Summer Training at
Fortis Flt. Lt. Rajan Dhall Hospital,
New Delhi

- **Incidence of Patient Identification Errors Observed before Medication and Procedure/Intervention**
- **Prescriptions Written in Capital in Compliance with NABH Standards**
- **Implementation and Compliance of Safety Checklist for Interventions in Cardiac Catheterization Laboratory**
- **Cost of Post Exposure Prophylaxis of Medical Occupational Sharp Injuries in a Tertiary Care Hospital**

By
Saakshi Kaushik

Under the guidance of
Dr. Geetika Goswami

MBA Hospital and Health Management
2015-2017

The IIHMR University, Jaipur
2016

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

IIHMR UNIVERSITY

CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Dr. Saakshi Kaushik** student of **MBA Hospital and Health Management** from the IIHMR University; Jaipur has undergone summer training at **Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi** from 1st April to 31st May, 2016.

The candidate has successfully carried out the study designated to her during summer training and her approach to the study has been sincere, scientific & analytical.

The internship is in fulfilment of the course requirements.

I wish her all success in all her future endeavours.

Col. (Dr.) Ashok Kaushik
Dean (Academics & Student Affairs)
IIHMR University, Jaipur

Dr. Geetika Goswami
Assistant Professor
IIHMR University, Jaipur

1, Prabhu Dayal Marg, Near Sanganer Airport, Jaipur-302029, Rajasthan, India.
Ph.: 0141-3924700, 2791431- 32, Fax:0141-3924738,E-mail: iihmr@iihmr.edu.in,Web: www.iihmr.edu.in

Fortis
FLT. LT. RAJAN DHALL
HOSPITAL
Vasant Kunj

Fortis Flt. Lt. Rajan Dhall Hospital
Sector B, Pocket 1,
Aruna Asaf Ali Marg, Vasant Kunj,
New Delhi - 110 070
Tel : +91 11 4277 6222
Fax : +91 11 4277 6221
Emergency : +91 11 4277 6444
Ambulance : 105010
E-mail : enquiries@fortishealthcare.com
Website : www.fortishealthcare.com

31-May -2016

To Whomsoever It May Concern

This is to certify that **Dr. Saakshi Kaushik,** a student of IIHMR University has completed her internship in Medical Administration Department.

Duration: **1st April 2016 to 31st May 2016.**

During this period her work was excellent and we wish her all the best for future endeavors.

For **Fortis Flt. Rajan Dhall Hospital, New Delhi.**

FORTIS FLT. LT. RAJAN DHALL HOSPITAL NEW DELHI

Rajesh Choudhary

Head- Human Resources

Acknowledgements

A summer project is a golden opportunity for learning and self-development. I consider myself very lucky and honoured to have so many wonderful people lead us through in completion of these projects.

I wish to express my deep gratitude and special thanks to my mentors, various staffs of IIHMR University and all guides from Fortis Hospital. In spite of being extraordinarily busy with their duties, they took time out to hear, guide, extend all help during the training and keep me on the correct path so that I can carry out my internship project work successfully.

I wish to mention my deepest thanks to the following people:

From Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi

Dr. Shalini Bhalla, Medical Superintendent

Dr. Ripen Gupta, Assistant Director, Department of Cardiology

Dr. Monica Jain, Infection Control Officer

Dr. Monica Manon, Quality Officer

Mr. Varghese Mathew, Quality Nurse

Sister Jomol Jose, Infection Control Nurse

Sister Mariamma David, Infection Control Nurse

From IIHMR University, Jaipur, Rajasthan

Mrs. Geetika Goswami, Assistant Professor

Dr. Monika Chaudhary, Associate Professor

Dr. Neetu Purohit, Associate Professor

I express our deepest thanks to acknowledge the contribution of rest of the Quality Department Staffs and Nurses for taking part in decision making, giving necessary advice, guidance, and for arranging all the facilities to make this project easier.

Lastly, we would also like to acknowledge with much appreciation, Director of Critical Care Unit, HOD of Finance Department, OPD In charge, Billing In charge, Doctors and Nursing staff of Cardiac Catheterization Laboratory, Wards, ICUs, and laboratory technicians, of Fortis Hospital, Vasant Kunj. A special thanks also goes to my team mate, Dr. Ritwik Chawla who help me to assemble the parts and gave suggestions about the task.

Self-Declaration

We hereby declare that the project report entitled "Incidence of patient identification errors observed before medication and procedure or intervention" submitted by us to Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi is an original piece of research work carried out by us under the guidance and supervision of Dr. Shalini Bhalla, Medical Superintendent The information has been collected from genuine and authentic sources.

06/05/16.

Dr. Shalini Bhalla,
Medical Superintendent,
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Dr. Ritwik Chawla
Dr. Saakshi Kaushik
MBA Hospital and
Health Management (2015-2017)
IIHMR University, Jaipur

SELF-DECLARATION

We hereby declare that the project report entitled "Prescriptions written in Capital in compliance with NABH standards" submitted by us to Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi is an original piece of research work carried out by us under the guidance and supervision of Dr. Shalini Bhalla, Medical Superintendent. The information has been collected from genuine & authentic sources.

06/05/16.

Dr. Shalini Bhalla,
Medical Superintendent,
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Dr. Saakshi Kaushik
Dr. Ritwik Chawla
MBA Hospital and
Health Management (2015-2017)
IIHMR University, Jaipur

Self-Declaration

We hereby declare that the project report entitled "Cost of Post Exposure Prophylaxis of Medical Occupational Sharp Injuries in a Tertiary Care Hospital" submitted by us to Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi is an original piece of research work carried out by us under the guidance and supervision of Dr. Shalini Bhalla, Medical Superintendent and Dr. Monika Jain, Infection Control Officer. The information has been collected from genuine and authentic sources.

Dr. Shalini Bhalla, 31/05/16
Medical Superintendent
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Dr. Ritwik Chawla
Dr. Saakshi Kaushik
MBA Hospital and
Health Management (2015-2017)
IIHMR University, Jaipur

Dr. Monika Jain, 31/5/2016
Infection Control Officer
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

SELF-DECLARATION

We hereby declare that the project report entitled "Implementation and compliance of safety checklist for interventions in Cardiac Catheterization Laboratory" submitted by us to Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi is an original piece of research work carried out by us under the guidance and supervision of Dr. Shalini Bhalla, Medical Superintendent. The information has been collected from genuine & authentic sources.

Dr. Shalini Bhalla, 31/05/16
Medical Superintendent
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Dr. Saakshi Kaushik
Dr. Ritwik Chawla
MBA Hospital and
Health Management (2015-2017)
IIHMR University, Jaipur

Dr. Ripen Gupta, 31/MAY/2016
Assistant Director, Department of Cardiology
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Table of Contents

About Fortis Healthcare Limited

Fortis is India's fastest growing healthcare delivery service provider, with operations starting in 2001. Founded by Late Dr. Parvinder Singh, with a vision to setup a network of world-class Super-specialty hospitals linked with a larger network of Multi-specialty hospitals, Fortis now has 52 hospitals. It is the second largest healthcare chain in India and the largest healthcare chain in North India. It has one of the largest Cardiac Programs in the world. Fortis Healthcare (India) is engaged in providing the latest in internationally recognised medical care to patients with a variety of ailments and medical conditions. Our unique network architecture provides expert care to our patients and a level of confidence in receiving the latest medicine has to offer.

Objectives

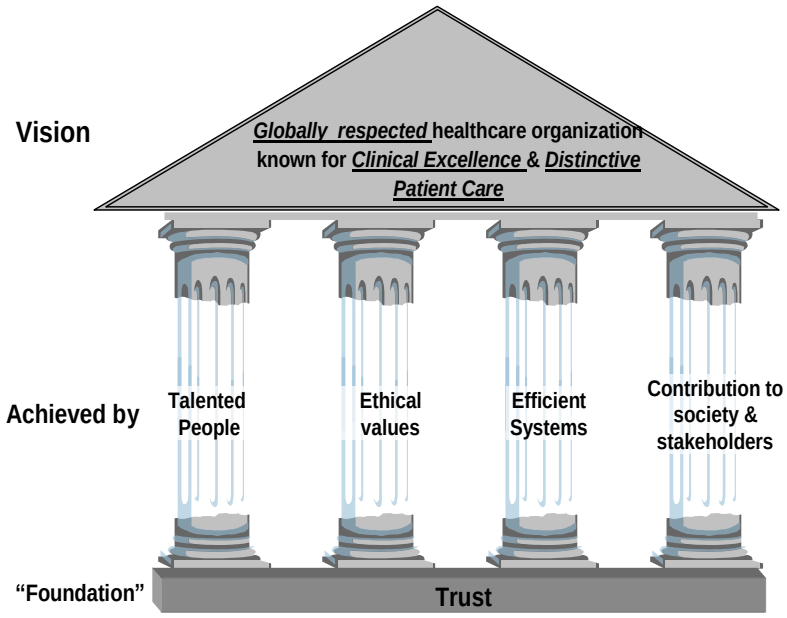
The Aim is to provide compassionate patient care with clinical excellence, towards achieving a single minded objectives – "Saving and Enriching Lives."

Vision, Mission and Values of Fortis Healthcare Limited

Vision: 'Globally respected healthcare organization recognized for Clinical Excellence and Distinctive Patient Care'

Mission: "To create a world class integrated healthcare delivery system in India entailing the finest of medical skills combined with compassionate patient care."

The Fortis Edifice



Values

The Values serve as a guideline for the routine conduct of each Fortisian. All employees are expected to imbibe and practice the Fortis values that are:

Values	Descriptors
Patient Centricity	• Commit to 'best outcomes and experience' for our patients. • Treat patients and their caregivers with compassion, care and understanding. • Our patients' needs will come first.
Integrity	• Be principled, open and honest. • Model and live our 'Values'. • Demonstrate moral courage to speak up and do the right things.
Teamwork	• Proactively support each other and operate as one team. • Respect and value people at all levels with different opinions, experiences and backgrounds. • Put organization needs' before department / self-interest.
Ownership	• Be responsible and take pride in our actions. • Take initiative and go beyond the call of duty. • Deliver commitment and agreement made.
Innovation	• Continuously improve and innovate to exceed expectations. • Adopt a 'can-do' attitude. • Challenge ourselves to do things differently.

