initiative** in partial fulfillment of the requirements for the award of the Post- Graduate Diploma in Health and Hospital Management.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Faculty Advisor

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Organizational Advisor

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Organization

Date : 25TH April 2011

Abstract

Reduction Of Medication Errors – A Quality Initiative

By

Dr. Prachi Tyagi

Today, in the health care profession, all types of medication errors including missed dose, wrong dosage forms, wrong time interval, wrong route, etc., are a big deal for better patient care. Today, problems related to medications are common in the healthcare profession, and are responsible for significant morbidity, mortality and cost.

Medication errors have been increasingly recognized as a major cause of iatrogenic illness and system-wide improvements have been the focus of prevention efforts. Critically ill patients are particularly vulnerable to injury resulting from medication errors because of the severity of illness, need for high risk medications with a narrow therapeutic index and frequent use of intravenous infusions.

The medication use process in hospital can be categorized into five broad stages: prescription, transcription, preparation, dispensation, and administration.An error can occur at any point in this process. Most errors occur during the administration stage , followed by prescription , preparation and transcription.

The earlier in the medication process an error occurs, the more likely it is to be intercepted Administration appears to be particularly vulnerable to error because of a paucity of system checks as most medications are administered by a single nurse. Nurses and pharmacists intercept up to 70% of prescription errors Preparation errors occur when there is a difference between the ordered amount or concentration of a medication and what is actually prepared and administered

The study is CROSS – SECTIONAL and QUANTITATIVE in approach.

PRIMARY DATA : Direct Observation of Various Opd's, Pharmacy, Wards

DATA COLLECTION : from OPD's, Pharmacy, Wards.

STATISTICAL TOOLS used are Bar diagram and pie charts by analyzing Excel .

Patient safety is an important health care issue because of the consequences of iatrogenic injuries. Medication errors in critical care are frequent, serious, and predictable. Human factor research in nonmedical settings suggests that demanding greater vigilance from providers of medical care may not result in meaningful safety improvement. Instead, the approach of identifying failures and redesigning faulty systems appears to be a more promising way to reduce human error.

Acknowledgement

I am thankful to Dr.Ramesh Chandna ,Chief Quality Officer, Asian Institue Of Medical Sciences, for his valuable suggestions and inspection throughout the study.

I wish to express my sincere thanks and gratitude to Ms. Nikita Sabherwal,DGM –Quality and Operations, my mentor, under whom I had the privilege to work.

Her valuable advice and expert supervision were available at every stage of this work. Her active interest in the work and helpful attitude encouraged me tremendously during period of study.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS USED

1. **AIMS : Asian Institue Of Medical Sciences**
2. **OPD – Out Patient Department**
3. **UHID – Unique Hospital Identification Number**
4. **ADE – Adverse Drug Event**
5. **od - once a day**
6. **bd - twice a day**
7. **sos - if necessary**
8. **stat – immediately**
9. **IM – intramuscular**
10. **IV – intravenous**
11. **SC – subcutaneous**
12. **TOP – topically**

ANNEXURES

ANNEXURES 1 : LIST OF LOOK ALIKE DRUGS

S.No	Category	Brand Name	Brand Name
1	TABLET	· DICLOMOL	· DIUCONTIN-K
2		· GLYCOMET-500 MG	· DOXOBID-400 MG
3		· ZORYL-M1	· ZERODOL-MR
4		· ROPARK-0.5MG	· LONAZEP-1MG
5		· ROPARK-0.25	· LONAZEP-0.25
6		· OLEANZ-5MG	· MIRTAZ-7.5MG
7	INJECTION	· TROPIN-1 ML	· PYROLATE-1 ML
8		· MAGNEX-2 GM	· MAGNAMYCIN-1 GM
9		· NEOVEC-4MG	· NEOCURON
10		· SODABICARBONATE-25 ML	· SODIUM CHLORIDE-25 ML
11			
12		· DOMIN	· NITROGLYCERIN
13		· POTTASSIUM CHLORIDE	· CALCIUMGLUCONATE
14	DROP	· VI-SYNERAL DROP	· VI-SYNERAL-
16			. ZINC DROP
17		· VITAZYME-15 ML	· TONOFERON -15 ML
18			

ANNEXURES : 2 - LIST OF LOOK ALIKE DRUG :

Mellaril	Elavil
Paxil	Taxol
Prilosec	Prozac
Cerebyx	Celebrex
Oxycontin	Oxycodone
Hydroxyzine	Hydralazine

Annexures Of Abbreviation -3 :

- ✓ od - once a day
- ✓ bd - twice a day
- ✓ tds - three times day
- ✓ qds - four times a day
- ✓ om : on - in the morning : at night
- ✓ prn - when required
- ✓ sos - if necessary
- ✓ stat – immediately
- ✓ IM – intramuscular
- ✓ IV – intravenous
- ✓ PR – per rectum
- ✓ PV – per vagina
- ✓ SC – subcutaneous
- ✓ TOP – topically

5.QUESTIONAIRE : Pharmacist

1. Is writing of Doctors Legible ?
2. If No – Do you Confirm back with the Respective Consultant ?
3. Do you Take Verbal Orders ?
4. If Drug Is Asked and is not available do you give Substitute ?
5. Do you know LASA drugs ?
6. Do you monitor Medication Errors ?

6.QUESTIONAIRE : Nurses

1. Is writing of Doctors Legible ?
2. If No – Do you Confirm back with the Respective Consultant or your supervisor ?
3. Do you Take Verbal Orders ?
4. Do you Handover Shift Change Over Form ?
5. Do you know LASA drugs ?
6. How do you report Medication Errors ?

7.MEDICATION ERROR FORM - FORMAT

8.ADVERSE DRUG EVENT FORM – FORMAT

9. Prescription Error Excel Sheet

10.Quality Indicators Excel Sheet

ADVERSE EVENT FORM

Patient Name Age/Sex

Date of Event Time UHID No. IPD No.

Admitting Doctor Area of Incident

1.Adverse Event Details (e.g. Patient fall, Medication Error, Abduction, Assaults, Safety/Security Incidents etc)

(A brief description of the event should be mentioned here.)

Physician Notified ❑Yes

❑No Time Sign/Name of Nurse/Doctor In charge

2.Immediate medical intervention taken for incident

(Details of intervention)

- **Outcome** ❑Unknown
  - ❑ No apparent Injury
  - ❑ Minor Injury
  - ❑ Major Injury
  - ❑Death
  - ❑ Discharged/LAMA
  - ❑Lost/Damagedproperty
  - ❑Other

3.Contributing Factors for Incident & Root Cause:

(Details of action root causes to be mentioned here.)

