Summer Training at
Jehangir Hospital, Pune
(April 3 to June 2, 2017)

Study on Medication Safety at Jehangir Hospital, Pune

By
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Under the guidance of
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MBA Hospital & Health Management
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Institute of Health Management Research
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2017

INSTITUTE OF HEALTH
MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that **Ms Pramita Mahapatra** has undergone summer training in **Jehangir Hospital, Pune** from **3rd April to 2nd June 2017.**

The candidate herself completed the project assign to her during summer training. Her approach to the project was sincere and proactive. This summer training is in partial fulfillment of the course requirement recommended for the award of MBA in Hospital and Health Management.

I wish her success in all her future endeavors.

Col. (Dr.) Ashok Kaushik
Dean (Academic & Student Affair)
The IIHMR University, Jaipur

Dr. Anoop Khanna
Professor
The IIHMR University, Jaipur

CERTIFICATE

This is to certify that Ms. Pramita Mahapatra has successfully completed the project,

"A Study on Medication Safety"

at Jehangir hospital, Pune"

Between 3rd April to 2nd June, 2017

During the project, she has worked on gathering the required data, interpreting it and presenting her conclusions. She has satisfactorily completed the entire study.

We wish her all the best in her future endeavors.

Dr. Sujata Malik

Director-Medical Strategies & Development

DR. SUJATA MALIK
Director - Medical Strategy & Development

Mr. Akesh Agrey

Head- Human Resource Department

Dr. Shalaka Sawant
Head Quality & Sr. Manager BPR

Dr. Shalaka Sawant

Head – Quality Systems

Date: 02 June 2017

Place: Pune

JEHANGIR HOSPITAL

We Add Care

Ref: JH/HR/2017-18/446

Date: 02/06/2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Pramita Mahapatra has successfully completed her internship at Jehangir Hospital in the **Quality Department** as an intern from 03/04/2017 to 02/06/2017.

During the internship period she was found to be sincere, hardworking and dedicated.

We wish her all the very best for her future endeavor.

For Jehangir Hospital, Pune;

Akesh Agrey
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Acknowledgement

"An endeavor over a period can be successful only with the advice and support of well-wishers. I take this opportunity to express my gratitude and appreciation to all those who encouraged me to complete this project.

First of all, I express my sage sense of gratitude and indebtedness to our President, Dr. Vivek Bhandari, IIHMR University, Jaipur,

I would to like extend my sincere and heartfelt thanks to Dr. Sujata Malik, Director of Medical Strategies & Development, Jehangir Hospital Pune, for providing me an opportunity to learn and develop professionally.

I am extremely thankful and pay my gratitude to project mentor – Dr. Shalaka Sawant, Head Quality Department, Jehangir Hospital, Pune, for giving me her valuable time, Suggestions and support throughout the study, greatly eased my task of completing this project.

I would like to express my deep sense of gratitude to entire Quality Department, Jehangir Hospital for valuable time, suggestions, support and keen interest throughout the study that helped me in completing this project.

I would like to extend my deep gratitude for my Academic mentor Dr. Anoop Khanna, Professor, IIHMR University, Jaipur, Rajasthan. I am greatly indebted to him for providing his valuable guidance at all stages of the study, advice, constructive suggestions, positive and supportive attitude and continuous encouragement, without which it would not have been possible to complete this project.

I would like to present Sincere thanks to the respondents (nurses) and the other staff of Jehangir Hospital sparing their valuable time extends support and providing relevant information.

I hope that I can build upon the experience and knowledge that I have gained and make a valuable contribution towards the industry in coming future.

Pramita Mahapatra,
MBA HM 21,
IIHMR University, Jaipur

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Organizational Report

INTRODUCTION

Jehangir Hospital was founded in 1946. Since then, 70 years in the service of providing quality healthcare with commitment, Jehangir Hospital builds a trust and respect in the hearts and minds of the patients and relatives. It is an institution renowned for its medical excellence, the dedication of its consultants and the care and compassion of its staff. Jehangir Hospital began as Jehangir Nursing Home. The founders are Sir Cowasji Jehangir and Lady Hirabai Jehangir.

In 1998, 350 bed Jehangir Hospital tied up with the Apollo Hospitals Group to assist in managing and modernizing the hospital. The Jehangir Hospital- Apollo Hospitals Group synergy thus provides the best outcomes for the patient: superior technology and medical skill combined with quality patient care. Since 2002, Jehangir Hospital has gone from a 180 bed hospital to a 350 bed multispecialty tertiary care hospital.

Vision:-

"Our vision is to be the region's foremost healthcare provider with access to diverse clinical services focusing on consistency in deliver y of quality care and use of best technology."

Mission:-

"Our mission is to provide healthcare of international standards through a team of qualified professionals and at a cost affordable to the community. We are also committed to maintain clinical excellence by focusing on healthcare academics and use of latest technology."

Tag line:-

"WE ADD CARE". "PATIENT FIRST"

Facilities:-

Heart care	Dialectology	Nephrology
Orthopedic	Endocrinology	Obesity Surgery
Neurology & Neurosurgery	ENT	Oncology & Cancer Care
Critical Care	General Surgery	Ophthalmology
Obstetrics & Gynecology	Hematology	Oral Surgery
Kidney Transplant	Hand surgery	Pediatric Surgery
Colon & Rectal Surgery	Homeopathy	Pain Management
Anesthesiology	Investigation & Diagnostic Services	Physiotherapy
Acupressure	Laparoscopic Surgery	Plastic & Reconstruction Surgery
Cosmetic Surgery	Proctology	Rheumatology
Dentistry	Medical & Surgical Gastroenterology	Urology
Dermatology	Neonatology	Vascular Surgery
Pediatric Asthma & pulmonology		

Other than that, there are research & academics Centre in Jehangir Hospital. They are as following,

- Jehangir Clinical Development Centre(JCDC)
- Hirabai Cowasji Jehangir Medical Research Institute(HCJMRI)
- Academics, Diplomate of National Board (DNB) courses, other fellowship courses.

Department Visits:-

Cash Pharmacy:-

- There are 10 pharmacists, one in charge pharmacist, 2 housekeeping staffs in the department. They are working in 3 shifts, morning, afternoon, night & department opens 24 hours & 7 days.
- They only provide service to outpatient. Medicines are not dispensed without prescription.
- Everyday approximately 300 prescriptions are served & all works are e based.

Central Sterile Supply Department:-

- There are 2 technicians & one supervisor in the department. There are 2 Autoclave & Ethylene Tri Oxide (ETO) machines.
- They receive materials (scissors, forceps etc.) in a packed box from wards only. After that the technicians are entered the items code and ward name in a register. Then these boxes are labeled by a color sticker which is an indicator, the color is changed after autoclaving.
- After that the boxes are kept inside the autoclave machine. The whole process is taking almost 1 and half hour.
- The endotracheal tube, catheter etc. are first sealed then they are sterilized in ETO machine. It almost takes 6 hours.