Corporate Social Responsibility (CSR)

Over the years, Fortis Healthcare Ltd. through Fortis Charitable Foundation (FCF) and its hospitals across India is committed towards providing healthcare for the socially marginalized and deprived sections of the society. They not only make sure that their programs are efficient, but also ensure that they are sustainable and relevant to those meant to benefit from them.

These are few initiatives of Fortis 2011 to 2015:

UMEED – This program came into existence in the year 2006, when the significance of bringing optimal medical care to the children of the weaker sections of the society was immensely felt. The Foundation of this program focuses on medical problems seen in children, like Cleft palate, Cleft Lip and Congenital Heart Defects. In all these three medical problems, an early medical intervention is imperative to ensure full recovery from them.

SEWA – Its core commitment is to be prepared to supplement government's efforts in providing medical support during a calamity. Leveraging learning from previous operations, SEWA wishes to create a platform to share and standardise best practices. Its efforts are to develop preparedness for specific disaster relief scenarios and formalise protocols and procedures to handle different disasters.

Through this program their key initiatives have been:

- Over 3395 lives reached during the Chennai Floods in 2015
- Reaching out to over 5000 people affected by the Nepal Earthquake in 2015
- Over 16000 lives reached during the J & K Floods in 2014

SAVERA – It focuses on providing access to preventive and remedial healthcare education for a range of stakeholders through various channels of communication like publications, audio-visual communication, children's books, pictures and posters, catering to diverse target groups.

It seeks to provide a platform to share research, findings and trends, creating awareness on critical health issues and works to drive opinion towards viable options.

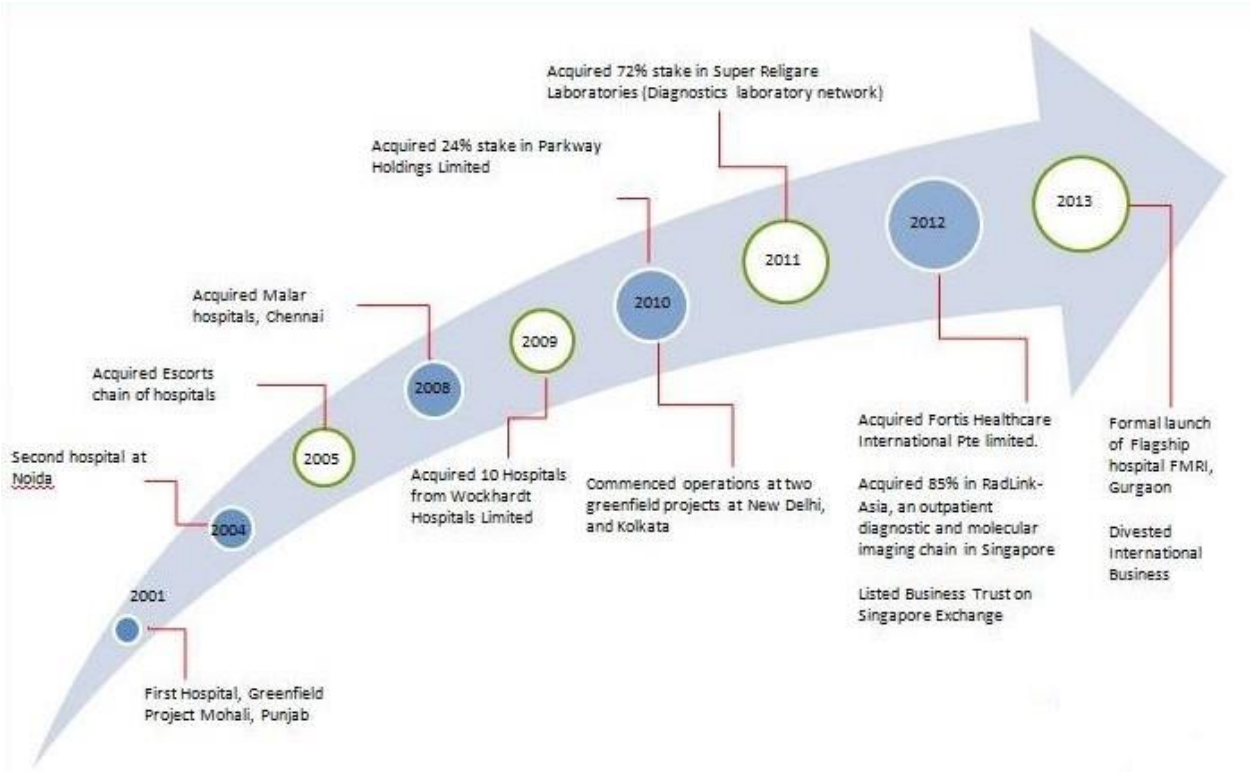
AANCHAL – It focuses on health and well-being of the mother, with the overall aim of ensuring improvements in community & societal health. AANCHAL incorporates women's issues & concerns at every stage of the health pathway, be it awareness & prevention, healthcare, psychological support and palliative care.

One of our primary focus areas under this programme is medical and psychological support, and care for Acid Attack Survivors.

CHHAYA – It is a programme designed to help, sustain and revive existing charitable healthcare infrastructure.

The programme identifies charitable and trust hospitals that require support and extends help to revive, sustain or improve their infrastructure, provides operational and clinical bandwidth to the local team to improve services and guidance in running operations.

Milestones



About Fortis Flt. Lt. Rajan Dhall Hospital, New Delhi

Fortis Flt. Lt. Rajan Dhall hospital was formally inaugurated on **8th July 2006.** The inauguration was done by Mr. Yoganand Shaastri, Delhi Health Minister.

The major focus of this healthcare facility is on high incidence health problems in India such as heart, kidney, respiratory and diabetic conditions, especially since there ae linkages between these. The facility also focuses on the treatment of complex join problems, a prevalent condition among senior citizens.

Infrastructure

Fortis Flt. Lt. Rajan Dhall hospital is a 200 bed NABH certified multi-specialty tertiary care hospital currently running in its 3rd cycle of NABH accreditation. It is spread over an area of 1,50,000 sq. feet.

A. CLINICAL

Super-Speciality

- Cardiac sciences
- Renal sciences
- Diabetes and metabolism
- Thoracic-Pulmonary Diseases
- Joint replacements
- ENT

Multi-Speciality

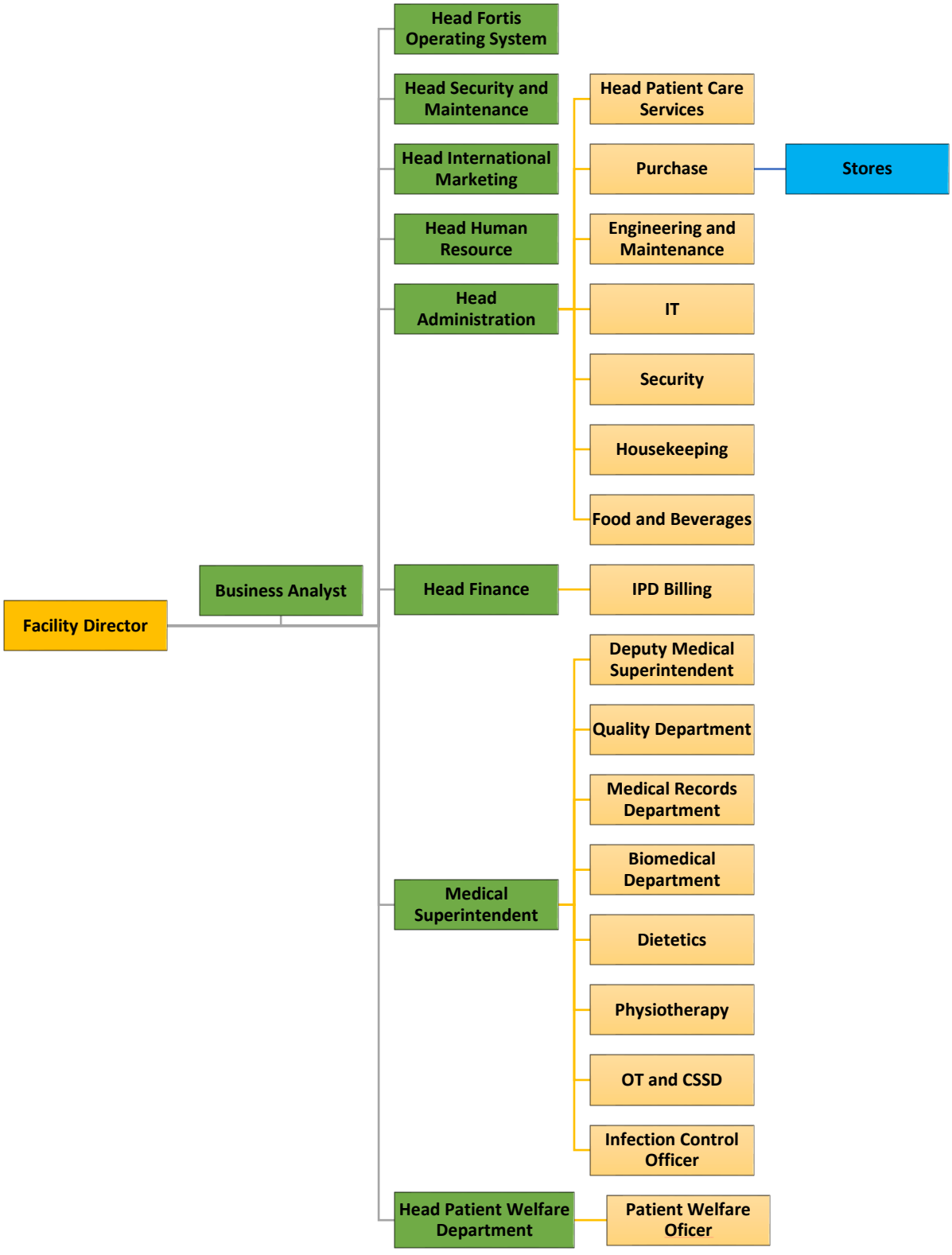
- Internal Medicine
- General Surgery
- Anaesthesiology
- Ophthalmology
- Paediatrics
- Dermatology
- Clinical Nutrition and Dietetics
- Dentistry
- Sports Medicine
- Neurology and Neurosurgery
- ENT
- Gastroenterology
- Psychiatry
- Gynaecology including Gynae Oncology
- Geriatric Medicine