4.Corrective Action Measures

Sign/Name of CNO/Admin/Med Admin

INTERNSHIP REPORT

1.1 ORGANIZATION PROFILE

Asian Institute of Medical Sciences (AIMS) is a 350 bed Super specialty tertiary care hospital, truly futuristic in its services & technology and brings together some of the most talented medical professionals in India.
The Institute provides preventive, diagnostic, therapeutic, rehabilitative, palliative and support services under one roof and is designed to meet patient care and research requirements of the new millennium.

LOCATION

The institute is centrally located in Sector 21A, Faridabad in the National Capital Region, New Delhi International airport, New Delhi Railway station and New Delhi Interstate bus terminus are all within 40 kms.

VISION

"To be the most trusted healthcare partner FOR PEOPLE through our unsurpassed quality & care and by striving to provide ACCESSIBLE, AFFORDABLE and BEST AVAILABLE healthcare services in India."

SPECIALITIES

The hospital has a **comprehensive Super specialty tertiary care facilities** in:

- Cardiac diseases
- Renal diseases
- Neonatal, Pediatrics /Medical & Cardiac Intensive care units
- Oncology

Other Specialties include :

- Orthopedics
- General Surgery
- Nephrology
- Endocrinology
- Gastroenterology
- General Medicine
- Gynaecology
- Pediatrics
- Neurology
- Ophthalmology
- Radiology
- Respiratory Medicine
- Urology

1.2 JOB RESPONSIBILITIES :

- **Worked in quality team during the pre-assessment of NABH**
- **To administer the hospital in coordination with Medical Administrator and DGM-Quality & Operations to improve various departments of the hospital according to the requirement of NABH**

The following are the responsibilities assigned to me by the organization:

- To conduct daily rounds to various departments and floors of the hospital to ensure compliance to various standards of NABH
- Developing Quality Manual for the Hospital..
- To gather (quality indicator) data from various department and monitor the same monthly
- Formulation of policies for the hospital.
- Making of all Medical SOP's along with the HOD's

- To conduct Internal Audit for various department as per the requirement of the NABH
- To analyze patient feedback and give valuable suggestions for improving the patient care facilities in the hospital
- Introducing SIGNAGES wherever necessary.
- Designing of Various Forms.
- To give sensitization Of NABH to the Hospital Staff.
- To assist the assessor in pre – assessment of Asian Institute of Medical Sciences for NABH
- Worked in team for the closure of the Non – compliance identified during Pre – assessment.

1.3 LEARNING POINTS

- Being in core team of quality, I got an opportunity to learn the whole process of NABH (starting from preparation of policies and procedures, documentation control, monitoring of quality indicators, filling for NABH application and assisting in NABH pre – assessment)
- Learned to apply the standards of NABH for various departments in practical
- Learned the art of auditing various department with respect to NABH

DISSERTATION REPORT

Introduction

"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 labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use." [1]

Errors due to look-alike or sound-alike medication names are common and are responsible for thousands of deaths and a large amount of money. Thousands of medication name pairs have been confused based on similar appearances or sounds when written or spoken or have been identified as having the potential for confusion. [2] .It has been expected that a large share of outpatient medication errors occur as a result of patients themselves not administering a medicine as intended. [3]

Medication error has been quite a severe problem in India for a long time but no serious measures have yet been adopted, to overcome or reduce this.

Medical error can reduce if the 5-Rights are followed :

1. Right Patient
2. Right Medication
3. Right Dosage
4. Right Time
5. Right Route

Medication Errors

Medication errors reported through prescription auditing could be because of the mistake done by a doctor, nurse or the pharmacist.

The most prevalent kind of medical error occurring are **:**

- **Omission / Extra Dose**
- **Unauthorized drug**
- **Wrong form of medication**
- **Wrong rate of administration**
- **Wrong time /dose/ route**

Medication errors are basically of two types**: intercepted errors and actual errors**, on the basis whether they reach the patient or not.

Both the types of errors are further divided into four categories-

- Prescription error
- Administration error
- Transcription error
- Dispensing error

Except administration error, rest all types of errors could be rectified by prescription auditing.

The administration error could only be rectified by hospital rounds, which are also essential for adverse drug reaction monitoring.

Prescription errors which are corrected and prevented by prescription auditing team are called as **intercepted error.**

Type of Error and Criteria

Prescription Errors

1. No route specified.
2. As-needed order without an indication.
3. Drug is indicated but the dose is inappropriate.
4. As-needed order without a time interval.
5. Dose change ordered without discontinuation of previous order.
6. Order is illegible.
7. Order is incomplete in specifying doses or frequency.

Transcription Errors

1. Order is not transcribed at all.
2. Order is transcribed incorrectly.
3. Allergy is not documented on the medication administration record.
4. Allergy is not documented on the order sheet.

Administration Errors

1. Scheduled dose is not documented as administered.
2. Drug is administered without a physician order.
3. Dose missed because of late transcription.
4. Order is incorrectly entered in the pharmacy computer.

Dispensing Errors

1. Wrong drug or dilution dispensed.
2. Wrong preparation dispensed.

The intercepted errors (the error which has not reached the patient) are documented by preserving a copy of the indent. The actual errors or an "error of omission", which does reach the patient inspite of auditing, are reported on a proper format called as quality variance report.

Medication error Report Form and Adverse Drug Reporting Form :

The Medication error and Adverse drug reaction are monitored . If any Medication error occurs it is reported on an Medication error reporting form. If any adverse drug reaction occurs it is reported on an ADR reporting form. All the details regarding the drug e.g. brand and generic name, doses, route of administration should be documented.

CONSEQUENCE OF MEDICATION ERROR :

Although only 10% of medication errors result in an ADE, these errors have profound implications for patients, families, and health care providers [4,5,6,] .The IOM report highlights that 44,000 to 98,000 patients die each year as a result of medical errors, a large portion of these being medication-related . However, deaths are only the tip of the iceberg. The human and societal burden is even greater with many patients experiencing costly and prolonged hospital stays and some patients never fully recovering to their premorbid status [7,8] . Bates and colleagues [8] estimated that in American hospitals the annual cost of serious medication errors in 1995 was $2.9 million per hospital and that a 17% decrease in incidence would result in $480,000 savings per hospital. Finally, the psychological impact of errors should not be ignored [8]. Errors erode patient, family, and public confidence in health care organizations.[9]

It is one of the critical aspects involved in patient safety and hence was identified as one of the quality indicators for nursing and pharmacy. The instances of medication errors are potentially life-threatening and have common occurrences in hospitals. This study attempts to fight this issue and improve the existing scenario of medication errors in their hospital.