Problems & Solution:

1) After sterilization the materials are kept beside the machine, as there is no sterile zone in the department. There must be a sterilization area or room for keeping those sterilized materials.
2) Proper ventilation is not there. The air conditioning machine is not working properly. So, that should be repaired or replaced immediately.

Outpatient Department:-

- The department includes Admissions, May I Help U, Registration, Call Centre & this department divided into Ground floor & Basement OPD.
- There are 4 front office staffs in registration, deals with billing & providing OPD case sheet. They provide a registration number, which is an identity of each patient.
- There are 2 staffs in Call Centre. Patient can book prior appointment from them for consultation.
- There are 2 in charge for outpatient department.
- Specialist doctors are there in outpatient department for consultation. 4 doctors are present at a time. Resident doctors are there for assisting.

Problems & Solution:-

1) Patient waiting time varies 15 minutes to more than 15 minutes. So, consultants need to be punctual.
2) There is a need for more front office staffs as there are long queue in front of the counter. They require more training for fast handling.
3) The waiting area is very noisy. So there must be other recreational kind of things in OPD.

Financial Counseling:-

- This department comes under Revenue department. There are 4 staffs in financial counseling.
- They estimate bills just one day after the admission by consulting the doctors. This is not a final bill. This bill is going to the responsible insurance company. There are codes for surgeries or any other treatment.
- This bill provides an idea of expenditure for hospital staying. This estimation is only for Inpatient. Without registration number of the patient the estimation is not prepared.

- Patient comes to this department. Then the counselor asks to responsible consultant for coding. Then the estimation is prepared.
- The estimation is based on some parameters like,
  - ✓ Professional charges
  - ✓ Hospital charges
  - ✓ Investigation
  - ✓ Pharmacy
  - ✓ Miscellaneous charges
- This department provides Total Approximate Expenses.

Problems & Solution:-

1) The staffs need to be more expert enough about the code of those treatments, which can reduce the patient waiting time.
2) They need to be more proficient about computer knowledge, for that they need in service training.

Operation Theatre:-

- The operation theatre is located in second floor. There are 2 in-charges, 5 technicians, 2 intern technicians, 4 housekeeping staffs, 15 nursing staffs, and 1 guest relation staff in operation theatre.
- This department includes changing room, pre- anesthetic counseling room, pre-operative room, pharmacy, post-operative recovery room & scrubbing area. There is separate operation theatre for separate departments like,
  - ✓ Orthopedic
  - ✓ Ophthalmology
  - ✓ Gynecology
  - ✓ Cardiac
  - ✓ Emergency
  - ✓ General Surgery
- There is separate operation theatre room for infected diseases.
- There is separate Central Sterile Supply Department in operation theatre. There are 2 autoclave machine and one manual autoclave machine.
- There are different apparatus in operation theatre like,
  - ✓ Operation theatre table with a surgical light with screens & monitors.
  - ✓ Operation theatre rooms are supplied with wall suction, oxygen & anesthetic gases.
  - ✓ There are centralized drainage and anesthetic apparatus.

- ✓ Sterile instruments to be used during surgery are arranged on a mayo table (manufactured for operation purpose).
- ✓ Pulse oximeter machine, automated blood pressure measuring machine & heart lung machine are there.

Problems & Solution:-

1) Shifting of patient from ward to operation theatre takes almost 2 to 3 hours. So the surgery delays. That needs to be corrected.

Magnetic Resonance Imaging:-

- The department is headed by a radiologist; there are 7 radiologists, one technician, one front office staff & one nurse in the department. The Magnetic Resonance Imaging is 1.5 tesla
- The department consists of one registration desk, console room, doctor chambers, changing room, wash room & gantry.
- First the patient comes to registration desk for billing in case of outpatient, for inpatient the billing is done after discharge. Then the patient asks to sign in a consent form.
- Then the technician takes a detail history, contrast is administered if required. Height, weight is taken before this procedure.

Physiotherapy:-

- There are total 7 physiotherapist & 2 housekeeping staff in this department. The department is headed by medical superintendent. There are 3 shifts like 8 am to 4.30 pm, 9 am to 5.30 pm, and 10.30 am to 7 pm.
- Approximately every day there are 10 patients in outpatient, 40 in wards & 20 patients in intensive care unit requires physiotherapy.
- The modalities are like,
  - ✓ Interferential therapy
  - ✓ Ultrasound therapy
  - ✓ Transcutaneous electric nerve stimulation
  - ✓ Traction
  - ✓ Paraffin wax bath
  - ✓ Mat, ball
- Patient can come as self or referred in outpatient, and then physiotherapy department writes code of treatment for billing purpose. After billing the treatment starts.
- In inpatient, the department receives a verbal order from nurses as written in file. Then it is entered into the system with code. Then the physiotherapist starts the treatment.

Problem & Solution:-

- They need more staff to serve the inpatient.
- Due to unavailability of Interferential therapy they were providing alternative treatment to the patient. So, biomedical department needs to be more efficient to solve the problem.

Executive Summary

The Project assigned was "A Study on Medication Safety" with primary objectives being:

- To identify the factors affecting medication safety
- To investigate major components resulting in Medication Error in all age groups and all stages from prescribing with reconciliation, transcribing, dispensing, administration of drugs.
- To understand major factors causing adverse drug reactions
- To bring in interventions to curtail down the errors and improve safety

The project was carried out in 3 stages,

- First stage was to carry out the Prescription (in-patient medication chart) Audit to understand the factors contributing the Medication Errors.
- Second stage was to carry out the Nurses Interview to understand the knowledge level & awareness regarding Medication Errors.
- Final stage was to move ahead with data analysis and conclusion.

The following results were obtained after the completion of the entire project:

- From prescription audit the findings are as follows,
  - ✓ Out of total 251 prescriptions, 95% of prescriptions were mentioned with allergy status followed by 9% prescriptions were mentioned with unapproved abbreviations. Also, 59% prescriptions are legible due to readable hand writing.
- From Nurses interview(Total 15 questions) the findings are as follows,
  - ✓ Out of total 100 nurses, 66 nurses are scored between 60% - 80% correct responses regarding medication safety.

Introduction on Medication Safety:

Medicines can help us to stay healthy, cure some diseases, relieve symptoms of disease & improve quality of life. But, like any form of treatment, medicines are not without risks & things may not always turn out as expected. All medicines have the potential for side effects. As well, despite the commitment & best planning of the people involved, mistakes sometimes happen. There are steps in medication processes include evidence based decision making, partnerships & communication with patients, multi-disciplinary teamwork. The steps are prescribing, transcribing, dispensing, administration & monitoring of patients.

Definitions:

Therapeutic Duplication:-

Therapeutic duplication is the practice of prescribing multiple medications for the same indication without a clear distinction of when one agent should be administered over another.

Near Miss:-

A near- miss is an unplanned event that did not result in injury, illness, or damage but had the potential to do so. Errors that did not result in patient harm, but could have, can be categorized as near misses.

Medication Error:-

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 health care professional, patient, or consumer.

