

SYSTEM & PROCESS OF PRESCRIBING, SUPPLYING AND ADMINISTERING MEDICATION TO PATIENTS AND ITS IMPACT ON MEDICATION SAFETY In Delhi Heart and Lung Institute



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INTRODUCTION

- The goal of drug therapy is the achievement of defined therapeutic outcomes that improve a patient's quality of life while minimizing patient risk.
- But there are inherent risks, both known and unknown, associated with the therapeutic use of drugs (prescription and nonprescription) and drug administration devices.
- The incidents or hazards that result from such risk have been defined as drug misadventuring, which includes both adverse drug reactions (ADRs) and medication errors.

The definition of a medication error as approved by The National Coordinating Council for Medication Error and Prevention 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.

- The Institute of Medicine's 1999 report suggested that medical errors accounted for 44,000-98,000 deaths each year in USA
- 7000 deaths because of medication error
- Estimated total cost of medical errors is \$17 billion-\$29 billion annually.
- Drugs are the most common cause of medical errors in hospitals, affecting 3.7% of patients
- Frequency of medication errors has been documented but little study of the factors associated with the root causes of these errors.

- Associations and correlations between hospital staffing (specifically nurses), prescription orders of doctors and copying of that order on to the medication chart (MAR) by the nurse, number of medication prescribed, storage of medication at bedside etc. With the medication administration safety of the patients at bedside.
- Various personnel involve in the medication use process which include doctors/physicians, nurses, pharmacist, ward boys, administrators/managers, patient, attendant.

HOSPITAL PROFILE

- 100 bedded super specialty hospital
- Facilities: Cardiac and Pulmonary Services
- Surgery and Sleep Disorders
- NABH and NABL accredited
- Situated in central Delhi

COMMON CAUSES OF MEDICATION ERRORS

- Ambiguous strength designation on labels or in packaging
- Drug product nomenclature (look-alike or sound-alike names, use of lettered or numbered prefixes and suffixes in drug names)
- Equipment failure or malfunction
- Communication barriers
- Illegible handwriting
- Improper transcription
- Inaccurate dosage calculation



Medication storage at bedside: LASA and other drugs in the same box

- Inadequately trained personnel
- Inappropriate abbreviations used in prescribing
- Labeling errors
- Excessive workload
- Lapses in individual performance
- Medicine unavailable
- Drug storage



Drug storage at nursing station in economy ward stored together



HIGH RISK DRUG STORAGE AT NURSING STATION

AIM

To study the systems and processes for prescribing, supplying and administering drugs to inpatient and ICU patients and their impact of medication administration safety in Delhi Heart And Lung Institute.

REASONS FOR DOING THE STUDY

- Hospital Bed Occupancy: 40-50(average)
- Total Administration per day: 3 per patient
- Total Administration per month: $40-50 \times 3 \times 30 = 3600-4500$
- 3600-4500 procedure per month with human intervention in each step
- Medication error reporting: almost nil

METHODOLOGY

RESEARCH QUESTIONS

- What are the incidences, causes and type of preventable medication errors in Delhi Heart & Lung Institute?
- What is the relation of medication safety with number of medication administered, number of patient assigned to the nurse, work experience of the nurse and acuity and vulnerability of patient?

HYPOTHESIS

- HYPOTHESIS 1: Medication safety is found to be inversely proportional to number of medication administered.
- HYPOTHESIS 2: There is a direct relation between medication safety and work experience of the assigned nurse.
- HYPOTHESIS 3: Medication safety has a relation with the workload of the assigned nurse.

- HYPOTHESIS 4: Medication safety has a relation with the acuity and vulnerability of patient.
- HYPOTHESIS 5: Medication safety is more if LASA drugs are stored in a separate container at bedside.
- HYPOTHESIS 6: Medication safety is enhanced if patient and attendant are educated and participated in their medical treatment.

OBJECTIVES

- To find the number of compromises with the medication safety.
- To find the main cause of error in the process of medication administration.
- To find the various nursing variables related to medication safety.
- To provide necessary recommendations.