Research Problem :

The majorities of medication errors occur as a result of poor prescribing, indenting and administration of drugs and involve relatively inexperienced medical staffs, who are responsible for the majority of prescribing in hospital

AIM

An analysis of medication prescription practices in the hospital to find out the reasons of errors in medication prescription, dispensing and administration.

OBJECTIVE

1. Understand the most common causes for error in the prescribing process.
2. Understand communication impact in reducing medication errors.
3. Understand technology as a factor reduce medication errors.
4. To develop a strategic plan within the organization for Effective reduction of the medication error.

RESEARCH METHODOLOGY

The study is CROSS – SECTIONAL and QUANTITATIVE in nature.

The sample methodology is purposive wherein data is collected from OPD's, Pharmacy, Wards.

A. Area of research – OPD's , Pharmacy , Wards

B. Duration of study - 10^{th} Jan 2011 – 10^{th} April 2011

C. Sample size - No. of Prescriptions : 600 prescriptions

Interview of Pharmacists – 6

Interview of Nurses – 12

D. **Data collection :**

PRIMARY DATA : Direct Observation of Various Opd's, Pharmacy, Wards

Statistical Tools - Bar diagram and pie charts by analyzing Excel .

LIMITATIONS OF STUDY :

1. Lack of Evidence Based Study in India.
2. No benchmark present.
3. Less areas focused like few OPD's ,Pharmacy, Wards.
4. Interview of only Pharmacist and Nurses done. Doctors could not be interviewed.
5. Bias involved as it is Perception based.

SIGNIFICANCE OF STUDY

The study will provide an overview on:-

- Necessary factors to be monitored by the Physician , Pharmacist ,and Nurses for reducing the possibility of error in future.
- Insight on the interpersonal communication skills for the Physician, Pharmacist and nurses and other staff.

DOCTORS PRESCRIPTION ERRORS

AREA OF STUDY : OPD is located on Ground Floor,1st Floor,2nd Floor..

PARAMETERIC DETAILS OF STUDY CONDUCTED

Study was conducted for the time period of 9:00am to 5:00pm for 3 months.

The data will be collected for the following parameters

- Patient's Complete Name
- UHID
- Age
- Sex
- Prescription Order's

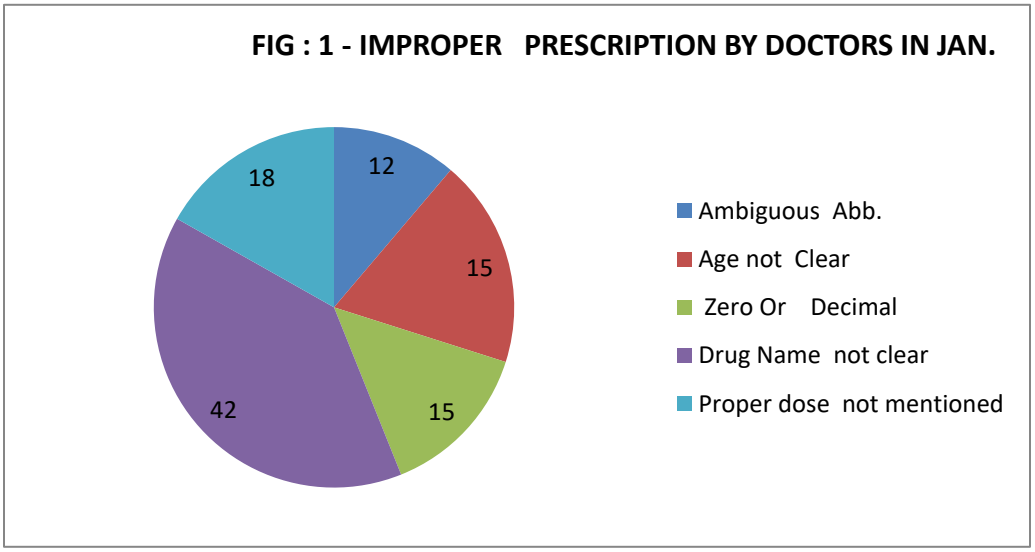
ANALYSIS IN JANUARY :

Prescription Seen : 610

Wrong Prescription : 10

Ambiguous Abb.	Age not Clear	Zero Or Decimal	Drug Name not clear	Proper dose not mentioned
12	20	15	42	18

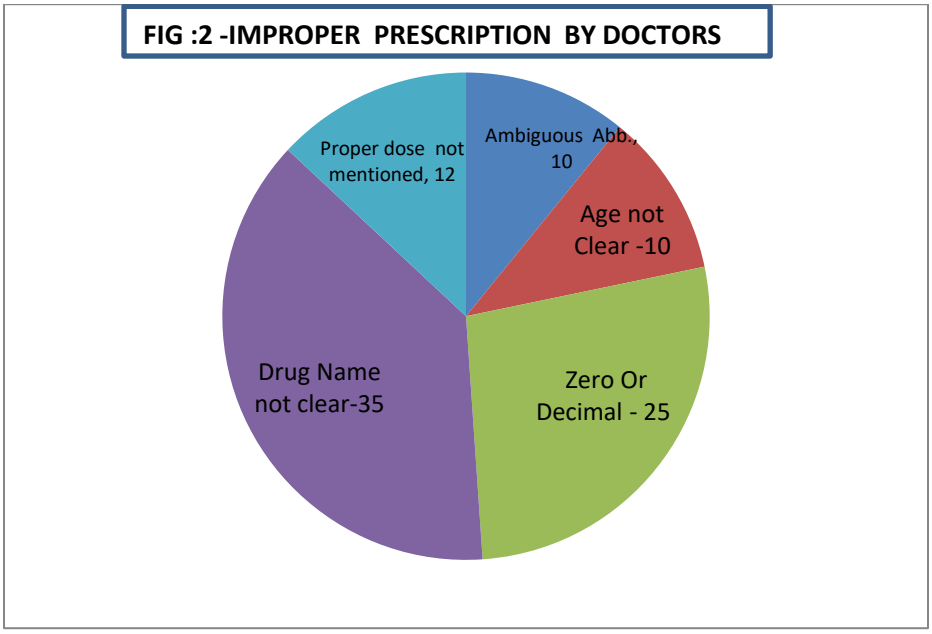
TABLE : 1 - PRESCRIPTION ERROR IN JAN 2011



ANALYSIS IN FEB. :

Ambiguous Abb.	Age not Clear	Zero Or Decimal	Drug Name not clear	Proper dose not mentioned
10	10	25	35	12