Adverse drug reaction (ADR):-

A response to a drug which is noxious & unintended & which occurs at doses normally used in man for prophylaxis, diagnosis or therapy of disease or for the modification of physiologic function

Therefore ADR= adverse event with a causal link to a drug.

Drug-Drug Interaction:-

Drug-drug interaction can be described as a change in a drug's effect on the body when the drug is taken together with the second drug. A drug-drug interaction can delay, decrease or enhance absorption of either drug. This can decrease or increase action of either or both drugs or cause adverse effects.

Drug-Food Interaction: -

Drug-food interaction can be described as a reaction occurs when the food you eat affects the ingredients in a medicine you are taking so the medicine cannot work the way it should. Drug-food interactions can happen with both prescription and over-the-counter medicines, including antacids, vitamins and iron pills.

High Alert Medications:-

Joint Commission on Accreditation of Healthcare Organizations (JCAHO) defines high alert medications as 'medications involved in a high percentage of medication errors or sentinel events & medications that carry a high risk for abuse, error, or other adverse outcomes'.

Look Alike Sound Alike Drugs:-

Drugs name that look similar in print or sound similar to other drugs when pronounced is known as "lookalike sound-alike drugs". Such agents carry a significant risk of being administered improperly to the patients, esp. when exchanged for one another.

Independent double check system:-

Independent double check means a second independent check confirming the medication correctly & reflects the original prescribed medication order.

Hospital Formulary:-

A continually revised compilation of approved pharmaceuticals, plus important ancillary information, which reflects the current clinical judgment of the institution's medical staff

Aim

To study the Patient safety around medication management and propose strategies to prevent such harms

Objective

- To identify the factors affecting medication safety
- To investigate major components resulting in Medication Error in all age groups and all stages from prescribing with reconciliation, transcribing, dispensing, administration of drugs.
- To understand major factors causing adverse drug reactions.
- To bring in interventions to curtail down the errors and improve safety.

Duration of Study

The data collection and interviews and analysis along with the implementation of intervention have been done over the period of two months (3rd April 2017 to 2nd June 2017).

Methodology:

Study Design: Concurrent study

Sampling Design:

Sampling technique: Probability cluster sampling (Two cluster samples were considered (Experience of nurses)

Sample Population: Nurses with 6 months to 5 years & more than 5 years of experience

Prescription (inpatient medication chart)

Sample Size:

- 100 nurses - 100 nursing interview (experience 6 months to 5 years & more than 5 years).
- 251 prescription auditing (data collected from inpatient medication chart).

Data Analysis Plan:

- Basic excel software is used for data analysis.

Study Variables:

1. Possible Reasons Behind Medication Error & Practices in Jehangir Hospital:

POSSIBLE REASONS BEHIND MEDICATION ERROR	PRACTICES IN JEHANGIR HOSPITAL
Oral prescription, poor, often unreadable writing, inadequate information about clinical characteristics & previous treatment of individual.	Unreadable hand writing
Inadequate communication among health professional	Not found
Choice of wrong drug, dose, route, frequency & duration	Not found
Inadequate reconciliation with handoffs during admission, transfer, discharges of patients & history, drug allergy not known	In some prescription allergy status was not mentioned.
Lost prescription	Not found
Ambiguous or incomplete orders in prescription	In some prescriptions dose, route, duration were missing.
Errors due to wrong data entry	Not found
Inappropriate documentation	Not found
Using of unapproved abbreviation	In some prescription unapproved abbreviation was used.
Improper communication between patient & pharmacist	Not found
Incompetent to screen for drug interaction & contraindication	Not found
Miscalculation of dose, dispensing incorrect medication	Not found
Interruption during dispensing of Look Alike Sound Alike (LASA) drugs.	Not found
Labeling & packaging mix-ups	Not found
Poor inventory control Name of the drug, dose, route of administration, frequency (or rate), reason or conditions under which the drug should be administered, patient's weight and age (if	Not found Drug dose, route, prescriber's signature were missing in some prescription.

relevant to dosage),The prescriber's signature and identification number should be included in the prescription, absent of these things leads to error in administration.	
The misuse of leading decimals & trailing zero can be dangerous in calculating dose, specifically in high alert medication	Not found
Lack of double checks	Not found
Verbal medication order	No errors found due to verbal medication order
Workload pressure does not permit counseling.	Not found
Lack of patient education materials	Not found
Lack of follow up	Not found
Inadequate monitoring system	Not found

2. Awareness Among Nurses:

- To see the awareness & knowledge level of nurses regarding medication safety I did a study, where 100 nurses were taken as sample in the basis of their experience. I had been taken nurses with 6 months to 5 years & more than 5 years of experience, where only 3 nurses were more than 5 years (average 8 to 10 years), and other 97 nurses were 6 months to 5 years.

- Interview sessions were conducted with the nurses. The questionnaire contained 15 questions with a time limit of 1 minute per question. The questions were multiple choices that had 4 options. The questionnaire has been attached in the annexure. The answers are filled in excel spreadsheet & analyzed after that. The result of nurses' response with interpretation is as following.

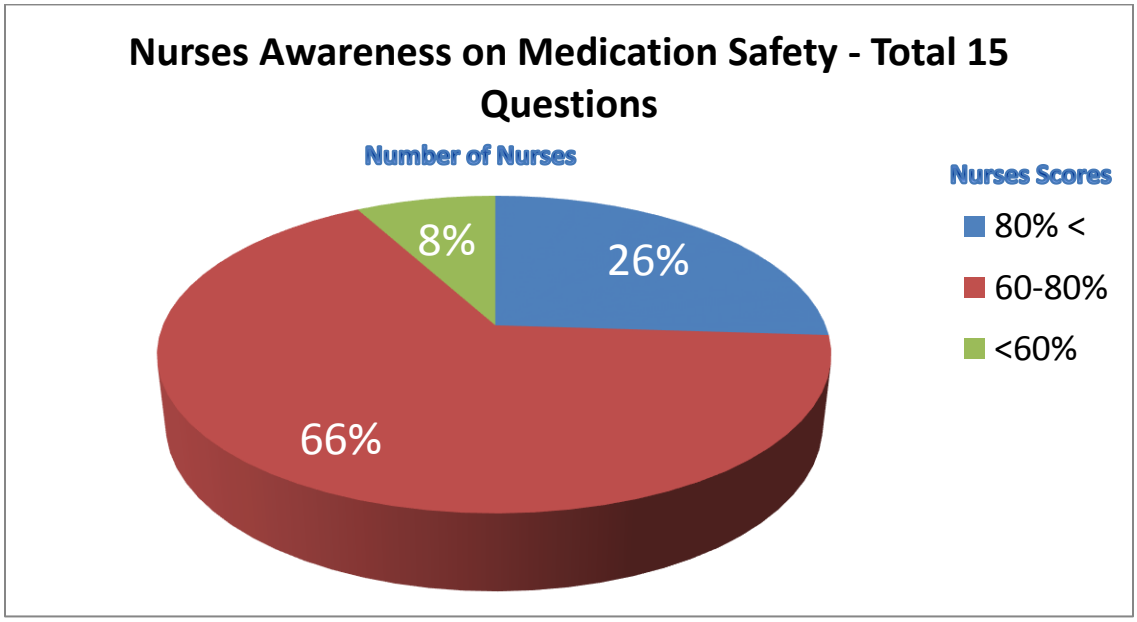

Figure 1: Nurses' awareness on Medication Safety - Total 15 Questions

Above figure indicates nurse's response regarding medication safety questionnaire, out of total 100 nurses 8 nurses (8% Nurses) had given below 60% correct responses, followed by 66 nurses (66% Nurses) had given between 60-80% responses. 26 nurses (26% Nurses) had given response above 80% correct responses.