RESEARCH DESIGN

- The research design was a descriptive research design.
- It was used because the purpose of the study was to provide hospital with information on the extent to which medication errors can occur and the presence of factors that generally increase the chance of medication errors which ultimately compromises the patient safety.
- The data were be collected by direct observation of the patient records, prescription, dispensing and during medication administration.
Observation of the storage of the drug at bedside and in the nursing station was done.
- The study results will be recorded in excel sheet.

SAMPLE

- The study was performed in Delhi Heart & Lung Institute. The targeted populations for this research are patients admitted in IPD and ICU setup of the hospital

Sample Size: 176 Medication Administrations

Research Instruments: For research question (occurrence of medication errors), the instrument used was a performa developed on excel to collect the necessary data.

Data Collection Procedure: The randomly selected number of drug administration in ICU and inpatients settings. The data was collected during the working hours of hospital i.e. between 8AM to 6PM. The data collection period lasted for 20 days.

(April 1,2014 to April 20,2014)

DATA ANALYSIS PLAN

- The information retrieved from direct observation of the drug administration, patient's charts and prescriptions were transported to the Statistical Package for Social Sciences (SPSS version 16.0) for analysis.
- Descriptive analysis was performed to describe data for frequency.
- Correlation of different data variables to assess the areas of magnitude contributing factors.