- Psychotherapy
- Surgical Oncology
- Medical Oncology
- Emergency Medicine

B. NON-CLINICAL

- Front Office
- TPA Department
- Medical Records Department
- Materials Department
- CSSD
- Quality Department
- Finance Department
- Housekeeping Department
- Food and Beverages Department
- Biomedical Department
- Patient Welfare Department
- Security and Maintenance Department
- Purchase and Supply Chain Department
- Human Resource Department
- Marketing Department
- Administration Department
- IT Department

Organogram


Facility Director
Business Analyst
Head Fortis Operating System
Head Security and Maintenance
Head International Marketing
Head Human Resource
Head Administration
Head Finance
Medical Superintendent
Head Patient Welfare Department
Head Patient Care Services
Purchase
Stores
Engineering and Maintenance
IT
Security
Housekeeping
Food and Beverages
IPD Billing
Deputy Medical Superintendent
Quality Department
Medical Records Department
Biomedical Department
Dietetics
Physiotherapy
OT and CSSD
Infection Control Officer
Patient Welfare Oficer

Floor Plan

Floor	Distributions of Hospital As Per The Floors
5th Floor	➢ Training Room, Research and Academics Department
4th Floor	➢ C.S.S.D., Pathology Lab, Biomedical Engineering, ➢ Staff Cafeteria
3rd Floor	➢ 5 Multispecialty Operation Theatre, I.C.U, H.D.U., Catheterization Lab, Pre-OT Area ➢ Doctor's Lounge
2nd Floor	➢ Patients' room, Paediatric ICU, Neonatal ICU, Deluxe Suite, Presidential Suite, I.T. Department
1st Floor	➢ Labour Delivery room, General Ward, Oncology Day Care, Patients' rooms ➢ Food and Beverages Department
Ground Floor	➢ Admission, Billing, Corporate/TPA Desk, Dispatch Counter, Emergency, Patient Welfare Department, ➢ Day care, Dialysis, Urodynamic / Bronchoscopy, PFT Lab, Pulmonology / Medical ICU, Physiotherapy, Quality Department , Dietary Department, A.H.U., ➢ Doctors cabins, Director's office, M.S Office, Front office manager cabin, International Marketing manager's cabin ➢ Library, Waiting Lounge, Visitors Cafeteria, Pharmacy
Basement	➢ OPD Consultation Chambers OPD Billing, Health Check Lounge, Primary Health Check, Dental Department, Mammamia, ➢ Blood Bank , Non Invasive Cardiology Lab, SRL Lab, , Imaging and Nuclear Medicine, Diabetes and Metabolism, Blood Bank, ➢ Human resource, Marketing Department, MRD, Material Store

Observational Learning

1. Introduction

The summer training is an integral part of the MBA in Hospital and Health Management course curriculum at IIHMR, Jaipur. At the end of the first year student undergo a training program of two months to get an in depth exposure of the Hospital. Taking up projects was a good opportunity, hence various projects were done as per the requirement of the organization. The whole purpose of the training is to build a base of knowledge about the structure and functioning of the hospital.

Over the period of two months of summer training at Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, I enhanced my knowledge by completing following four projects at the hospital:

- Incidence of patient identification errors observed before medication and procedure/intervention
- Prescriptions written in Capital in compliance with NABH standards
- Implementation and compliance of safety checklist for interventions in Cardiac Catheterization Laboratory
- Cost of Post Exposure Prophylaxis of Medical Occupational Sharp Injuries in a tertiary Care Hospital

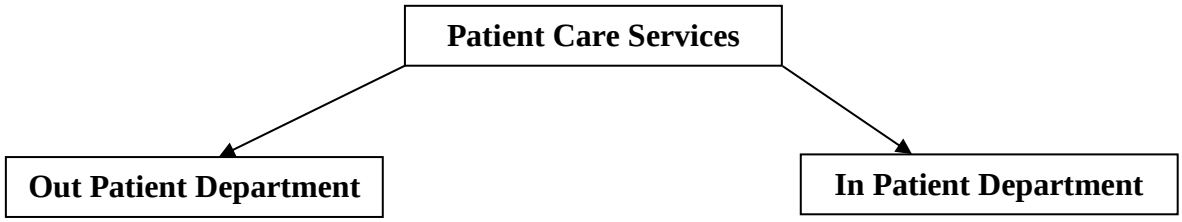
2. Data Collection

Keeping observation learning as the most important part of the summer training schedule, I tried to grasp it out as much as I can through my projects scope areas.

For exploring, any department in the hospital prior permission from the head of the department was mandatory. After securing permission I was guided by one of the staff in all respective department, which helped me the most to enrich my knowledge in each area.

3. General Findings

Following is a brief description of the specific objectives and general findings based on department-wise observations and major critical factors affecting the functioning of the departments.



A. Out Patient Department

Under **Patient Care Services Department,** the first part is O.P.D. which have various sub-departments like OPD Billing, Call Centre and Primary Health Check-up (PHC). It was situated in the basement of the hospital, which was divided into four areas:

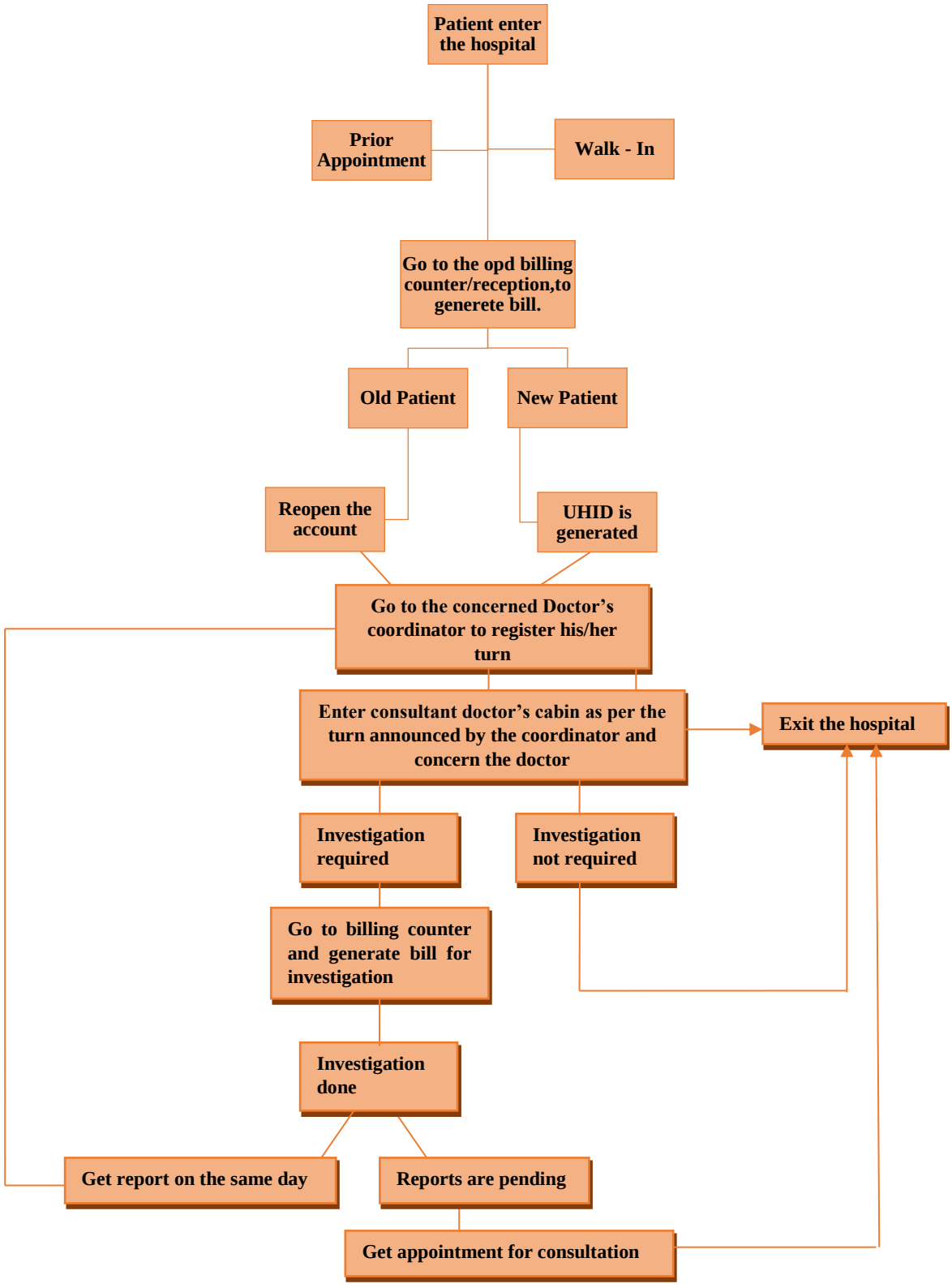
- Multi-speciality Consultation area
- Super-speciality Consultation area
- OPD Billing Counter
- Primary Health Check-up (PHC)

1. OPD Billing

OPD Billing counters were situated in the centre of the OPD Area. Here all bills for Consultations and tests were generated on the basis of yearly revised tariffs of the hospital. As soon as a new patient enters the hospital, he/ she was supposed to go to this area and fill a registration form. After his/her name was registered in the computer, a Unique Hospital Identification number (UHID) was generated for the patient. This UHID will later help in identifying the person at the time of registration during follow up consultations or revisits.