3. Medication Practices Of Resident Doctors:

- To know the trend of medication practice of resident doctors in Jehangir Hospital, I have done inpatient medication chart auditing. The auditing is based on some parameters like drug name, dose, route, frequency, legibility & unapproved abbreviation were mentioned or not. The findings of prescription audits are as following.

    a. Prescription Audit Analysis (Drug name, dose, frequency, drug administration route, and duration (Mentioned vs. Non-mentioned):

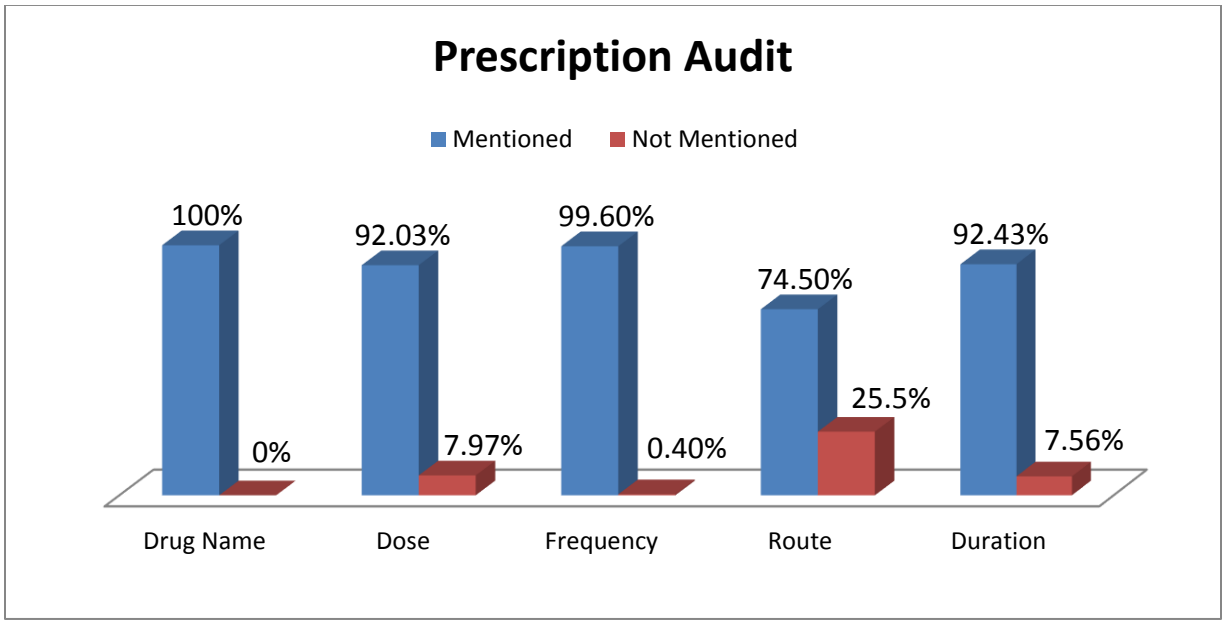

Figure 2: Indicates number of prescriptions with drug name, dose, frequency, drug administration route, and duration (Mentioned vs. Non-mentioned)

Above figures indicates number of prescriptions with drug name, dose, frequency, drug administration route, and duration. Among all the prescriptions, 251 Prescriptions are mentioned with drug name, followed by 231 prescriptions mentioned with proper dose and 20 prescriptions are having one or two dose missing.

Furthermore, 250 prescriptions are mentioned with frequency and only one prescription is having frequency not mentioned. 187 prescriptions are mentioned with drug administration route and 64 prescriptions are not mentioned with drug administration route. Also, 232 prescriptions are mentioned with duration for medication to be continued.

b. Prescription Audit Analysis (Unapproved Abbreviation)

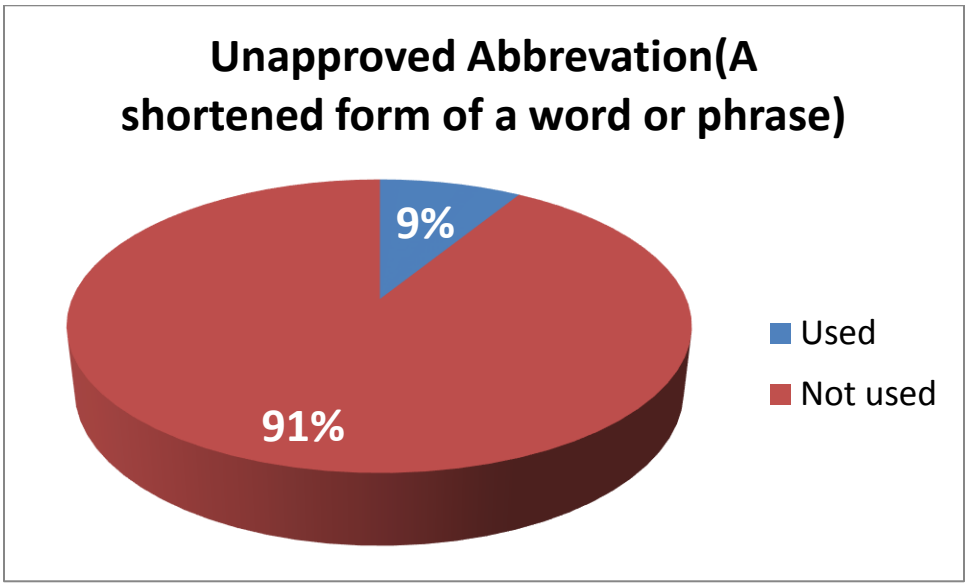

Figure 3: Indicates number of prescription audit with unapproved abbreviations (Used vs. not used)

Above figure shows the usage of unapproved abbreviations by the resident doctors in medication chart. 91% doctors are not using any unapproved abbreviations, followed by 9% doctors which are using unapproved abbreviations.

c. Prescription Audit Analysis (Legibility criteria)