TABLE 1.1

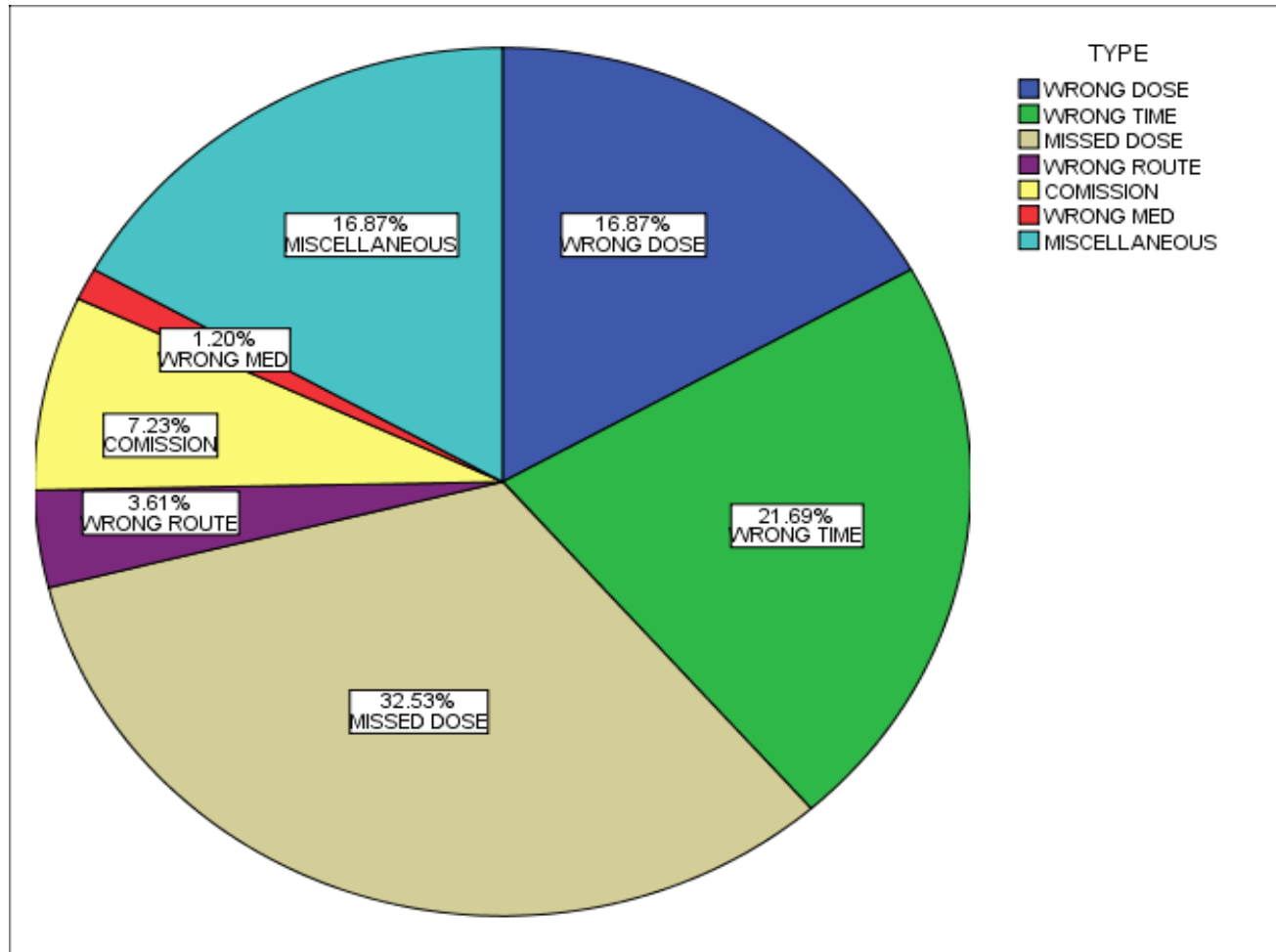
TOTAL NUMBER OF COMPROMISES IN MEDICATION SAFETY

Event during administration		
	Frequency	Percent
YES	83	47.2
NO	93	52.8
Total	176	100.0

Out of total administrations sample i.e. 176, in 47.2% cases (83) there in one or the other event which could have cause a breach or compromised the medication administration safety of the patient.

GRAPH 1.1

TYPE OF EVENTS WHICH CAN COMPROMISE THE MEDICATION SAFETY



The causes of breach in medication safety were mainly due to either missing of a dose (32.53%), or due to wrong time of the administration (21.69%).

Other causes were wrong dose, and some other factors like:

Brand name different as prescribed, dose as per the reports, incorrect date on prescription, OT Nurse doing the ward duty, revised order not written etc.

Minor causes were wrong medicine, wrong rote and commission of a drug stopped by the doctor verbally.

TABLE 1.2

CORRELATION OF NUMBER OF DRUGS AND EVENT DURING ADMINISTRATION

Number of drug range-

- 1= 1-3 drugs
- 2= 4-6 drugs
- 3= 7-9 drugs
- 4= 10-12 drugs
- 5= 13-15 drugs

Number of drug range * Event during administration Crosstabulation					
			Event during administration		Total
			YES	NO	
Number of drug range	1	Count	18	32	50
		% within Number of drug range	36.0%	64.0%	100.0%
		% within Event during administration	21.7%	34.4%	28.4%
	2	Count	30	37	67
		% within Number of drug range	44.8%	55.2%	100.0%
		% within Event during administration	36.1%	39.8%	38.1%
	3	Count	27	18	45
		% within Number of drug range	60.0%	40.0%	100.0%
		% within Event during administration	32.5%	19.4%	25.6%
	4	Count	7	6	13
		% within Number of drug range	53.8%	46.2%	100.0%
		% within Event during administration	8.4%	6.5%	7.4%
	5	Count	1	0	1
		% within Number of drug range	100.0%	.0%	100.0%
		% within Event during administration	1.2%	.0%	.6%
Total		Count	83	93	176
		% within Number of drug range	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

As per the analysis in the administration where more number of drugs were given at a time more was the breach in the medication safety. So it showed a negative correlation between number of drugs and occurrence of an event during drug administration.

TABLE 1.3

CORRELATION OF DOCTOR AND NURSE NOTES VARIATION AND EVENT DURING DRUG ADMINISTRATION

There was a positive correlation between the occurrence of an error and the variation in the doctor and nurse notes. As whenever there was a variation, in 93.9% of the cases an event did occurred.