The process, patient has to follow for Multi-Speciality or Super-Speciality OPD Consultation is given as follow:

OPD PROCESS FLOW



Priority was given to the appointment patients but no walk-in patient was turned away. Coordinator managed the patients' turn according to the time and in between slots. All the time details like, generating bill, reaching coordinator for their turn, entering doctor's cabin, leaving doctor's cabin, etc. were recorded in FOS.

2. **Call Center**

For any query, appointment or information, Fortis have its help line number. Call center staff handles all the calls personally. For any appointment, either it is fixed by the C.C staff or C.C staff transfer the call to the respective doctor's coordinator. Once the appointment was fixed, it got centralized and recorded on Fortis Operating System and a message was sent to the patient. A reminder message was also sent to the patient on the day of appointment.

3. **Primary Health Check-up**

This department is also a part of OPD, where different primary health checkup packages are provided to the patient. It was situated in center of the basement, of the OPD area. If a patient wants to undergo a health checkup, they suggest them the best package as per his/her requirements. There were various packages for male, female, heart patients, children, old age patients, etc.

Patient flow in P.H.C

- Patient gets registered, generate his/her UHID, and gets the billing done at the P.H.C counter, as per the package.
- As soon as bill was generated patient get 2 copies of physician checklist, which contains names of all tests included in that package.
- One sheet remained with the patient and one goes in the lab for patients' details and entries.
- Time was recorded at every level in FOS like, the moment patient reaches the respective investigation room, time when he gets his/her turn, the time when reaching to the next room, etc.
- Patient was on 12 hour fasting, all the pre fasting tests like blood tests were done first following all non-fasting tests.

- During the entire schedule of the patient, as per the package, one of the P.H.C coordinator escorted patient to different investigation rooms.

B. In-Patient Departments

Under **Patient Care Services Department,** the second part is IPD, which includes various sub-areas like

a) Admission and Bed Management for Emergency and OPD
b) Financial Counselling / Estimates
c) IPD Wards

a) Admissions

Reception for admissions was located on the ground floor. As soon as the patient or his/her attendant reaches the front office, he/ she will be attended by the front office Assistant. F.O.A welcomes and assists the patient to check-in through the hospital information system (H.I.S) using a unique hospital identification number. Then F.O.A guides the patient to the counsellor, who explain him/her the entire admission process including, all formalities, financial estimate, room choice, or if they have any other query.

Then after counselling, patients are requested to make an advance payment, for which receipt was given and after all the formalities F.O.A will acquaint the patient to his/ her room and various facilities. Once the patient get admitted in I.P.D, an identification ID band will be placed on patient's wrist, which will be removed only at the time of discharge.

These bands include three colours
White - For normal patient, it is mandatory to all
Orange – For vulnerable patients, e.g.: children below the age of 12 year, adult above age of 65 years, physically/ mentally challenged person, patient who cannot perform act of daily living.
Yellow – For allergic patient

Bed Management

The bed management manager did this process at the front desk. Every bed in the hospital was fully equipped with the state-of-the-art medical facilities, regardless of their categories.

There are various types of room available in the hospital, according to the different hospitality services provided. These include:

General ward – 18 Beds,
Twin sharing and classic – 28 Beds,
Single – 13 Beds,
Single classic – 10 Beds,
Deluxe – 3 Beds,

Deluxe suites – 2 Beds,
Presidential suites – 1 Bed,
ICUs – (12+15+5+6+10+5) Beds,
Day care – 5 Beds.

Every effort was be made by the bed manger to provide a room requested by the patient, but in case the room desired was not vacant, room of upgraded class would be given to the patient on the same rate as per the desired room. Every day bed status, shifting details and everything related to bed occupancies was updated in H.I.S. There were four bed status: vacant, to be cleared, occupied, patient is ready to leave.

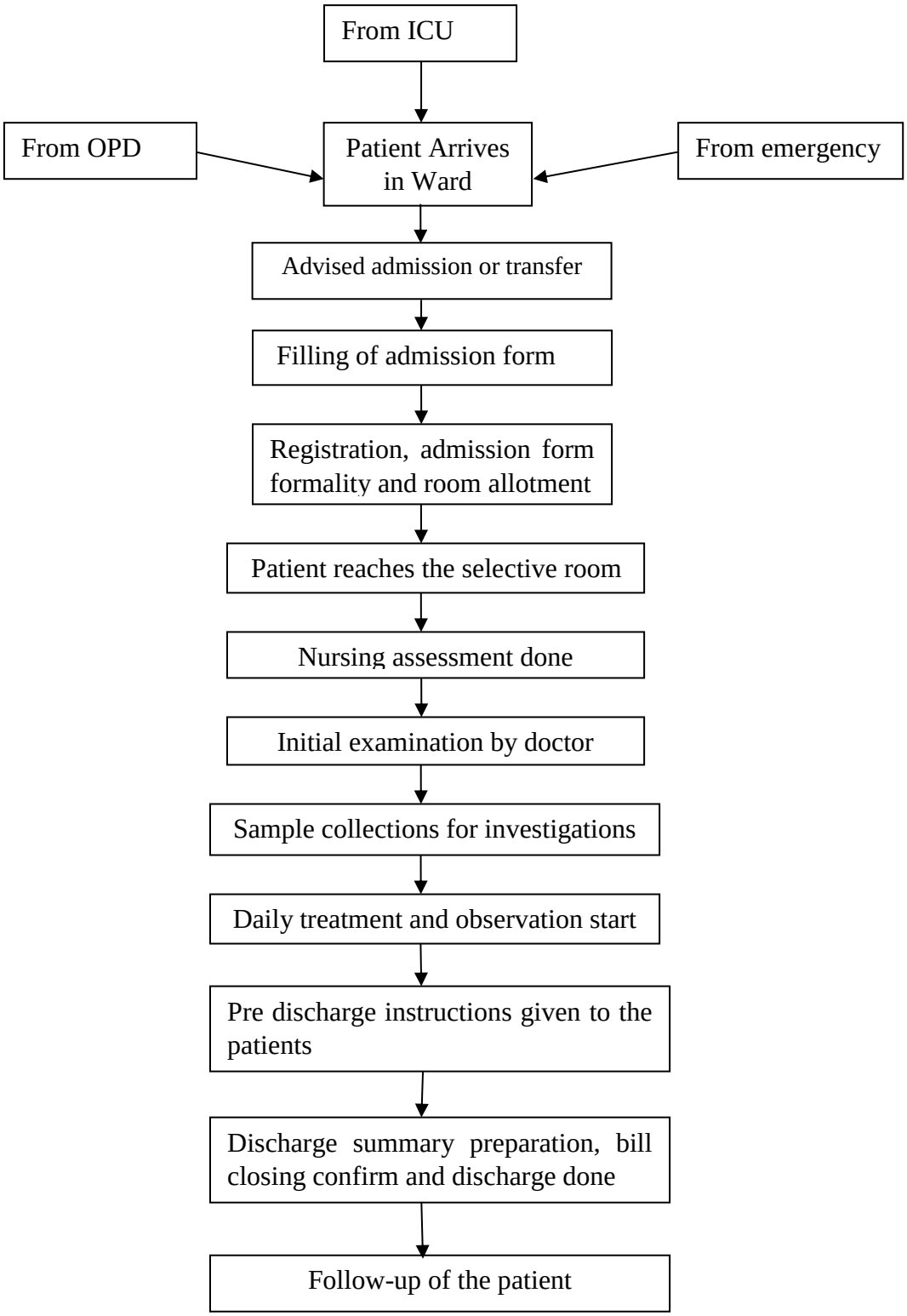
b) Financial counselling

The hospital counsellor's cabins were situated at the IPD reception. These counsellors give all the financial estimates to the patient for his/her treatment. They clear various queries like: packages, non-packages, multi-speciality procedures, room booking, etc.

c) IPD wards

There were six wings on first and second floor of the hospital. Three wings (A1, A2 and A3) are on the first floor, three wings (B1, B2 and B3) are on the second floor. Each wing was handled by a head nurse. These wing have rooms of various categories. In the ward, a file was maintained for each patient individually with all his/ her daily treatment related documents. Wards follow a process with all patients i.e.

IPD ward process flow



C. Third Party Administration / Corporate

This is a special cell for counselling corporate patient, which were referred through various medical agencies. This department is situated on ground floor. TPA counsellors help the patients, by informing them about:

- Which documents they need to submit for claiming insurance
- What all paper work they need to complete for TPA
- All the process and policy regarding advance deposits and reimbursements
- Which type of coverage will be provided by the patient's health insurance company

Being a corporate patient, they required to submit requisite official documents, to avail all the relevant facilities and discounts, as may be applicable. Initially bill goes for initial approval to highlight the estimate bill for the procedure, and later after treatment, it goes for final approval. In between if, the third party needs any clarifications hospital must have all the explanations for all the charges they quoted to the patient.

D. Billing (Dialysis, Emergency, I.P.D)

IPD and emergency billing was done at the reception on the ground floor, whereas dialysis billing was done in the dialysis ward. Billing can be done by cash, cheque, or TPA.

For IPD treatment, patients are required to pay some advance payment as per the room and treatment they will seek. Further, a deposit is to be paid, as and when expenditure exceeds the initial payment. Patient was contacted by IPD reception daily for his/her billing updates.

In case of **TPA billing**, cash deposit was waived, as long as the insurance company has not authorized the treatment and hospital does not get the approval.

If patient's TPA has authorized cashless transaction for his/her treatment, patient will be required to write a voluntary undertaking, that " in case my insurance company denies paying for my treatment before I discharge, I will clear entire bill. "

Patient is expected to pay the difference between the authorized bill amount and the actual bill amount resulting from items, which are not covered, in patient's insurance policy.

The security cheques will be refunded back to the patient once the hospital receives TPA's payment.