TABLE : 2 - PRESCRIPTION ERROR IN FEB. 2011



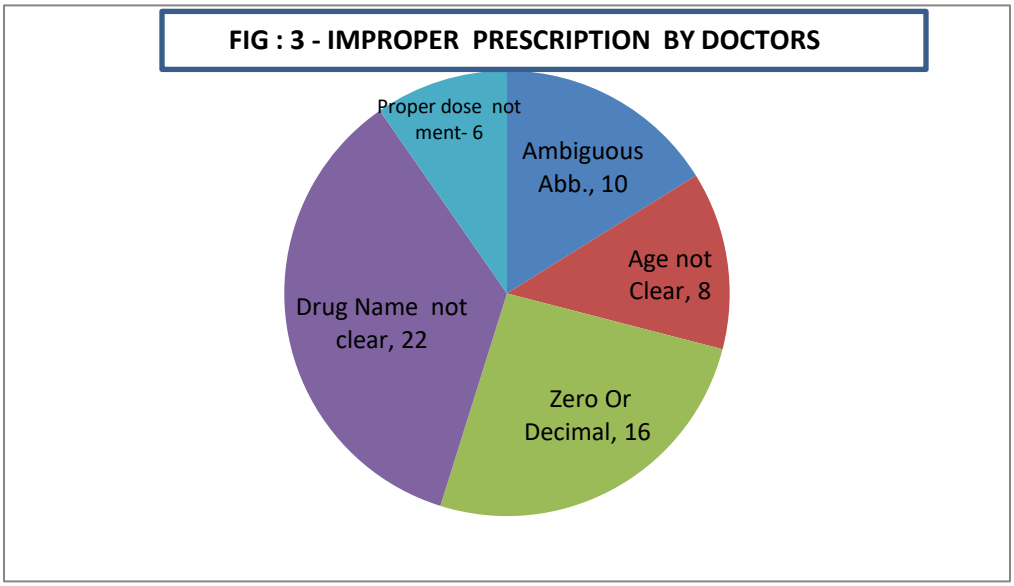
ANALYSIS IN MARCH :

Prescription Seen : 610

Wrong Prescription : 61

Ambiguous Abb.	Age not Clear	Zero Or Decimal	Drug Name not clear	Proper dose not mentioned
10	8	16	22	6

TABLE : 3 - Prescription Error in MARCH 2011



REASONS OF ERROR IN DOCTOR'S PRESCRIPTION :

1) illegible handwriting,
2) Prohibited abbreviations Eg. For **micrograms** – Doctor write mg and nurse misinterpret it as **Milligram**
3) Communication of verbal orders
4) Dosage miscalculations Eg. In Paeds patient
5) Drug administration Route not clear Eg. Not specified whether **I.v** or **I.m**
6) Special instruction not documented on the prescription sheet by the Doctor – Eg. Whether to be given before food or after food.
7) Lack of knowledge of the drug
    - Wrong dose, choice, drug.
    - Interaction
    - Allergy checking

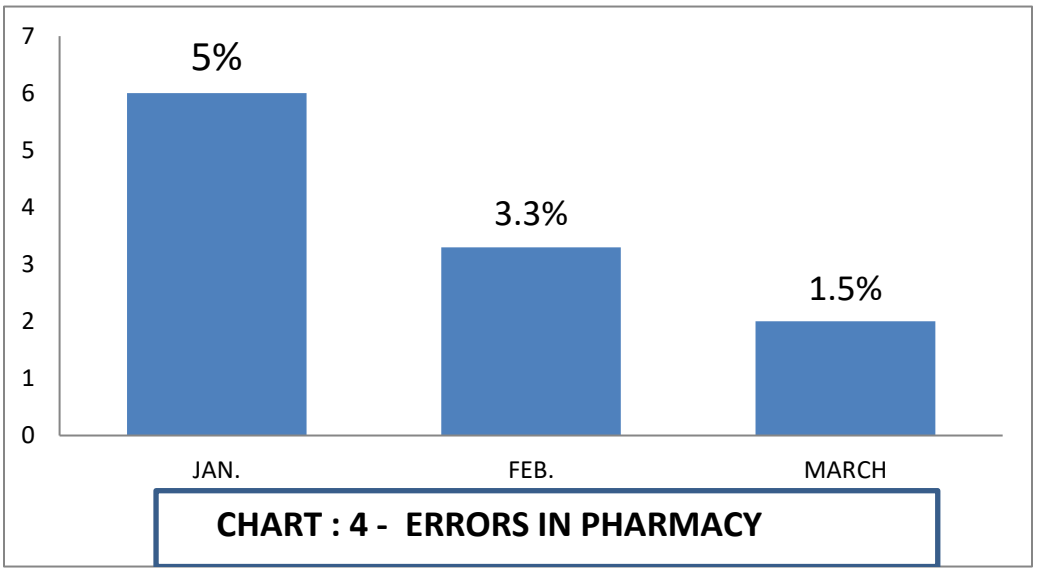
8) **"Rule" violations** – Not writing drugs according to **DRUG FORMULARY** – which further confuses the pharmacist .
9) **Oral Orders :**Drug orders given orally can be misunderstood, especially if they involve a sound-alike drug, for example: Mellaril &Elavil . Annexures attached.

Errors in Dispensing at the Pharmacy

The Pharmacy at **Asian Institue Of Medical Sciences** is outsourced **to S.S. PHARMATECH.**

Out of 300 prescriptions,

MONTH	JAN	FEB	MARCH
ERROR REPORTED	5%	3.30%	1.5%
TABLE :4 - DISPENSING ERROR IN PHARMACY			



REASONS OF ERRORS AT PHARMACY- on the basis of Data Collected and the Interview taken :