Variations in doctor and nurse notes * Event during administration Crosstabulation					
			Event during administration		Total
			YES	NO	
Variations in doctor and nurse notes	YES	Count	31	2	33
		% within Variations in dr and nurse notes	93.9%	6.1%	100.0%
		% within Event during administration	37.3%	2.2%	18.8%
	NO	Count	52	91	143
		% within Variations in doctor and nurse notes	36.4%	63.6%	100.0%
		% within Event during administration	62.7%	97.8%	81.2%
Total		Count	83	93	176
		% within Variations in doctor and nurse notes	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

TABLE 1.4

CORRELATION OF NURSE WORK EXPERIENCE AND DRUG ADMINISTRATION EVENT

Nurse Experience Range:

- 1= 0-8 months
- 2= 9-17 months
- 3= 18-26 months
- 4= 27-35 months
- 5= 36-44 months
- 6- 45-53 months
- 7= 54-62 months
- 8= 63-71 months

Nurse work exp range * Event during administration Crosstabulation					
			Event during administration		Total
			YES	NO	
Nurse work exp range	1	Count	27	34	61
		% within Nurse work exp range	44.3%	55.7%	100.0%
		% within Event during administration	32.5%	36.6%	34.7%
	2	Count	40	41	81
		% within Nurse work exp range	49.4%	50.6%	100.0%
		% within Event during administration	48.2%	44.1%	46.0%
	3	Count	11	11	22
		% within Nurse work exp range	50.0%	50.0%	100.0%
		% within Event during administration	13.3%	11.8%	12.5%
	4	Count	2	0	2
		% within Nurse work exp range	100.0%	.0%	100.0%
		% within Event during administration	2.4%	.0%	1.1%
	5	Count	3	2	5
		% within Nurse work exp range	60.0%	40.0%	100.0%
		% within Event during administration	3.6%	2.2%	2.8%
	7	Count	0	1	1
		% within Nurse work exp range	.0%	100.0%	100.0%
		% within Event during administration	.0%	1.1%	.6%
	8	Count	0	4	4
		% within Nurse work exp range	.0%	100.0%	100.0%
		% within Event during administration	.0%	4.3%	2.3%
Total		Count	83	93	176
		% within Nurse work exp range	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

TABLE 1.5

CORRELATION OF NUMBER OF PATIENT ASSIGNED TO THE NURSE AND DRUG ADMINISTRATION EVENT

Maximum compromises were occurring when number of patient assigned was 3-5 per nurse i.e. in economy ward.

Patient assigned to nurse* Event during administration Crosstabulation

			Event during administration		Total
			YES	NO	
Patient assigned to nurse	1	Count	2	5	7
		% within Patient assigned to nurse	28.6%	71.4%	100.0%
		% within Event during administration	2.4%	5.4%	4.0%
	2	Count	23	37	60
		% within Patient assigned to nurse	38.3%	61.7%	100.0%
		% within Event during administration	27.7%	39.8%	34.1%
	3	Count	20	19	39
		% within Patient assigned to nurse	51.3%	48.7%	100.0%
		% within Event during administration	24.1%	20.4%	22.2%
	4	Count	21	15	36
		% within Patient assigned to nurse	58.3%	41.7%	100.0%
		% within Event during administration	25.3%	16.1%	20.5%
	5	Count	12	9	21
		% within Patient assigned to nurse	57.1%	42.9%	100.0%
		% within Event during administration	14.5%	9.7%	11.9%
	6	Count	2	4	6
		% within Patient assigned to nurse	33.3%	66.7%	100.0%
		% within Event during administration	2.4%	4.3%	3.4%
	7	Count	3	4	7
		% within Patient assigned to nurse	42.9%	57.1%	100.0%
		% within Event during administration	3.6%	4.3%	4.0%
Total		Count	83	93	176
		% within Patient assigned to nurse	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

TABLE 1.6

CORRELATION BETWEEN THE TYPE OF WARD AND THE EVENT OCCURRING ADMINISTRATION

Maximum compromises with the medication safety were found in the economy ward(41%) and than in the single ward (22.9%) which suggests that in critical care more attention was given to the care of patient due to more staff-patient ratio.