In case of **emergency billing**, the only difference is, in this ER Tariff is applicable.

In case of **dialysis billing** firstly, approval was send to the company, and sanction amount is calculated. Then co-payment was checked, which results in two conditions, either approval amount is within the limit or approval amount is above the limit. So the amount hospital will take from patient will depend on either of the situations.

E. Despatch

This department was included with the billing department. All the bills either cash or TPA bills, PSU (government) bills, private cooperate bills, international high commission bills, at the end of the day will reach to dispatch officer.

- The staff handling the dispatches checks all these bills. Later he will dispatch the bills to the cooperate office on the daily basis.
- Private cooperate bills will be send directly on the cooperate address.
- However, all the international high commission bills will be dispatched on the monthly basis.
- In case private cooperate payment is made according to the reference number given to the different companies. These details will be shared with the finance department and the cooperate department. Details like authorized letter, bill, coverage, is send later to the respected companies.

If there is any bill which needs to be refunded due to any mistake that need to be signed by the front office head and front office assistant for its approval.

Outstanding payables

In this area, if the bill of the patient exceeds the estimated amount, follow up of the patient is done. If the bill exceeds twenty thousand then hospital starts giving call to the patient.

But in case bill amount is less than the estimated amount, then money was refunded to the patient. If more than 20,000 then hospital refund it in cheque, if less than 20,000 then by cash.

F. Medical Record Department

This department was located in the basement. After the discharge of the patient, his/her file is stored in this department. Due to shortage of space only records of one year were stored in this branch. Rest after one-year, records will shift to their store, which is outside the hospital. These medical records file contain various documents like:

1) General, procedure, blood product, high-risk treatment, anaesthesia, surgery, sedation and any other consent
2) Doctor's admission assessment
3) Doctor's daily progress note
4) Nursing admission assessment
5) Daily nursing flow sheet
6) Nutritional assessment and screening from
7) Dietician's notes and diet chart
8) Physiotherapist assessment and notes
9) Critical care flow sheet
10) Medication order and administration chart
11) High alert medication monitoring form
12) Diabetic chart
13) Input output, vital chart
14) Preoperative checklist
15) Pre anaesthesia assessment and anaesthesia plan
16) Surgical safety checklist
17) OT notes
18) Pre sedation assessment notes
19) Patient's reports
20) Patient and family education form
21) In house transfer form
22) Cross referral records
23) Discharge/ death summary

G. Information Technology Department

This department was located on second floor. Their function is to manage Fortis operating system. All the database and tariff records of pervious years were maintained by this department. This department also managed of the hospital information system. If any error was encountered, this department repairs all desktops of the hospital. Every employee of the hospital was having his/her own ID to run FOS, these ID's were given by IT departments only.

H. Dietetics, food and beverages

Dietetics department was situated on the ground floor, whereas kitchen was situated on the first floor of the hospital. This department serves the patient and ensures the nutritional needs of all patients, as prescribed by the doctor. Every day diet tickets were prepared for every patient.

The dietician's role was:

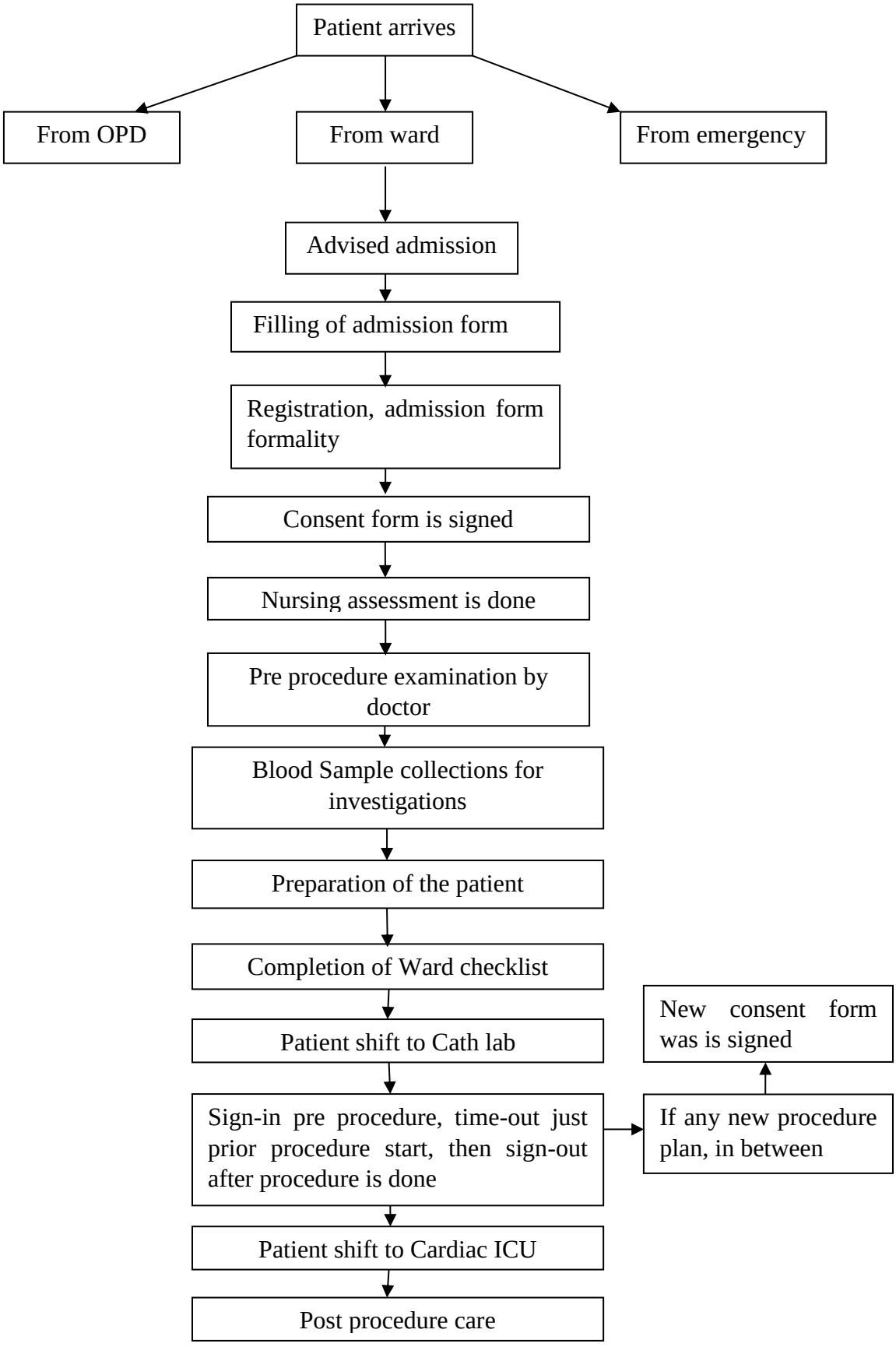
- To ensure that patient is served with food, in compliance to the treatment of patient prescribed by doctor
- Checking the diet of all patient periodically, going on rounds to their respective areas to solve patients queries related to diet and to know their choice of food they want to be serve in their meal.
- To coordinate with kitchen staff related to any complain or to ensure that the right quality of food is served to all patients.

Even the food wastage was mentioned daily on the notice board by this department to avoid the wastage and a strict control can be maintained on the inventory of the food items.

I. Cardiac catheterization Laboratory

In this laboratory all the intervention procedures like, CABG, PTCA, PPI, TPI etc. were performed. This lab is located opposite to Cardiac Intensive Critical Unit. Initially in this department only the patient flow sheet was used for all the procedures. However, later under the project a surgical safety checklist was implemented in Cath lab. So after that a complete safety checklist along with the patient flow sheet was used as a safety check for all the procedures.

Process flow of patient undergoing for cardiac interventional procedures



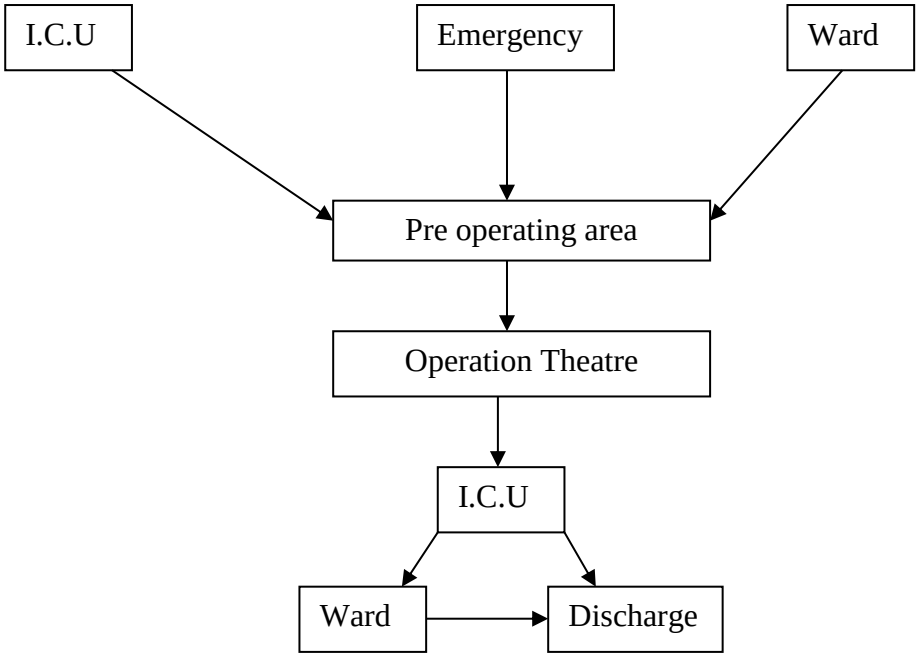
J. Operation Theater

In the hospital O.T was situated on 3rd floor. On average 20-25, surgeries were performed in a day. The hospital consisted of 5 O.T's including Cardiac, Joint replacement, Renal, and General. Along with O.T, a Post Operating Area is also there, where all the sign in procedure were performed before every surgery. Before, just prior to the start and after every surgery, sign-in, time out, and sign-out procedures were performed, as a surgical safety protocols. The O.T manager every morning prepares the surgeries schedule of that day. This schedule includes the name of the patient, date surgery time, I.P.I.D, surgeon and anesthetics name ward / I.C.U from where patient have to come to O.T. , name of the surgery. Surgeries schedule may get alter if there is any delay in patient's pre surgical procedures, such as, consent confirm is not there, reports are pending, etc. In the hospital to check and maintain the compliance rate of the surgical safety protocols, different surgical audits were conducted for any random surgery by the hospital's Quality Department nursing officer. This audit was conducted to observe the sign-in, time out, sign-out procedure compliances.