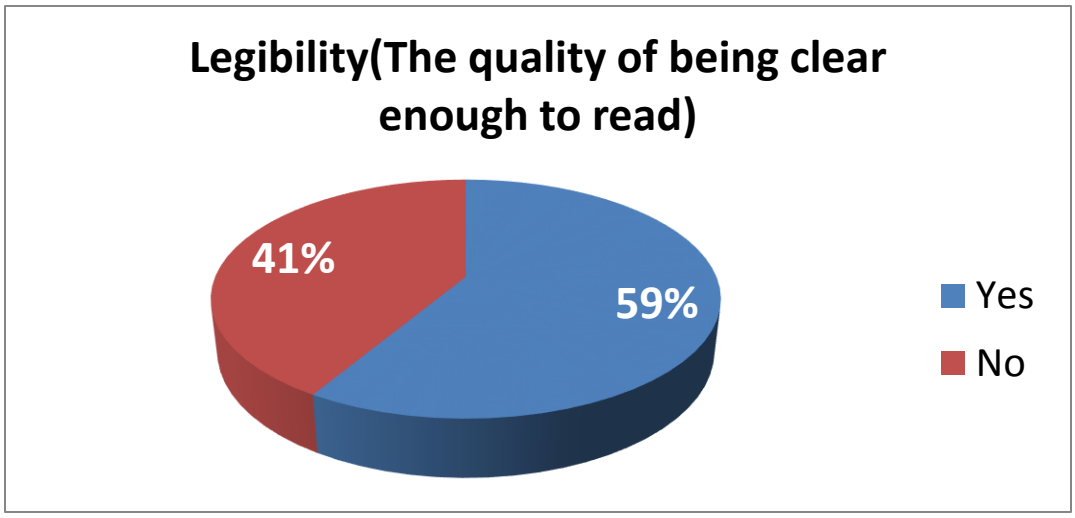

Figure 4: Indicates number of prescriptions with legibility criteria for readable writing and letters in capitals

Above figure indicates that 59% resident doctors' handwriting is legible, followed by 41% doctors' handwriting is neither readable nor written in capitals.

d. Prescription Audit Analysis (Doctor's signature)

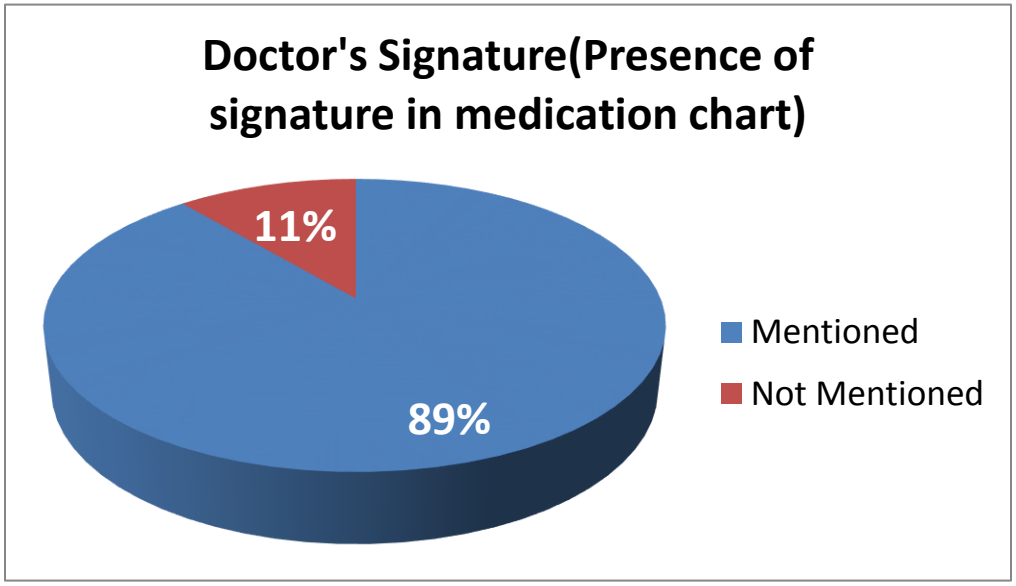

Figure 5: Indicates numbers of prescriptions with resident doctors' signature (Mentioned vs. Non-mentioned)

Above figure gives a description about presence of doctor's signature in medication chart or prescription. 89% prescriptions are properly signed but 11% are left without the signature.

4. Factors during Prescription & Administration Contributing To Adverse Drug Reaction:

- Allergic reactions represent one third of adverse drug reaction. Adverse drug reactions are any reactions that result from the use of a certain medication. Allergic reaction can be a cause which may lead to morbidity & mortality.
- Adverse Drug Reaction, a response to a drug which is noxious & unintended & which occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of disease or for the modification of physiologic function, so if a high alert medication is prescribing without knowing the allergic status it may lead to Adverse Drug Reaction.
- So it is very important to ask about allergic status of a patient during history taking & mentioning it in the medication chart. This factor is necessary to screen medication safety process. So, following results comprise of allergy status mentioned in prescriptions (medication chart).

a. Prescription Audit Analysis (Allergy status)

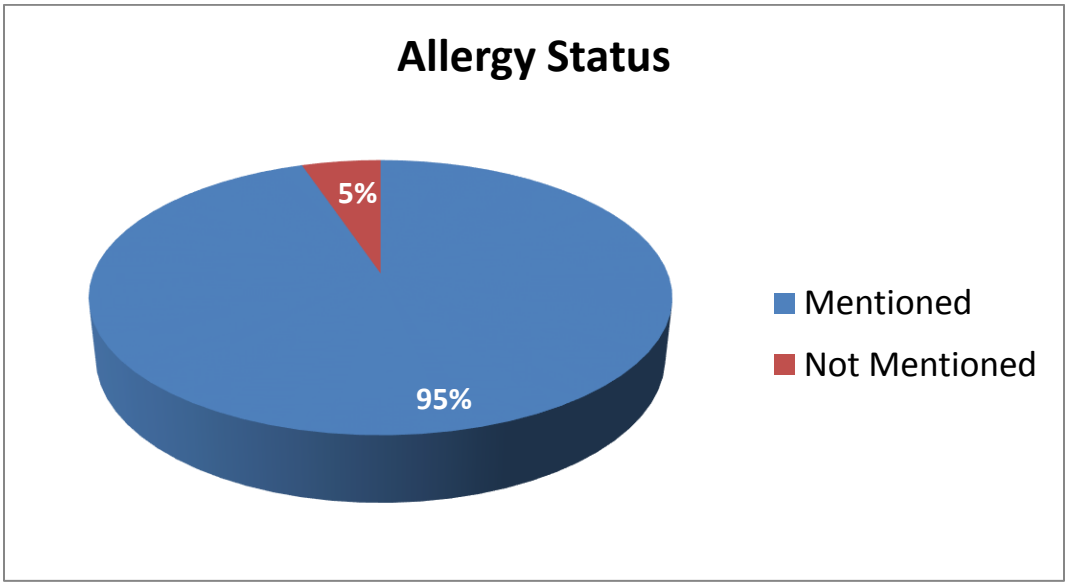

Figure 6: Indicates number of prescription with allergy status (Mentioned vs. Non-mentioned)

Above figure explains about that, 95% resident doctors are mentioning the allergic status of a patient, but 5% are not doing it. So, it may lead to adverse drug reaction.