1.Illegible handwriting

2.Misinterpretation

3.Mistakes in identifying drugs – Name,Packaging

4. Misreading in case of a Look A Like & Sound A like

5. Only a trainee available during Night Shift.

6.Less Staff available

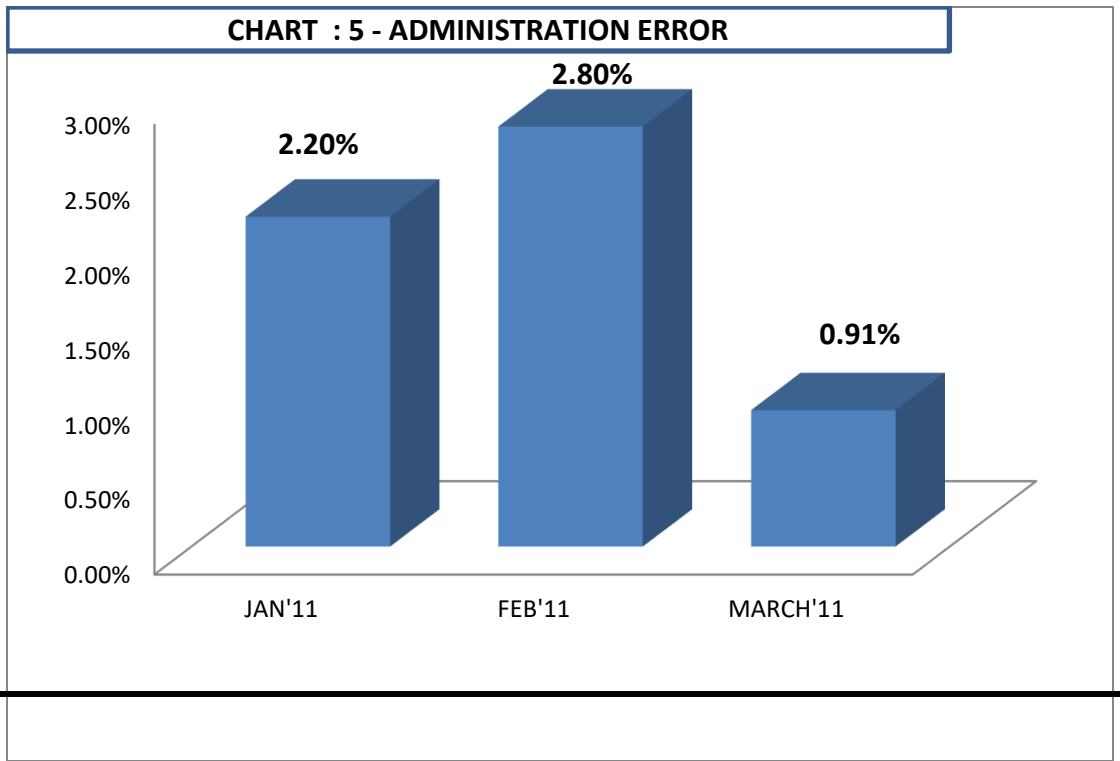
7. 6-8 drugs stored in a single box ,this causes confusion.

8. **Oral Orders :**Drug orders given orally can be misunderstood, especially if they involve a **LOOK A LIKE & SOUND ALIKE** .For example: Mellaril &Elavil , Cerebyx & Celebrex ANNEXURES : List of **LOOK A LIKE & SOUND ALIKE.** [10]

Errors during Administration by the Nursing

Quality Indicator	JAN'11	FEB'11	MARCH'11
Medication Errors (Administration)	2.20%	2.80%	0.91%

TABLE : 5 - ADMINISTRATION ERROR



REASONS OF ERRORS DURING ADMINISTRATION :

On the basis of data collected by medication errors Reporting Form and by interviewing them are as follows :

1. Drug Chart not maintained properly
2. Instruction not read properly or if in doubt they are not confirmed neither by their team Leader nor by the Doctor.
3. Usually errors happen during the change of the Shift
4. **Language Barrier** – South Indian Nurses have problem in taking Verbal Orders.
5. **Attrition Of staff** during Jan and Feb.
6. More Patient Inflow in the month of Feb. as it was the foundation Month – Heavy Discounts on various Procedures.
7. Sometimes Confusion in Cut Tablets.

FINDINGS :

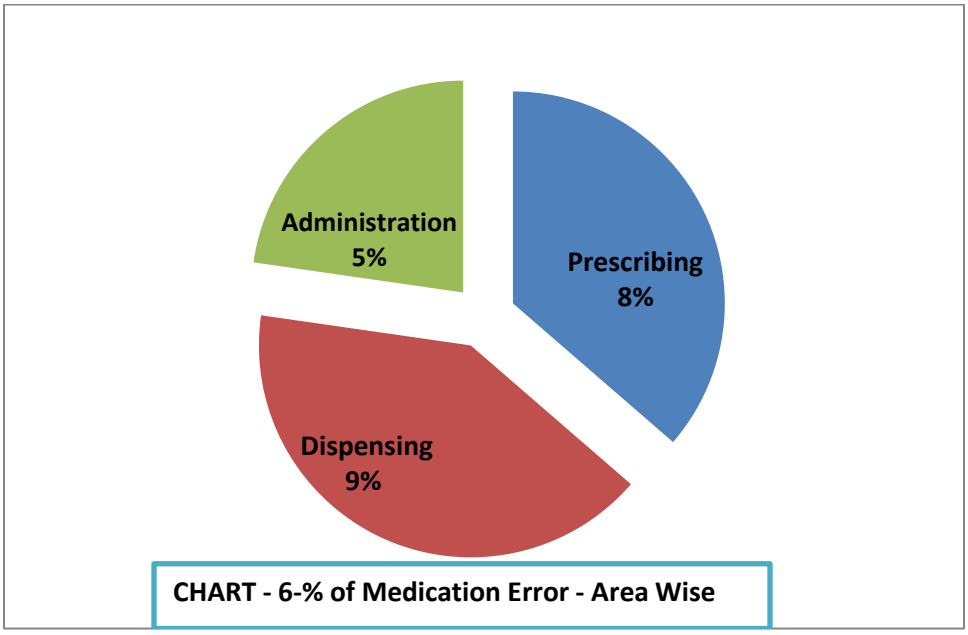
1.Area wise Medication Error –

- **OPD**
- **Wards**
- **Pharmacy**

2.Type Of Errors :

- **Dispensing Error**
- **Administration Error**
- **Prescription Error**

AREA WISE ANALYSIS	Type OF Error	%
OPD	Prescribing	8%
Pharmacy	Dispensing	9%
Wards	Administration	5%
TABLE : 6 -% of Medication Error -	AREA WISE	



RESULT :

Common causes of medication errors

A. Human factors

B. Systems

C. Abbreviations

D. Oral orders

E. Look-alike and sound-alike drugs

F. Dosage calculation

G. At-risk population

DISCUSSION : Strong relationship of Medication error with staff ratio and workload.

During the month of Jan and Feb. Nursing Attrition rate was high so workload increased which led to increased workload which further led to Medication error.

The training frequency was increased from mid of Feb. so Error rate in the month of March decreased drastically.

CONCLUSION : It is one of the critical aspects involved in patient safety and hence was identified as one of the quality indicators for nursing and pharmacy. The instances of medication errors are potentially life-threatening and have common occurrences in hospitals. This study attempts to fight this issue and improve the existing scenario of medication errors in their hospital.

By implementing the recommendations ,the medication errors came down by almost 20% .

As there is a continuous quality improvement programme , the medication errors must come down gradually.