Various safety checks was done to keep the patient safe during or after surgery;

1) Informed Consent form was asked to sign, before every surgery.
2) Before surgery staff ask patient's name, double identification was done, confirm surgery name, and side to be operated was get marked.
3) All hand wash steps was performed by all doctors and nursing staff involved in surgery.
4) Before discharge, doctor or nurse explain everything need to take care and about medications.
5) If any post-operative complication after discharge, patients were advised to contact doctor immediately.

Process flow of O.T



K. Quality Department

This department was located on the ground floor and headed by the medical superintendent of the hospital. The work was mainly auditing, implementing policies and whether work was being done properly or not. The hospital is running in its 3rd cycle of NABH accreditation. First, one and a half years surveillance of NABH is conducted to see the hospital is maintaining the same standards or not. Every three years they come for accreditation.

Quality department maintain the Standard Operating Protocols, arrange meetings to discuss on implementing policies and identifying the problems in the hospital and sorting out the issue by education and training. The compliance, non-compliance and issues are presented to the management in a meeting organised quarterly every year. In this meeting all the issues are then solved to maintain the standards of hospital as per the NABH protocols. If any intervention is required, will also be discussed in the meeting.

Infection Control committee works with Quality Department to address the issues related to infections in the hospital and solve those issues. Daily audits were held to check whether the hospital is following the standards as set by the infection control committee. Any

category of staff responsible for high rate of infection or area in the hospital found to be having non-compliance to infection control, a specific education and training program was held for the same staff or in the area concerned. Infection control committee also took care of management and follow up of Sharp Injuries to the hospital staff.

L. Patient Welfare Department

This department is situated in the ground floor, next to the admission/reception area. This department handled the concerns of patients related to any of the services in the hospital. Feedback form which was given to the patient at the time of discharge formed the backbone of their profile. There were three floors in the hospital and the Floor manager of each floor and patient welfare officer worked together.

M. Intensive Care Unit

There were 8 ICU's in the hospital where visitors' entry was not permitted besides during visiting hours only. They were situated on different floors of the hospital. The different ICU's based on the location in the hospital are given in the following table:

Intensive Care Unit	Speciality	No. of Beds	Location
ICU 1	Cardiology	12	3rd Floor
ICU 2	Critical Care Management	15	3rd Floor
ICU 3	High Density Unit	5-6	3rd Floor
ICU 4	Orthopaedic	4-5	3rd Floor
ICU 5	Medical (Pulmonary)	12	Ground Floor
ICU 6	Highly Infectious patients	5	3rd Floor
ICU 7	Neonatal (till 1 year)	4-5	2nd Floor
ICU 8	Paediatric (above 1 year)	6	2nd Floor

PROJECT 1

Incidence of patient identification errors observed before medication and procedure / intervention

Self-Declaration

We hereby declare that the project report entitled "Incidence of patient identification errors observed before medication and procedure or intervention" submitted by us to Fortis Flt. Lt. Rajan Dhall Hospital, Vasant Kunj, New Delhi is an original piece of research work carried out by us under the guidance and supervision of Dr. Shalini Bhalla, Medical Superintendent The information has been collected from genuine and authentic sources.

Dr. Shalini Bhalla,
Medical Superintendent,
Fortis Flt. Lt. Rajan Dhall Hospital
Date:

Dr. Ritwik Chawla
Dr. Saakshi Kaushik
MBA Hospital and
Health Management (2015-2017)
IIHMR University, Jaipur

Table of Contents

ABBREVIATIONS

CQI	Continual Quality Improvement
CT	Computed Tomography
ECG	Electrocardiography
ID	Identity
IPID	Inpatient Identity
MRN	Medical Record Number
NABH	National Accreditation Board for Hospitals
NPSA	National Patient Safety Agency
NPSG	National Patient Safety Goals
NRLS	National Reporting and Learning System
OT	Operation Theatre
ref.	refer
WHO	World Health Organization

Introduction

Worldwide, health care facilities faces wide range of safety problems. The failure to correctly identify patients continues to result in medication errors, transfusion errors, testing errors, wrong person procedures and the discharge of infants to the wrong families. (*WHO,* 2007). During medication administration, failure to identify patients correctly can lead to patients receiving incorrect medications, perhaps resulting in adverse drug events and even death (*Schulmeister,* 2008). The major areas where patient misidentification can occur include drug administration, blood transfusions and surgical interventions and procedures. The trend towards limiting working hours for clinical team members leads to an increased number of team members caring for each patient. This increases the likelihood of hand-over and other communication problems, which increases the chances of avoiding identification check of patients. (*WHO* 2007)

A patient wristband may seem a relatively simple feature of healthcare, compared to the management of high-risk procedures, medicines and a work environment of constant vigilance and emergency situations. All patients admitted to acute healthcare settings are issued with a patient identity wristband. The aim of a patient wristband is to uniquely identify the patient in a hospital.

Identifying a patient with ID band

- The hospital staff must ensure that all inpatients must wear an ID band at all times during the stay in the hospital.
- The patient's identity must be confirmed by the staff before administering any medication or carrying out any intervention or procedure.
- At least two identifiers (e.g.: patient's full name and ID number) must be used to verify patient's identity.
- If the patient is found to have no ID band neither medication should be administered, nor should any procedure or intervention be performed.
- Cases in which patient's ID band is torn or rubbed or has be to be removed, for any reason, it is the responsibility of the staff to ensure that it should be replaced without any delay.

Several organizations have suggested guidelines to increase the accuracy of patient identification, including the National Patient Safety Agency, the Joint Commission on

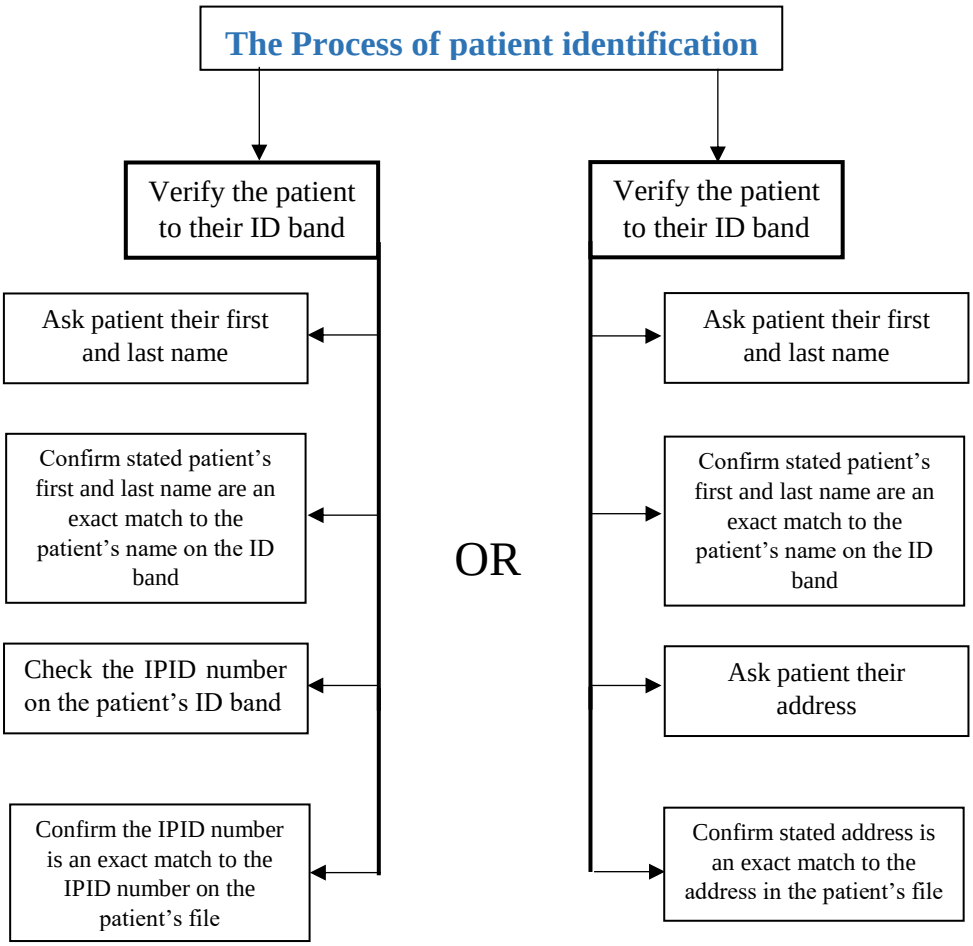
Accreditation of Healthcare, and the World Health Organization. The Joint Commission, in the United States of America, listed *"Improve the accuracy of patient identification"* as the first of its National Patient Safety Goals introduced in 2003, and has since then updated it annually. (*Junghee Jo, Jenna L.*, 2013) The Joint Commission guidelines for fulfilling this goal are:

- **NPSG.01.01.01:** Use at least two patient identifiers when providing care, treatment and services. Identifiers may be the individual's name, an assigned identification number, date of birth, or other person-specific identifier. The patient's room number or physical location is not used as an identifier.
- **NPSG.01.03.01:** Eliminate transfusion errors related to patient misidentification.