Outcome variables & Conclusion:

1. Patient safety:

Prescription of Medications:-

- Prescriptions of medicines are written in Medication chart (indoor patient) & Prescription slip (outpatient) only by the doctor prescribing it.
- Minimum qualification of MBBS (bachelor in medicine bachelor in surgery) is mandatory for writing prescription.
- As per policy, Consultants are supposed to write the medication order or prescription in legible hand writing , in Block Letters & there should not be any unapproved abbreviations, but 41% doctor's hand writing was neither legible nor in Block Letters & 9% doctors use unapproved abbreviations are giving us scope for improvement.
- As per Jehangir Hospital's policy Consultants need to specify all information necessary for properly dispensing the medicines in prescription slip including,

  - ✓ Name, age, sex & the registration number of the patient.
  - ✓ Name of the drug, drug strength & quantity, route.
  - ✓ Time & frequency.
  - ✓ Duration of continuation of medication.
  - ✓ Full instruction for administration of drug.
  - ✓ Date (day, month, and year).
  - ✓ Name, signature & registration number of the prescriber with date & time.

It was seen in the study, in 20 prescriptions few drugs were without dose, in 1 of the prescription the frequency of drugs was not mentioned, the route of medication was missing in 64 prescriptions, duration was not mentioned in 19 prescriptions & 11% doctors were not signed in medication chart. The prescription error rates observed are low yet need further improvement. It was seen during the study that the joining of new Doctors generally leads to raise in the trend till the time they get inducted with the prevailing policies and protocols.

- Dosage appropriate for age & weight (for patients with pediatric age group & chemotherapy.
- Medication order contains following,

  - ✓ Name of the drug & dose
  - ✓ Route
  - ✓ Time & frequency
  - ✓ Full instructions for administration of drugs
  - ✓ Name & signature of the prescribing doctor with date & time.
  - ✓ Dosage appropriate for age & weight (for patients in pediatric age group & chemotherapy).

- Only standardized list of approved abbreviations for medications are supposed to be used.

- When signing orders that have been written into patient's medical record, physician confirms that what they are signing is exactly what they ordered.
- Verbal orders are counter signed by the doctor who ordered it within 24 hours of ordering.

Conclusion & Suggestions: It was studied that the Prescription policy is adhered to by all the residents & consultants barring a few exceptions as mentioned above. Continuous reinforcement of trainings shall make them aware of the commonly happening errors and scope for improvements.

Transcription of Medication:

Transcription is carried out by the Nurse from the Medication Chart to the HMIS (Hospital Management of Information System). There have been no transcription errors encountered during the survey, however, the system can be further improvised / modernized on following suggestions:

- Using of CPOE (computerized physician order entry) is partially being done yet it can be further improved by ruling out handwritten Medication Charts and allowing direct feeding of drugs in to the patient folio available online, this is possible after computer on wheels are made available.
- Bar code technology can be used to further strengthen the system.
- Automated pharmacy carousel system, consisting of bar-coded medication bins, a bar-code scanner, a label printer, and software that allowed the carousel system to interface with the hospital's pharmacy information systems is used.
- Implementation of bed side entry of drugs can reduce transcription errors.

Safe Dispensing of Medicines:-

- Medicines are dispensed to the wards or patient care units only after online (in situations of system failure) indent is sent to inpatient pharmacy.
- Indent is sent by the respective nurse as per the prescription written by the treating doctor in patient's medication chart.
- A pharmacist reviews the complete order which includes name, dosage, route of administration & strength.
- The order is screened for clarity & appropriateness, dose, therapeutic duplications, drug-drug interactions, allergies & formulary status.
- Drug near to expiry dates is taken out before 3 month & stored separately with proper labeling (expiry medicines/ not for sale).
- All medications dispensed in wards/ patient care units are recalled as & when required according to SOP (standard operating procedure) for recall of medications.

Conclusion & Suggestions: - There are no such errors found. Putting bar code system may improve this system & conducting seminars for pharmacist on dispensing strengthens this system further more.

Administration of Medications:-

- Following staffs are authorized for administer medication,

  - ✓ Registered nurse
  - ✓ Registered medical practitioner with minimum qualification of MBBS.
  - ✓ Medical interns may administer medications under supervision of a licensed physician.
  - ✓ Other staff, Medications may be administered only by following persons authorized by their respective licensing agency & approved departmental policy,

    - ➢ Pharmacist
    - ➢ Physiotherapist
    - ➢ Radiology technician
    - ➢ Electroencephalography Technicians
    - ➢ Pulmonary function test Technicians

- Before administering a medication staff is,

  - ✓ Identify correct patient, registration number & full name.
  - ✓ Checking for the five rights

    - ➢ Right patient
    - ➢ Right drug
    - ➢ Right dose
    - ➢ Right route
    - ➢ Right time

- The list of approved abbreviations in Jehangir hospitals are,

  - ✓ OD :- every 24 hours
  - ✓ BID :- every 12 hours
  - ✓ TID :-every 8 hours
  - ✓ QID :-every 6 hours
  - ✓ HS :- night time
  - ✓ Stat :-Immediately
  - ✓ SOS :-As & when required

- Medication selected is the correct one based on the medication order & product level.
- Medication has not expired.
- No particulate matter & discoloration is present.
- There is no contraindication.

- Educate the patient, or if appropriate, the patient's family about any potential significant adverse reaction & other concerns about administering a new medication.
- Any time one or more medications are prepared but are not administered immediately, the medication container is appropriately labeled.
- The medication container can be any storage device such as, syringe, bottle, or box which can be labeled & secured in such a way that it can be readily determined that the contents are intact & have not expired.
- All intravenous infusions are labeled before administration. The label contains, name & strength of the medication, date & time, initials of the person preparing the label & administrating the medication & name of the patient.
- The staff administrating medication documents the same in patient's medical record including, date & time of administration, specific brand of medication, dose, route of administration of the actual medication given, start time, rate of infusion & end of infusion & the type of fluid given, signature & NR(nursing registration) number.
- Patients are not allowed for self- administration of their medications during their hospital stay.
- Out- side medications are prohibited only permitted after authorization by Medical Director/Medical Superintendent/Night Manager in duty.
- Informed written consent is obtained from the patient or attendant or relative for the same.

Conclusion & Suggestions: - 1 administration error found, which is very negligible then it was informed to respective head of the departments. Quality department & respective department analyzed the root cause. After that corrective & preventive actions were taken. In service training for nurses can reduce this kind of errors.

Monitoring of Patients:-

- After administration of medicine, patient is monitored by Nurses for any symptoms & signs for allergy, breathing difficulty, giddiness, light headedness, drowsiness, sinking sensation, nausea, vomiting, diarrhea, shivering, cold sweats, hot flushes & any other abnormal feeling. But as per my study the allergy status was missing in 5% of prescriptions.
- Symptoms are recorded & concerned doctor is informed in case any abnormal symptoms as stated above.
- Adverse drug reaction form is filled up & sent to quality department in case the patient develops any adverse drug reaction.
- Medications can be altered or dose verified after the orders of consultant or doctor.
- Patient is monitored closely for the relevant vitals depending on the type of high alert medications administered.