Ward * Event during administration Crosstabulation

			Event during administration		Total
			YES	NO	
Ward	CCU	Count	18	31	49
		% within Ward	36.7%	63.3%	100.0%
		% within Event during administration	21.7%	33.3%	27.8%
	HDU	Count	12	19	31
		% within Ward	38.7%	61.3%	100.0%
		% within Event during administration	14.5%	20.4%	17.6%
	E	Count	34	26	60
		% within Ward	56.7%	43.3%	100.0%
		% within Event during administration	41.0%	28.0%	34.1%
	S	Count	19	17	36
		% within Ward	52.8%	47.2%	100.0%
		% within Event during administration	22.9%	18.3%	20.5%
Total		Count	83	93	176
		% within Ward	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

TABLE 1.7

CORRELATION OF VULNERABILITY OF PATIENT AND EVENT DURING ADMINISTRATION

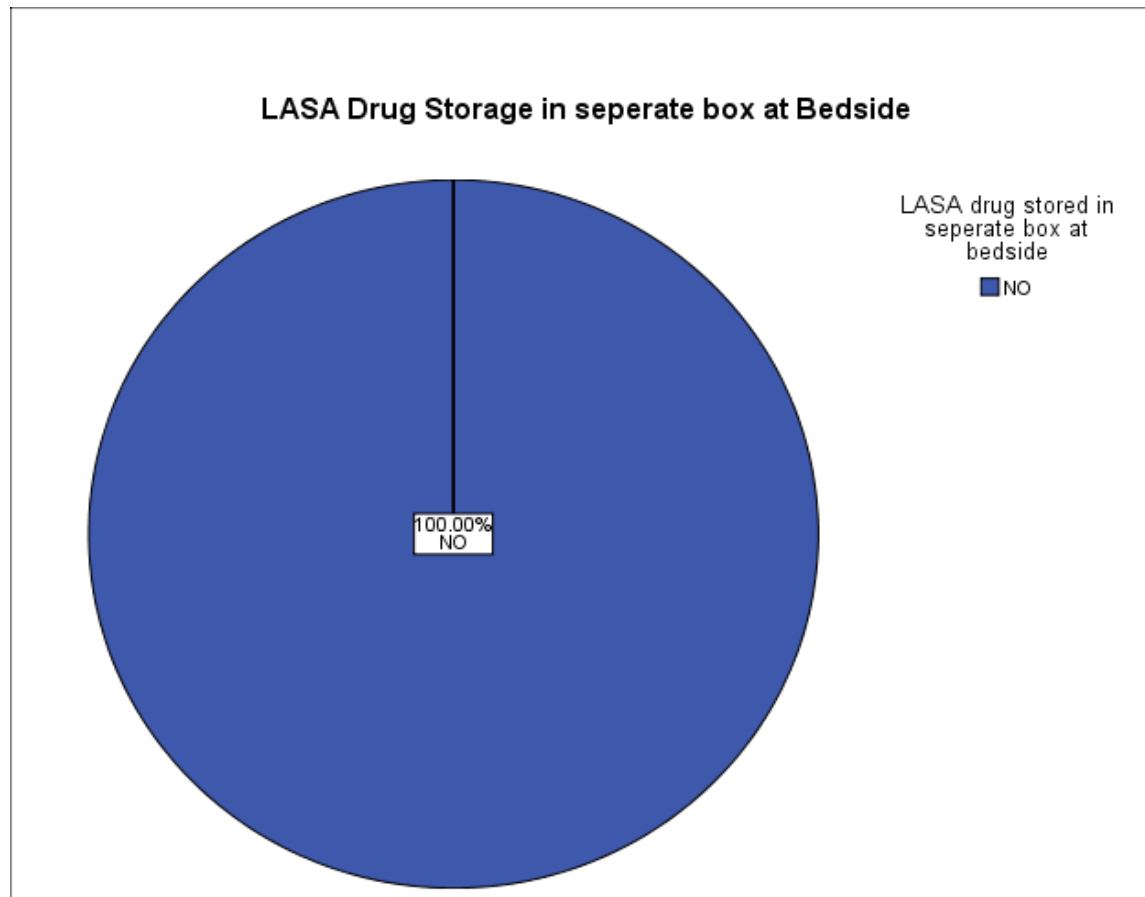
It was found that vulnerability was not effecting the medication administration safety. And also when the patient was vulnerable the Events were less.