The National Accreditation Board for Hospital and Healthcare provider (NABH) has certain accreditation standards for hospitals on particulars of Continual Quality Improvement. The organisation must identify key indicators to monitor the clinical structures, processes and outcomes, which are used as tools for continuous improvement. One of the Objective element in the new 4th Edition of guidelines include patient safety goals.

Healthcare facilities may train their workers by using policies and/or procedures based on their interpretation of the above mentioned guidelines. For example, Fortis Flt. Lt. Rajan Dhall Hospital (New Delhi, India) facility-specific guidelines are:

The two patient specific identifiers are: 1) first and last name of patient spelt in full (initials are not permitted) and 2) the IPID number of the hospital on his/her ID band . . . the two specific identifiers are matched with the individual before beginning with medication, blood collection, procedure and/or intervention. Other Identifiers which can be used are – address, date of birth or photo ID.



Types of Identification Bands

There are different colours of bands as per the category under which the patient lie. The different colours of bands are:

1) White Band – Universal band, mandatory to be worn by all individuals admitted to the hospital (ref. Annexure 1).
2) Yellow Band/Red Band – For patients who have allergies or give any history of allergy (ref. Annexure 2).
3) Orange Band – For patients who needs extra attention or care and/ or patients who are above 65 or below 12 years of age and have potential to fall (ref. Annexure 1).
4) Pink and Blue band – Identification for new born children, Pink is for girls and blue is for boys.

Background

While in many countries wristbands are traditionally used for identifying hospitalized patients, missing bands or incorrect information limit the efficacy of this system. Colour coding of wristbands facilitates rapid visual recognition of specific issues, but the lack of a standardized coding system has led to errors by staff who provide care at multiple facilities. Between November 2003 and July 2005, the United Kingdom National Patient Safety Agency reported 236 incidents and near misses related to missing wristbands with incorrect information (S. Singh, 2005). The National Patient Safety Agency's (NPSA) National Reporting and Learning System (NRLS) reported incidents such as: mismatches between patients and the documentation on their samples, records, blood transfusion samples and products and medication (65%); missing ID bands with incorrect data on them (16%); mismatches between patients and their medical records (10%); and failures in the manual checking processes (9%) (*Berveley Norris*, 2007).

The amount of information on a wristband has steadily increased, usually with the aim of assisting delivery of care e.g. consultant name, ward name, allergies and address. The lack of standardisation, prioritization and space means that potential errors associated with patient identifiers include date of birth being mixed up due to differing formats and patients mixed up due to name formats. Long and multiple names may be truncated or omitted; first and second names may be presented in the wrong order; nicknames and shortened names mixed up with given full names; official names and known as names mixed up; names from different cultures being wrongly translated or represented.

Several research studies have discussed patient identification errors in various healthcare processes in healthcare facilities, few of those studies have also proposed specific strategies or guidelines to decrease such errors. *Lane et al.* (2006) propose a hierarchical protocol for the ideal medication administration process. Their research suggests, comparing the patient's identification (ID) band to the patient's chart during medication administration. *Spruill et al.* (2009) suggests matching two patient identifiers, the patient's name and medical record number (MRN), between two specific artifacts, namely the patient's ID band and the chemotherapy product label, to decrease incidents of patient misidentification before chemotherapy administration. *Paparella* (2012) recommends matching any two patient identifiers suggested by the Joint Commission across three specific artifacts: the

patient's statements about their identity, the patient's ID band, and the medication order with respect to the medication administration process. These studies focuses on specific processes (e.g.: medication administration, chemotherapy), specific artifacts (e.g., patient's ID band, patient's medication chart, chemotherapy product label, medication order), or specific identifiers (e.g., patient's name, MRN).

Purpose of Study

The hospital is presently running in its 3rd cycle of NABH. It mandates institutionalization of the revised standards (4th Edition) by 31st July 2016. One of the CQI 3j indicator, "**Incidence of patient identification errors**" before medication and procedure/intervention was reviewed in the study, as was asked by the medical superintendent of the hospital. This indicator provides guidance to the staff to ensure the correct identity of all patients, at all times, to restrict the risk of misidentification and adverse outcomes of care.

Objectives

- To identify the number of individuals for whom double identification check was done before administering medication, as per CQI 3j indicator of National Accreditation Board of Hospitals (4^{th} Edition) and hospital policy.
- To identify the number of individuals for whom double identification check was done before procedure/intervention as per CQI 3j indicator of National Accreditation Board of Hospitals (4^{th} Edition) and hospital policy.

Scope of the Study

This CQI indicator is applicable to the following staff of the hospital:

- Doctors/Surgeons
- Nurses
- Technician

Methodology

Study Area
Inpatient wards, pre-OT room, ultrasound room, CT scan room.

Study Population
Total number of patients receiving medication and/or undergoing any procedure or intervention by doctors, nurses and technicians of wards, pre-OT room, imaging department were studied.

Study Design
Concurrent, descriptive, observational study.

Sample Design
In this study convenient random sampling technique was used to observe doctors, nurses, technicians of inpatient wards, pre-OT room, imaging department before administration of medicines and before beginning of any procedure or intervention, during the functional hours in the day time.

Study Time
The study population was observed over a period of 11 days from 13th April to 25th April 2016.

Tool for the study
Prepared observational checklist (ref. Annexure 3 and 4). Microsoft excel for analysis of data.

Methods of Measurement

An observer followed the doctors, nurses and technicians with each patient and filled an observational check list. Identifying the patient identification error was defined as not completing the assigned task on that patient which conforms to the policies and guidelines laid down by the hospital.

Convenience random sample of 68 observations respectively were captured before administering medication and procedure or intervention during the month of April 2016. The study was conducted over a period of 11 days to identify the number of individuals for

whom double identification check was not done. Verifying patient identity is defined as matching the patient to the identity band. Confirmation of patient identity required the use of at least two available patient identifiers (i.e., name, IPID number). Matching the patient to the identity band could only be done by asking the patient his or her name and matching the IPID number from the file to the identity band attached to the patient's wrist. Various other parameters were identified such as:

- Method of patient verification
- Colour of ID band used
- Identification details on the band
- Legibility of identification details
- Presence of core identifiers on the band
- Verbal confirmation of patient's name
- Identification check before transfer to procedure room
- Type of procedure
- Double identification before medication
- Double Identification before procedure

Inclusion Criteria

- Doctors/Surgeons
- Nurses
- Technician
- Patients of wards
- Imaging department
- Pre-OT room
- Dialysis ward

Exclusion Criteria

- Intensive care unit
- Blood sample laboratory

Results

Total observation before administration of medication has been taken as N_m and before procedure/intervention as N_p. Errors observed for both are E_m and E_p respectively. When results were calculated, it was found that **before administering medication** to a patient, identification wristbands were used for 16 patients and in remaining 18 number of cases ID band was not used, this accounts for 52.9 % incidence. There were few errors observed in cases of identification details on the band (Table. 1). However, major areas where the scope of error was high was verbal confirmation of identity and checking it from the patient's file. The incidence here is as high as above 70 % (Table. 1).

Table 1. Comparison of incidences characterizing the inadequate patient identification before administering medication.

Criteria	N_m	E_m	Incidence of non-compliance
ID Band not used for verification	**34**	**18**	**52.9 %**
Right colour band used for allergic or vulnerable patients	**34**	**0**	**0 %**
Patient Identification details incorrect	**34**	**4**	**11.7 %**
Core Identifiers not present/incorrect/rubbed	**34**	**5**	**14.7 %**
Identifiers illegible	**34**	**6**	**17.6 %**
Patient's name not confirmed	**34**	**25**	**73.5 %**
Verbally confirmed named not matched with file	**34**	**29**	**85.2 %**

Caption: N_m = number of observations before administering medication; E_m = Number of errors.

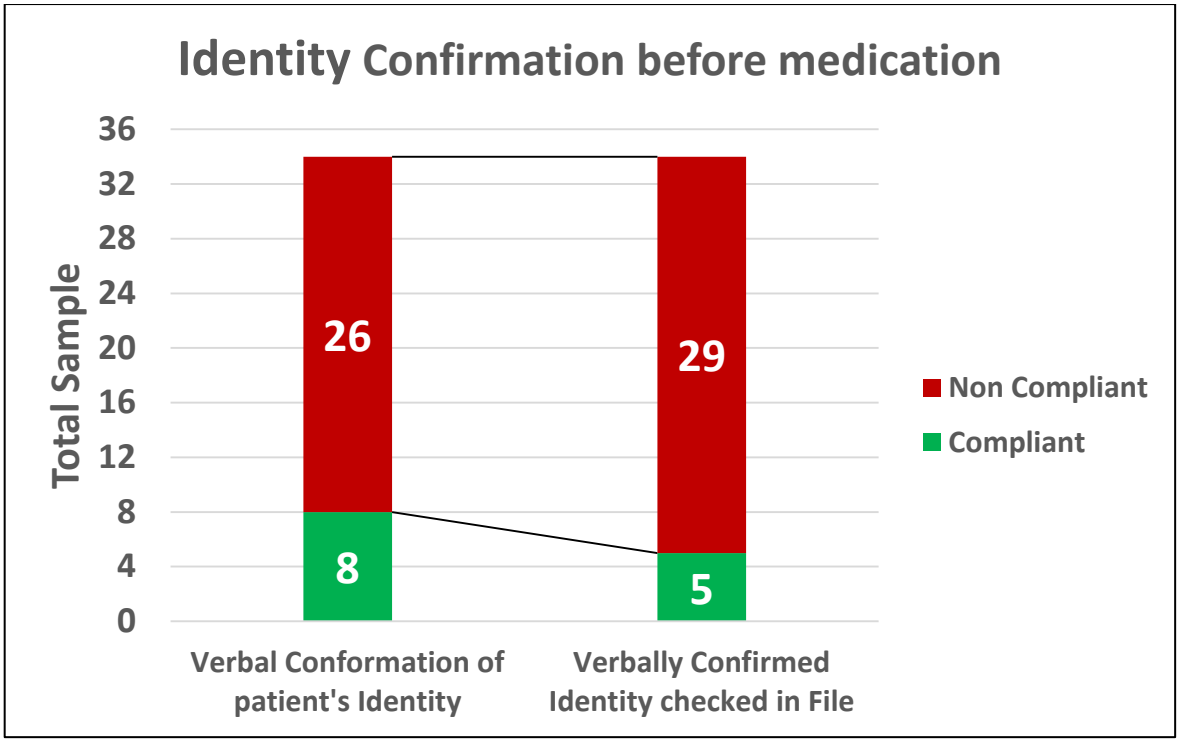


Figure: 1

Results for patient identification **before a procedure/intervention** was also observed in which, 9 errors were identified in cases where ID band was not used for verification. Identification details on the band were illegible in 5 cases out of 34 observations. In 6 number of cases, it was observed that the patient name was not verbally confirmed with the patient or carer. Furthermore, 10 cases were such where verbally confirmed name was not checked with the patient's file. Out of 34 number of invasive and non-invasive procedures, double identification was not done in 13 cases. (Table. 2).