Storage of Medications:-

- Pharmacy department is responsible for storage of medications as per hospital policies & procedures.
- The nursing director is responsible for ensure support & assistance in the execution of the strategies outlined in the document & in its application to the performance of employees under her direction.
- Medications are stored in specialized compartments in drawers when not in use & accessible only to authorized personnel.
- The proper environmental control (proper temperature, light, humidity, ventilation, conditions of sanitation) is maintained in all storage areas within the hospitals.
- Medications are stored in orderly manner to prevent crowding using FEFO (first expiry first out).
- Look alike sound alike (LASA) drugs are stored separately in all pharmacy stores.
- High alert medications are stored separately from regular stock under lock & key.
- Narcotic drugs are stored separately with double lock system in cash pharmacy only.
- Labeling of all medication should be done.
- All emergency crash cart contains approved medication stored as per the standardized list.
- All emergency crash cart is kept near the nursing stations in accessible position.
- Emergency check for emergency crash cart medicines are done monthly & documented in register with signature.

Conclusion & Suggestions:-

Nurses are aware of practice of first expiry first out but not able to explain it correctly. Trainings can be reinforced periodically.

LASA practices are not being uniformly followed as it was seen that certain LASA drugs which were identified with the colour coded sticker they were not stored away from each other and were found next to each other. They should be kept in diagonal to each other to prevent errors.

Reporting of Medication Errors & Adverse Drug Reaction:-

- Jehangir Hospital encourages the reporting of adverse drug event, medication errors & adverse drug reaction as a means to assess & improve the medication use process & provide a safe environment for patient care.
- There is no any punitive action for reporting of medication error or adverse drug reaction.
- Medication errors & adverse drug reaction is reported by physicians, nurses, pharmacists & any member of staff within 24 hours of incident.
- Any adverse drug event that results in temporary & permanent harm, or that requires additional monitoring or treatment to prevent harm, must be communicated to the treating consultant immediately.

- Medication errors are compiled by pharmacy department & database shall be maintained & finding out the root cause of error.
- All medication errors are analyzed by Pharmacy & Therapeutic Committee.
- Any nursing staffs who witness a suspected adverse drug reaction notify the resident doctor.
- Resident doctor informs to the treating consultant about the reaction. The consultant takes a decision regarding the dose reduction or stoppage of medicines.
- Attending doctor or staff nurse reports adverse drug reaction with reporting form immediately after reaction has occurred.
- The above mentioned form is sent to Quality Department. The clinical pharmacist is also informed about the same.
- Quality department forwards the form to the Director Medical Services who decides who can take action for the same. Once an action taken report is filled & received in QSO (Quality service organization), QSO retains a copy of the form & submits the original to clinical pharmacist.
- Meanwhile, clinical pharmacist is discussing with the treating consultant about Adverse Drug Reaction & then decides about the recall or stoppage of the drug use in hospital depending upon the severity of reaction & occurrence of Adverse Drug Reaction in multiple patients.
- Decision of recall of drugs is taken in consultation with chief pharmacist, Medical Superintendent by clinical pharmacist. Pharmacy & Therapeutic Committee reviews all Adverse Drug Reaction quarterly.

Verbal Orders:-

- Consultant's verbal & telephonic orders are utilized only in situations where the ordering doctor is not available to write the order & delay will result in compromise in patient care.
- Consultant's verbal & telephonic orders are only be accepted by following healthcare professionals. Orders are appropriate & within the professional's scope of practice,
    - Ward medical officers
    - Registered nurses
- Verbal orders for high alert medication & Narcotic & Psychotropic substances are not accepted as Jehangir Hospital's Policy.
- The verbal or phone order is documented by the professionals who accepts the order & shall include :
    - Name of the patient
    - Date
    - Time

- The individual accepting the verbal order must record & then read back the order in it's entirely to the prescribing physician at the time the order is taken , documenting that the order was" read back".
- Verbal & telephone orders are signed or initiated by the prescribing consultant as soon as possible, but not later than 24 hours after being given.

High Alert Medication:-

- Jehangir hospital identifies the following high alert medication,

  - ✓ Concentrated electrolytes
  - ✓ Hypertonic solutions
  - ✓ Insulin
  - ✓ Intravenous & oral anticoagulants
  - ✓ Injectable Anesthetic Agents
  - ✓ Injectable Muscle Relaxants
  - ✓ Injectable Sedatives
  - ✓ Intravenous opioid Analgesics
  - ✓ Parenteral Chemotherapeutic Agents

- No verbal orders are accepted for High Alert Medication.
- The primary consultant or resident doctor explains about the high risk medication & their possible adverse effect, side effects, drug interaction to the patient & attendant.
- All storage locations of high alert medications are clearly labeled & separated from regular stock & kept under lock & key.
- All high alert medications are verified before dispensing & stamped as "Verified" by the dispensing pharmacist.
- High alert intravenous infusions are clearly labeled as such using a font readily distinguishable from the rest of the label.
- All high alert medications are administered only after written prescription/order of the prescriber.
- Two registered nurses perform independent double check of high alert medication before administering. A second nurse performs & documents a check by initiating the "double check" of that item prior to medication administration.
- Any time a patient is transferred between units, the nurse transferring the patient & the nurse accepting the patient is encouraged to check continuous intravenous infusion of all high alert medication at bedside.

Usage of Narcotic drugs & Psychotropic substances:-

- The hospital has a valid license under Maharashtra Narcotic drugs & Psychotropic Substances Rules – 1985.
- The pharmacy in charge ensures timely renewal of this license. The said license is always being kept update & will be framed & put up in cash pharmacy.

- The items are procured only from authorized dealers licensed under Maharashtra Narcotic Drugs & Psychotropic Substances Rules 1985 or corresponding rules in any part of India, or in accordance with the same.
- The drugs can only be prescribed by an authorized registered medical practitioner.
- These drugs are stored only in cash pharmacy under double lock.
- Quantity of drugs procured is as per the amount allowed by licensing authority.
- It is not permitted to hold any stock of these drugs in wards / ICU, or any other place in the hospital, except cash pharmacy.
- A written handling – taking over of the drugs are done by pharmacists on duty, in each shift.
- Senior pharmacist on duty in cash pharmacy is responsible for maintenance of records of narcotics usage in that shift.
- The drugs are always being kept under lock & key & will be opened only at the time of dispensing.
- Prescription from wards/ICUs (intensive care units) is for a specific patent for one day only.
- The prescription is mention with date, time, signature, registration number, qualification, name of the prescribing doctor & the name of patient, dose, route of administration & frequency of administration of drug, is also be mentioned on the prescription.
- The prescription is given in triplicate. Two copies of prescription are retained with the pharmacy & one is kept with the patient –for outpatients, or in patient's medical records, for inpatients.
- Issue of medication for in- patients is only being for a particular patient for one day, as per dose mentioned in the prescription.
- The senior staff nurse in the ward ensures that the drug is immediately administered to the patient as per prescribed dose, the remaining dose for the day, if any, is kept under lock, with keys being kept in the custody of the senior nurse on duty.
- For issuing of drugs under Narcotic Drugs & Psychotropic Substances Act, to outpatients – example Morphine Tablets, patient needs a new prescription every time he comes to purchase the drugs from pharmacy. No issue is done on earlier prescription.
- A Stamp is affixed on the patient's copy of prescription, by the pharmacist, stating his name, address of pharmacy & date of dispensing with signature on the stamp.
- Clear labeling is done on packet of issued drugs, stating name of patients, Registration no, & IP. No (in case of in- patients) quantity of drug, dose, number of units- example ampoules, tablets etc. Name & signature of issuing pharmacist is also be affixed on the label, along with date & time of issue.
- Pharmacy keeps a register to maintain complete records of patients to whom drugs have been issued, Full name & addresses of registered medical practitioners prescribing the drug is mentioned.
- The register has true account of kind & quantity of drugs dispensed, & balance stock.
- All prescriptions are produced to licensing authority, along with licensed & existing stock for inspection, when the same is demanded.
- No nurse is permitted to write or indent for narcotic drugs.