VULNERABILITY * Event during administration Crosstabulation

			Event during administration		Total
			YES	NO	
VULNERABILITY	YES	Count	42	54	96
		% within VULNERABILITY	43.8%	56.2%	100.0%
		% within Event during administration	50.6%	58.1%	54.5%
	NO	Count	41	39	80
		% within VULNERABILITY	51.2%	48.8%	100.0%
		% within Event during administration	49.4%	41.9%	45.5%
Total		Count	83	93	176
		% within VULNERABILITY	47.2%	52.8%	100.0%
		% within Event during administration	100.0%	100.0%	100.0%

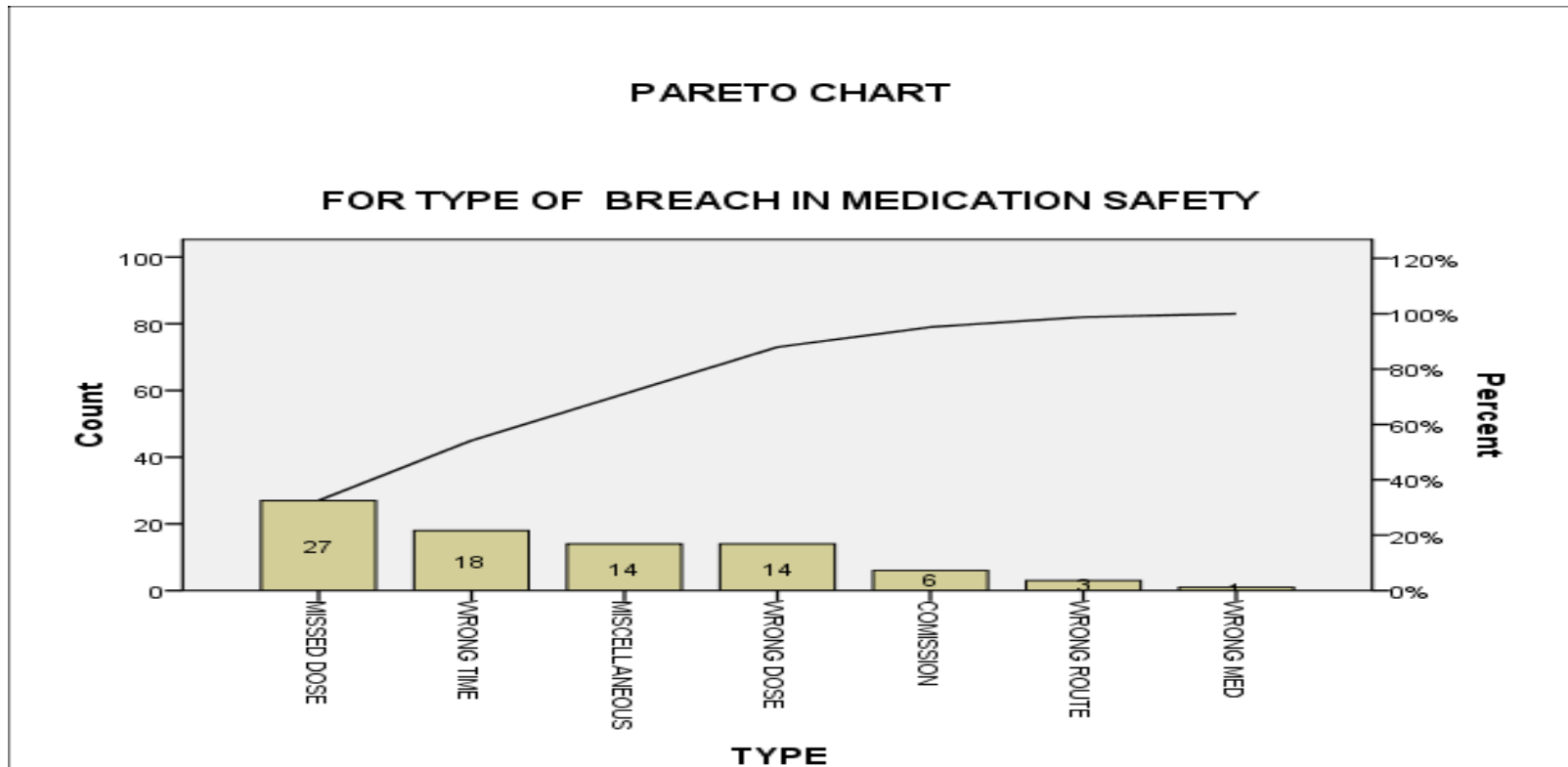
GRAPH 1.2

LASA DRUG STORAGE AT BEDSIDE



GRAPH 1.3

PARETO CHART : MAIN CAUSE OF BREACH IN MEDICATION SAFETY



As we can see the main type of breaches were missed doses, wrong time, wrong dose and some miscellaneous causes.

DISCUSSION

- In total 176 opportunities for errors or total administration were registered of which 83(47.2%) breach in the medication safety or errors were detected.
- More breaches were found in the economy ward as seen in table 1.6.
- And as per our pareto chart i.e. Graph 1.2 it was very clear that 80% of the effect were due to just 4 main causes –Missed dose, Wrong time, Wrong Dose and some miscellaneous causes.
- Positive correlation between the occurrence of an error and the variation in the doctor and nurse notes. As whenever there was a variation, in 93.9% of the cases an event did occurred as per table 1.3.
- Revised orders were not written by doctors.
- Nurses didn't write the actual time of administration.
- The MAR sheet just had the column for drug name.

- Patient assigned to the nurses and number of drug to be administered decreases the medication administration safety.
- High risk drug storage at nursing station was not in an entirely separate cupboard.