RECOMMENDATIONS :

DOCTOR'S:

1.No Verbal orders are allowed (allowed only in case of emergency) and the doctor has to documented as soon as possible.

2.Weekly File Audit started both for In- Patient & Discharged Patient.

3.Electronic Pads were introduced.

4.Filter clinics were introduced where ever the OPD was heavy For Eg. Gynae Opd,Paeds Opd,Orthopaedic OPD's ,so that Doctor can spend appropriate time writing the Prescriptions.

5. Use of **Drug Formulary** made compulsory.

6.**PHYSICIAN PATIENT COMMUNICATION :**
Most of the physicians with official responsibilities to convey instructions on proper medication use have frequently been found to be ineffective in their role.

Many physicians do not communicate health and treatment information in a manner that can be understood by patients with limited literacy skills. Doctors are requested to spend more time explaining the drugs to the patient.

7.TRAININGS ON SAFE PRESCRIBING

a) Providing a prescription that is: Legible,Signed,Timed ,Giving all information to allow safe administration,Clear and unambiguous.

b.) Take particular care if: Patient is Impaired renal function,Hepatic dysfunction,Children or elderly.

c.) Remember the **"FIVE RIGHTS"**

1. Right patient
2. Right drug
3. Right time
4. Right dose
5. Right route

d.)The following things to be taken in Considerations while writing a Prescription

- Write micrograms not mcg
- Leading zero before decimal expression. For Eg.

  ✓ 0.5mg .5mg **X**

- No trailing zero after decimal expression.Foor Eg.

  ✓ 0.05mg .050mg **X**

- If < 1gram use mg
- If < 1mg use micrograms
- If < 1 microgram use nanograms

e.)PRESCRIPTION ABBREVIATIONS : For Eg. od - once a day

Annexure attached..

PHARMACY:

1.Look Alike – Sound Alike Drug List to be displayed at relevant place at the Pharmacy.

2.Prescription to be checked by the clinical pharmacist and not Trainees.Pharmacist should read it carefully and check the drug name (generic / brand), strength, formulation, doses, route of administration, frequency and duration of intake.

3. Substitute Of Drugs should not be given.Only Drugs prescribed by the Doctor to be Dispensed.

4.Trained Staff to be kept for the night Shift.

5. Single Tablet not to be Dispensed, Full Packet should be given to the Patient.

6. 2-3 drugs to be kept in the single Drug Box instead of Multiple Drugs.

7.Double Check should be done before dispensing and time to be taken to read labels.

NURSING :

1.Drug Chart to be maintained properly – Signed and Timed

2.No verbal Orders to be taken.

3. Trainee nurses should not be given the task of administration of Drugs.

4.Proper training sessions should be maintained for the Nurses.

5. Shift Change Over Register to be Maintained .

6. Double Check of Drugs should be done to be done by two nurses – One Senior and One Junior – before administration of Drugs .

REFERENCES

Information obtained on the Internet

1. The National Coordinating Council for Medication Error Reporting and Prevention

NCC MERP: The First Ten Years "Defining the Problem and Developing Solutions"

December 2005. www.nccmerp.org.

2.Berman A. Reducing medication errors through naming, labeling, and packaging. J Med Syst 2004;28:9-29. [PUBMED] (www.ncbi.nlm.nih.gov)

.

3.Gurwitz J, Field T, Harrold L. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. JAMA 2003;289:1107-16

4.Calabrese AD, Erstad BL, Brandl K, Barletta JF, Kane SL, Sherman DS: **Medication administration errors in adult patients in the ICU.** Intensive Care Med 2001, **27:**1592-1598. PubMed Abstract | Publisher Full Text (www.ncbi.nlm.nih.gov)

5. Bates DW, Boyle DL, Vander Vliet MB, Schneider J, Leape L: **Relationship between medication errors and adverse drug events.** J Gen Intern Med 1995, **10:**199-205. PubMed Abstract | Publisher Full Text (www.ncbi.nlm.nih.gov)

6.Barker KN, Flynn EA, Pepper GA, Bates DW, Mikeal RL: **Medication errors observed in 36 health care facilities.** Arch Intern Med 2002, **162:**1897-1903. PubMed Abstract | Publisher Full Text

7.Classen D.C, Pestotnik SL, Evans RS, Lloyd JF, Burke JP: **Adverse drug events in hospitalized patients. Excess length of stay, extra costs, and attributable mortality.** JAMA 1997, **277:**301-306. PubMed Abstract | Publisher Full Text (www.ncbi.nlm.nih.gov)

8.Bates DW, Leape LL, Cullen DJ, Laird N, Petersen LA, Teich JM, Burdick E, Hickey M, Kleefield S, Shea B, Vander Vliet M, Seger DL: **Effect of computerized physician order entry and a team intervention on prevention of serious medication errors.** JAMA 1998, **280:**1311-1316. PubMed Abstract | Publisher Full Text (www.ncbi.nlm.nih.gov)

9.Christensen JF, Levinson W, Dunn PM: **The heart of darkness: the impact of perceived mistakes on physicians.** J Gen Intern Med 1992, **7:**424-431. PubMed Abstract | Publisher Full Text

(www.ncbi.nlm.nih.gov)

ADDENDUM

The Dissertation approval committee suggested modifying the title of the project as "REDUCTION OF MEDICATION ERRORS "Moreover, they recommended adding some important points in my study. Following is the list of topics added:

1. **Review Of Literature**
2. **List of High Alert Drugs**

REVIEW OF LITERATURE

The number of actual errors that occur in our healthcare system is, by most accounts, much higher. In a study of 36 medical facilities, the true error rate was determined to be 14.6%, which in our hypothetical hospital would trigger 319,740 medication errors. [Flynn EA, Barker K, Pepper GA, et al,2002] How can that be? Why is the medication process so prone to error? One answer lies in the number of steps needed to administer even the simplest of newly ordered medications. The medication ordering process for a noncomputerized,order entry system is summarized in the following: It is a virtual certainty that patients admitted to the hospital will receive multiple medications and each administration occurrence carries with it the risk of error or misadventure. The definitions used in the literature to discuss drug-related experiences are at times controversial. The following definitions are taken, in part, from the American Journal of Health-System Pharmacists [Am J Health-Syst Pharm,1998]

Estimates of death related to medication error are concerning. The Institute of Medicine report, To Err is Human, suggested that medication errors result in up to 7,000 deaths yearly in the United States[Kohn LT, Corrigan JM, Donaldson MS,1998].