- The drug is only being issued on doctor's prescription in the specified format.
- No doctor can prescribe these drugs for himself / herself.
- A registered dentist can prescribe only for dental treatment & shall mention on prescription-"For local dental treatment only".
- Disposal of Narcotics & Psychotropic substances is done with signature of two staff nurses & same is documented in the Disposal Register.

For Chemotherapy Drugs:-

- Chemotherapy is prescribed by Medical Oncologist & other consultants who have been credentialed & privileged by the hospital.
- The chemotherapy drugs are prepared & administered only in day care center & inpatient wards.
- The staff of day care center is periodically trained on preparation, administration, handling & safe disposal of chemotherapeutic agents.
- Patients on chemotherapy are under continuous monitoring & any sign of reaction is responded with high priority.
- Informed consent for Parenteral Chemotherapy is obtained for each cycle of chemotherapy.
- Chemotherapy is administered in the day care center or in the inpatient wards unless patient requires critical care.
- Only trained Nurse administers parenteral chemotherapy.
- Administration of non-systemic chemotherapy Intrathecally, intravesically, or directly into an organ is done in operating room by a qualified physician.
- Chemotherapy orders must be signed & dated by the consultant. Orders must contain following,

    - ✓ Patient name
    - ✓ Diagnosis
    - ✓ Height
    - ✓ Weight
    - ✓ Body surface area
    - ✓ Allergies
    - ✓ Drug name
    - ✓ Dose in mg/kg
    - ✓ Dose to be given
    - ✓ Route
    - ✓ Rate of infusion
    - ✓ Frequency
    - ✓ Day of treatments

- If there is any change in dose of chemotherapy agent is required, new chemotherapy orders are written.

- The drug name is written in "BLOCK" letters & in full & no abbreviations are allowed.
- Verbal or phone orders for chemotherapy is be accepted.
- All cytotoxic drugs are disposed as per protocol outlines for biomedical waste management rules.

2. Training needs for Nurses and Doctors :

- In order to improve the knowledge as well as awareness about medication safety in nurses following activities can be undertaken.
  - In service training
  - Interactive sessions
  - Holding symposium
  - Quiz program
- Continue Medical education(CME) can be undertaken for resident doctors
- The medication week was celebrated in Jehangir Hospital on 21st April,2017 in which different activities were conducted which includes as follows,
  - Poster competition by resident doctors
  - CME on prescription reconciliation, how to write prescription (drug name, dose, frequency, route, legibility, allergic status, abbreviations & signature) medication errors in pediatric age group.
  - A group of consultants were participated in that CME. The CME was majorly focusing upon medical reconciliation & prescription writing. Director of Medical Services & Medical Superintendent of Jehangir Hospital, were the judges for poster presentation.
  - The winners of the poster presentation were awarded with trophies which act as a motivation factor for the resident doctors.

3. Education needs for patients:

- Speak up campaigning was conducted to create awareness among patients
- Pamphlets were distributed to every indoor patient & their relatives regarding medication safety, patient rights to information and general information
- Detailed information was provided about the pamphlet to the patients.

Figure 7: Figure represents medication safety pamphlet - Presented at speak up education campaign for patients at Jehangir hospital, Pune

Annexure:

Questionnaire for nurse's interview

1. What are the five (5) traditional basic rights of medication administration?

a. Patient, Medication, Dose, Time, Process

b. Medication, Dose, Patient, Purpose, Time

c. Dose, Medication, Time, Route, Patient

d. Patient, Documentation, Dose, Time, Medication

2. What is the best method to make sure a patient has swallowed his or her prescribed PO medication?

a. Ask them to open their mouth and stick out their tongue

b. Watch them swallow and have them talk immediately afterwards

c. Look for an empty medication cup next to the patient

d. None of the above

3. You have been instructed to administer an oral medication (Ranitidine 150mg) to a patient. What is the minimum of times the nurse should check the medication label before administering this drug.

a. 1 time
b. 2 times
c. 3 times
d. 4 times

4. All of the following are required sources to confirm the patient's identity before administering medication EXCEPT

a. Patient's Identification band

b. Patient's room/bed number

c. Ask the patient

d. Patient's chart

5. A drug that causes urination is called:

a. Diuretic
b. Emetic
c. Cirrhotic
d. Escule

6. Acetyl cysteine is the antidote for which overdose?

a. Aspirin

b. Acetaminophen

c. Opiate

d. Benzodiazepine

7. When giving an IV push medication, when do you flush with normal saline?

a. Before you give medication

b. No reason to flush

c. Both A and D

d. After you give the medication

8. A drug that reduces anxiety is called

a. Sedatives
b. Tranquilizer
c. Vaccine
d. Ointment

9. Nitroglycerine is used for:

a. Narcotic overdose
b. Inflammatory conditions
c. Treatment of angina pectoris
d. Anti-anxiety muscle relaxant treatment

10. Hydrocortisone is a drug used to suppress:

a. Inflammation
b. Appetite
c. Erythema
d. Excretion of urine

11. Oxygen is ordered as percentage of oxygen concentration and its rate of delivery is written as:

a. Liters per minutes
b. Volume per minutes
c. Degrees per minute
d. Percentage per minute

12. An inactive substance substituted in place of the actual drug to satisfy the patient is called:

a. Sedative
b. Stimulant
c. Placebo
d. Antiseptic

13. The physician has ordered 500mg of a medication the amount on hand is 250mg per tablet. How many tablets will be given?

a. 0.5 tab
b. 1 tab
c. 2 tab
d. 2.5 tab

14. The physician has ordered 0.2 gm. of a medication. The amount on hand is 400mg tabs. How many tablets will be given to the patient?

a. 0.5 tab
b. 1 tab
c. 2 tab
d. 2.5 tab

15. The physician has ordered 50mg of Demerol be given to a patient. The amount of hand is 100mg/ml. How many cc's of Demerol will be injected?

a. 0.5 cc
b. 1cc
c. 1.5 cc
d. 0.25cc

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