- Not reporting an error attitude of staff

CONCLUSION AND RECOMMENDATIONS

- Medication errors can be prevented by alterations in the system for ordering, dispensing and administration of drugs.
- Quality improvements are required in most of the stages of the medication process.
- Reluctance or unwillingness of the doctor, pharmacist or nurse to admit to a medication error.
- Important that an attitude of “no blame” is adopted in case of incident reporting
- Several of the identified errors and error types, could be avoided by automated solutions like computerized order entry, barcode medication administration and RFID

- Ensuring an accurate drug history is taken
- Printing the drug name and patient details clearly on the prescription
- Including all details of drug therapy i.e. name of drug, dose, directions, duration of therapy
- A zero should always precede expression of values <1 e.g. 0.1. Ten-fold errors in dose have occurred due to the use of a trailing zero.
- Avoiding the use of abbreviations e.g. AZT, ISMN, FeSO₄, U
- Being aware of sound-a-like and look-a-like products
- Ensuring a safe dispensing procedure from pharmacy by using separate bag dispensing

- Modified medication charts: **ADDITION OF SEPARATE COLUMNS FOR DOSE, ROUTE, TIME and SIGN**
- Focusing on the task in hand, keeping interruptions to a minimum
- Being aware of high risk drugs e.g. Potassium chloride, cytotoxic agents
- Introducing good housekeeping practices
- Checking patients identity
- Having dosage calculations checked independently by another healthcare professional before the drug is administered
- Involving patient in their medication administration
- Minimizing interruptions during drug rounds.

THANK YOU!!!