One of the largest studies that examined hospital-related medication errors included data obtained from 1116 hospitals (32% of US hospitals), reporting 430,586 medication errors [Bond CA, Raehl CL, Franke T. ,2001] Of these hospitals,913 provided information on adverse outcomes. The mean number of total errors reported yearly per hospital was 385. As might be expected, there was variability between hospitals. Analysis of the reported errors, however, did yield some important information. On average, the hospitals reported negative patient outcomes (undefined in this study) as 19 ± 25 per year per hospital. Adjusted for the average number of occupied beds, the medication error rate was calculated to be 2.3 ± 4 per occupied bed. Similarly, adverse patient outcomes resulting from medication errors were estimated to be 0.12 ±0.3 per occupied bed. Other conclusions gleaned from this report include the following:

- Approximately 5% of all patients admitted to the hospitals experienced a medication error during their hospital stay
- Based on the number of medication errors, one medication error occurred approximately every 23 hours
- Medication errors that resulted in adverse patient outcomes occurred in 0.25% of admitted patients
- A medication-related adverse outcome occurred every 19 days.

Adverse drug events (ADEs), which may or may not be due to error, also are frequently observed within our hospitals. One referenced study reported that the rate of ADEs was 6.5 per 100 hospital admissions [Bates DW, Cullen DJ, Laird N, et al,1995] When examining these ADEs, approximately 1% were fatal and 12% were felt to be life threatening.Another study helped to provide perspective on the impact of adverse drug reactions throughout the nation. [Lazarou J, Pomeranz BH, Corey PN. ,2001] More than 2.2 million hospitalized patients experienced a serious adverse drug reaction yearly and, of these, over 100,000 were fatal. Medication errors and adverse drug events impose a threat on the safety of our patients and impart a high financial burden on the healthcare system. In 1995, adverse drug events, which include medication errors and preventable and non-preventable adverse events, were estimated to cost $76 - $136 billion yearly[Johnson JA, Bootman LJ. 1998] This included the need for treatment, hospitalization, drug therapy interventions, lost time from work, and litigation. It is difficult to determine the exact number or percentage of adverse drug events and errors that occur in hospitals. It is possible, however, to say that medication errors represent the third most frequent cause of sentinel events (11.4%) reported to The Joint Commission (TJC)[JCAHO ,2002] Though this TJC reporting program is voluntary, the relatively large number of events that occur due to medication errors demand attention. TJC has addressed this issue in recently released accreditation standards

deal with later in this chapter. Examining the root causes of these sentinel events provides at least some direction for hospital administrators who wish to curtail these preventable events.

How do error and ADR rates compare at individual hospitals? That question is very difficult to answer other than to say that whatever the reporting system used, it probably is a mere snapshot of what is really happening in our hospitals. Low error rates are frequently more indicative of a poor reporting system than a system with good controls. The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP), recommended against comparative error rate data in a June 11, 2002 statement.The most obvious way to reduce costs, to say nothing about patient safety, is to avoid adverse drug events. In one hospital's ICU, preventable errors were reduced by 66% when a pharmacist made rounds with the physicians and consulted on new orders throughout the day. The estimated annual savings were $270,000, an amount far exceeding the cost of the additional pharmacist [Leape LL, Cullen DJ, Clapp EB, et al ,2003]Similarly, a pharmacist and nurse team reduced costs by just under $24,000 in a 91- day period when they actively participated in drug therapy intervention in a medical ICU [Katona BG, Ayd PR, Walters JK, et al. ,1998]The authors projected a yearly savings in excess of $500,000 if the project were expanded to other hospital intensive care areas. It has been predicted that for every $1 spent on clinical pharmacy services, $16.70 are saved [Schumock GT, Meek PD, Ploetz PA, et al.,1998].Medication errors occur at all steps in the medication process: ordering, dispensing, and administration. The causes for medication misadventures are many, which is not surprising given the billions of doses of medications administered yearly and the large number of individuals involved in the entire process. One reason why drug misadventures continue to occur is that hospitals may not fully utilize their data to prioritize and drive system improvements. One common problem that hospitals face is that these misadventures, and particularly errors, do not neatly fall into defined categories. As an example, assume a patient receives another patient’s medication. It would be easy to assume that this error was the result of a poor patient identification technique. But that does not help understand why the error occurred. Was the patient identification wristband correct? Were there two patients with the same last name in the same room? Was the medication entered in the computer for the wrong patient? Determining the root cause of the error is the only way to eliminate the source of the error. Because incident reporting systems usually fail to identify root causes, the same errors may be repeated over and over again. It is important, therefore, to ensure that incident reporting systems and data are used to fuel analysis and corrective action in systems.Healthcare professionals are at risk of error because they work in a hurried, pressure-ridden, andsometimes hostile environment. [Buerhaus PI. Lucian,1999]. Consider this scenario for the many reasons of patient misidentification.When a prescriber writes an order, he/she must first find the chart – not an easy task in many hospitals. All charts look alike, providing the first opportunity for error. Errors occur if the wrong chart is selected. The order may be written while on the run and in a milieu of noise and congestion. The unit clerk or nurse who first views the order is in the center of this chaos, yet they are expected to carefully review the order for correctness and direct the order to the next healthcare provider. If it is a drug order, the order is transported to another hectic environment – the pharmacy. Here the staff is faced with hundreds of orders and have multiple distractions such as telephone calls for drug information, interruptions from nurses or aides who are looking for urgently needed medications, and interventions with other pharmacy staff members who are waiting for a double check on already processed orders. Finally, the drug makes its way back to the nursing unit where the nurse sorts through the pile of drugs received and makes a decision as to which medications require immediate attention. Often pulled in several directions at once, the nurse goes into the patient’s room and administers the drug. During the process, she may well be deciding which of the three stat requests requires attention first.

So why was the drug given to the wrong patient? Maybe it was written on the wrong chart or perhaps the right chart had the wrong addressograph on the order form. The pharmacy could have filled the medication for the wrong patient because a previous patient’s computer file was opened and the order

entered for the wrong patient. Perhaps the nurse misread the patient's name or was administering drugs to multiple patients at the same time. The possibilities are endless. Yet, this error may be classified solely as a patient identification error. One significant problem in evaluating medication errors is that many contributing factors may have caused the error to occur. Taken individually, each factor might appear to minor; however, collectively they may reveal flaws in the process.It has been estimated that 75% of transcription errors are the result of distractions[Teichman PG, Caffee AE,2002]. Handwriting is always a source of concern, especially with so many look/sound alike medications on the market. As a matter of fact, the Institute for Safe Medication Practices has called for the elimination of handwritten prescriptions by 2003[ISMP,2003] There are a wide variety of types and causes of medication errors. The United States Pharmacopeia (USP) developed a voluntary reporting system named MedMARx, which uses standard definitions and collection methods in an attempt to gather meaning data. Recently, the USP released a report analyzing data from 41,296 reported medication errors from 184 medical facilities[The United States Pharmacopeial Convention,2002].

As emphasized earlier, adverse drug events may or may not be preventable. For example, assume a patient has a first-time allergic reaction to an antibiotic and develops a rash and respiratory symptoms. This adverse drug reaction would reasonably be classified as non-preventable. However, if the patient's records suggested a previous allergic reaction to similar antibiotics, then a more thorough analysis of the past allergic reaction could have resulted in avoidance of the problem. Of all adverse drug events, as many as one-half may be preventable[Gurwitz JH, Field TS, Avorn J, et al.,2000].

One analysis attempted to classify adverse drug reactions requiring hospital admissions, of which the average length of stay was just over 6 days[McDonnell PJ, Jacobs MR. ,2002].

NCC MERP is an organization consisting of representatives that span from medical science to public advocacy groups. Among its 20 representatives are the FDA, the American Medical Association, the American Society of Health-System Pharmacists, JCAHO, and the National Patient Safety Organization. Its primary objective is to promote nationwide awareness for medication error reporting and prevention. NCC MERP works closely with other patient safety organizations, state healthcare affiliates, national professional and managed care organizations, and third-party payers. The NCC One large challenge facing hospitals is the way in which medication errors are reported. Medication errors are almost always directly linked to an individual or individuals. Although many hospitals promote the concept of a non-punitive environment, it is nevertheless difficult to disclose errors that may reflect negatively on one's self. Additionally, medication errors that are considered minor may not seem worth reporting. Reporting a medication error via incident reports is often time consuming.

Faced with stressful patient care responsibilities, it is easy to understand why many consider the completion of incident reports as inconsequential. Of course, the problem with under reporting is that it is impossible to obtain a true picture of a hospital's source of errors 24 Although much effort has been made toward educating patients regarding health-related issues, it has been estimated that one-half of all prescriptions are taken incorrectly, and as many as one out of every ten hospital admissions may be caused by medications[Porter J, Hick H. ,2004] Failure to take medications as prescribed also leads to increased healthcare expenditures. In a 1990 study of elderly patients admitted to hospitals, it was determined that 11.4% were noncompliant with their physician's orders[Coe N, Fanale, JE, Kronholm P,1990].

At that time, the estimated cost per occurrence was determined to be $2,100. Obviously, that dollar figure would be higher if adjusted for today's economy.Interestingly, failure to inform and educate patients about their medications is also subject to litigation.

The duty of pharmacists to warn patients of potential drug hazards has been tested in the courts in at least two states.30 In Baker v. Arbor Drugs (Royal Oak, Michigan), the Michigan Court of Appeals ruled that when Arbor Drugs advertised its screening for drug interactions by way of its computer, the company assumed a duty to warn the patient. Failure to do so in this case resulted in a settlement of

$100,000. Similarly, in an Arizona legal suit (Lasley v. Shrakes Country Club Pharmacy, Inc.), the court ruled that pharmacists have a duty to warn the patient irrespective of any duty the prescribing doctor owes the patient. Quoting a spokesperson for the National Association of Boards of Pharmacy, (the association) has argued that, from a public health perspective, there should be a duty to warn because of the educational level of the pharmacist and the fact that the pharmacist is the last line of defense before the consumer or patient ingests the drug. Nationally, the Omnibus Budget Reconciliation Act of 1990 required that pharmacists council patients in outpatient settings. According to Jesse Vivian, a pharmacist and attorney in the Detroit area, pharmacists will eventually find that they have a universal requirement to become "information managers" for their patients [Barnes PG.,2002].

Although there are many articles written in the lay press that encourage patients to take an active role in their health care, studies such as one conducted at the Albany Medical Center in New York repeatedly demonstrate that patients do not understand or possess essential knowledge about the medications they consume. In this study, only 15% of the elderly emergency department patients(over age 65) could correctly list all their medications, dosages, frequencies, and indications. On average, patients failed to list at least one prescription medication taken regularly. In another study,discrepancies between the medication prescribed and the medication actually taken by the patient occurred in as many as 76% of patients[Bedell SE, Jabbour S, Goldberg R, et al. ,2002]. Consumers may not have enough knowledge to properly use over-the-counter (OTC) medications. In a survey conducted for the National Council on Patient Information and Education,33 60% of the patients polled reported taking one or more OTC drug within the past 6 months. A third of these patients admitted to taking medication beyond the recommended dose believing that more is better when it comes to medications. Approximately 36% of patients combined several OTC medications at the same time, yet only 20% of patients knew the active ingredient of the products they consumed. Do healthcare consumers fear medication mistakes? The Commonwealth Fund 2001 Heath Care Quality Survey highlighted problems that patients experienced relative to medication errors[Davis K, Schoenbaum SC, Collins KS. ,2001]. Of the patients surveyed, approximately 16% received the wrong medication or wrong dose from a community pharmacy. One of three patients reported a medication error as a hospital inpatient, 22% of which were classified by the patient as serious. Errors aside, 20% of patients found prescriptions labels difficult to understand and 26% found the medication instructions too difficult to comprehend.

Clearly, patient education and participation in their own healthcare decisions should be encouraged. When hospitalized, patients should be encouraged to freely ask questions of their healthcare providers. They should ask why tests are being performed, and they need to understand the results of these tests in terms that make sense to them. Whenever a medication is administered, patients should question the purpose of the medication (especially if new) and challenge the use of the medication if it does not make sense to them. For example, if the patient is given a medication to reduce blood pressure and he/she does not have hypertension, the patient should inquire why that medication was prescribed. If the medication looks different from the medication they received from the previous dose, they should inquire why its appearance has changed. The same advice is true if the number of tablets or capsules is different than previously taken. The Agency for Healthcare Research and Quality has developed a list of patient safety tips, which includes the following relative to medications [Agency for Healthcare Research and Quality.,2000].

HIGH ALERT DRUGS PRESENT IN THE HOSPITAL

1. PHENYTOIN
2. AMINOPHYLLINE
3. HEPARIN
4. I/V IRON
5. CONCENTRATED ELECTROLYTES
6. POTASSIUM CHLORIDE
7. POTASIUM PHOSPHATE
8. SOD.CHLORIDE >0.9%
9. MAG.SULPHATE 50%
10. ALL CHEMOTHERAPY DRUGS
11. ALL NARCOTIC DRUGS
12. MORPHINE
13. FENTANYL
14. PETHEDINE
15. SUFANTANYL

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