When bifurcation of invasive and no-invasive procedures is done, it was seen that in 90% of invasive procedures which includes, surgeries and biopsies, a double identification check was done (Figure: 2). Here, the identification procedure was carried out in the pre-OT room, where patient's identity is confirmed using 2 identifiers (i.e., patient's name and IPID number of the patient). Whereas in non-invasive procedures the incidence of double identification was 15 %, as single identification check was done 70 % of the time. (Figure:3)

Table. 2. Comparison of incidences characterizing the inadequate patient identification before procedure/intervention.

Criteria	N_p	E_p	**Incidence of non-compliance**
ID Band not used	34	9	26.4 %
Patient identification details incorrect	34	1	2.9 %
Core Identifiers not present/incorrect/rubbed	34	3	8.8 %
Identifiers illegible	34	5	14.7 %
Patient's name not confirmed	34	6	17.6 %
Verbally confirmed named not matched with file	34	10	29.4 %
Identification Check not done before transfer	34	9	26.4 %
Double Identification not done before procedure	34	13	38.2 %

Caption: N_p = number of observations before procedure/intervention; E_p = Number of errors.

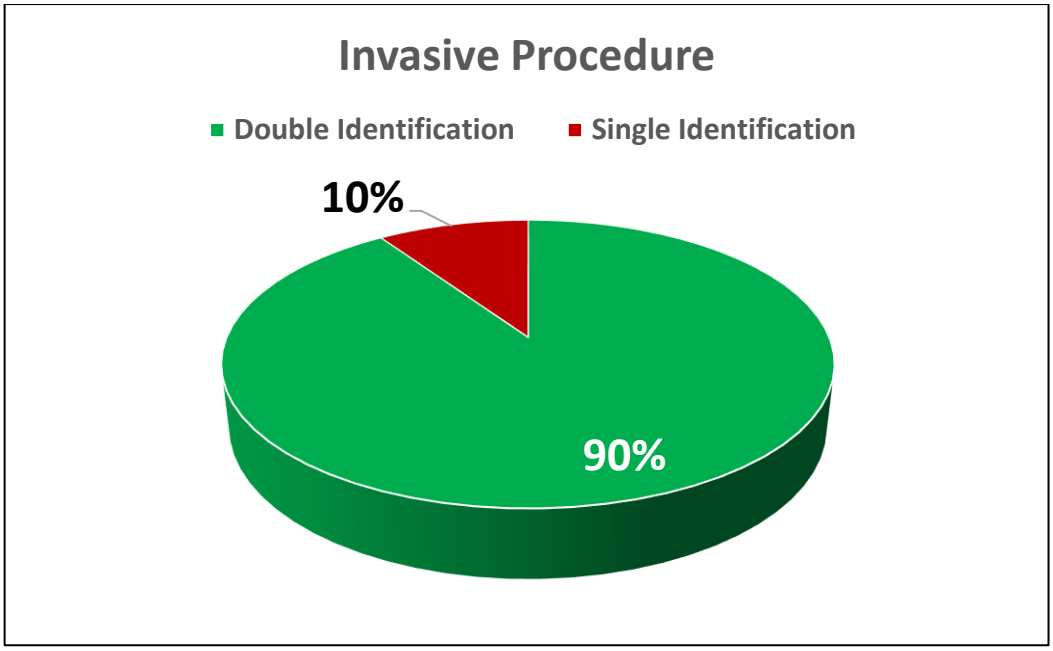


Figure: 2

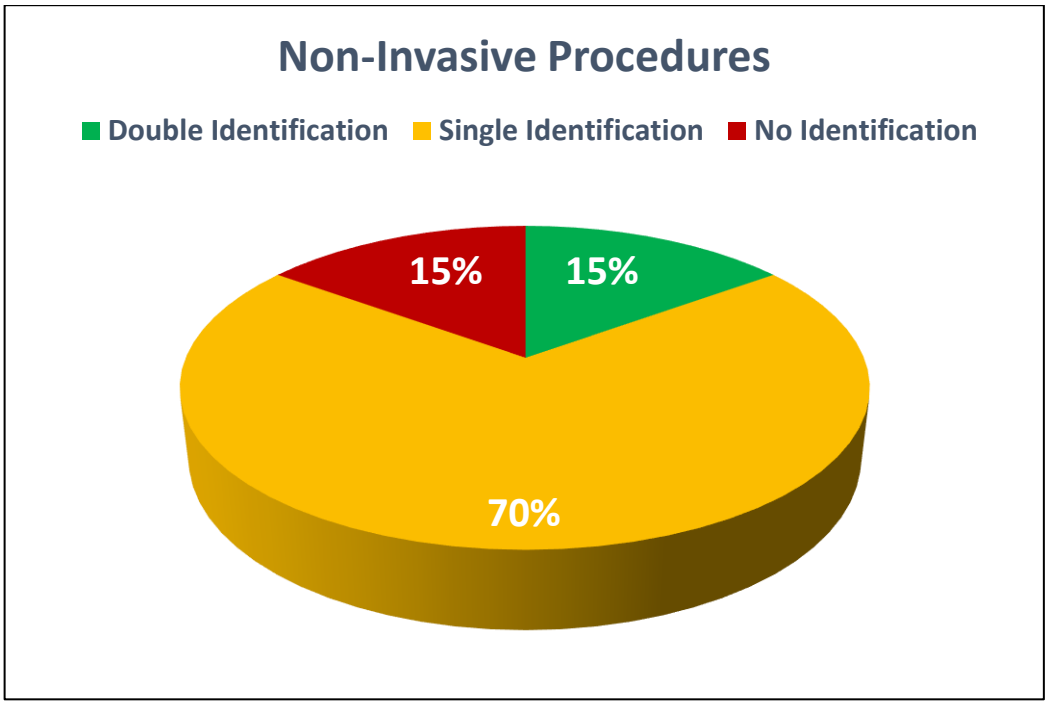


Figure: 3

Incidence for identification check of different procedures have also been identified (Figure: 4).

Here incidence for double identification was 0 % in procedures like blood sample collection, ECG and dialysis. On the contrary, incidence of double identification was 90.5 % for surgeries and 100 % for CT scan.

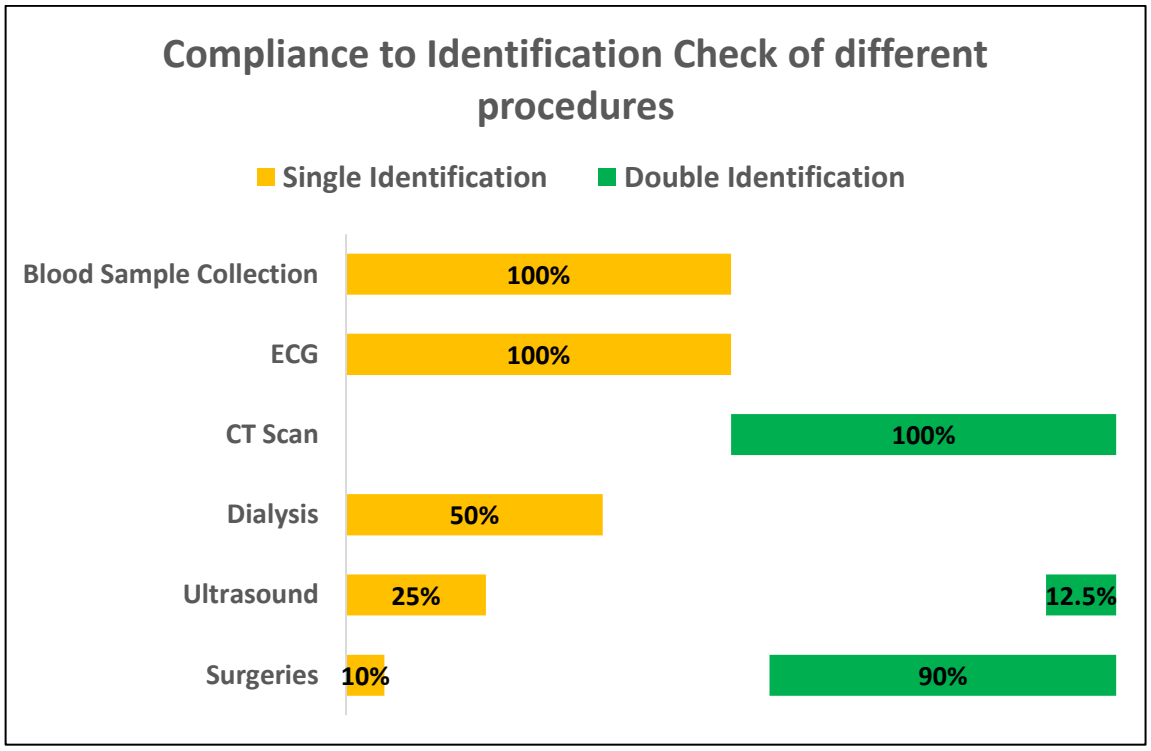


Figure: 4

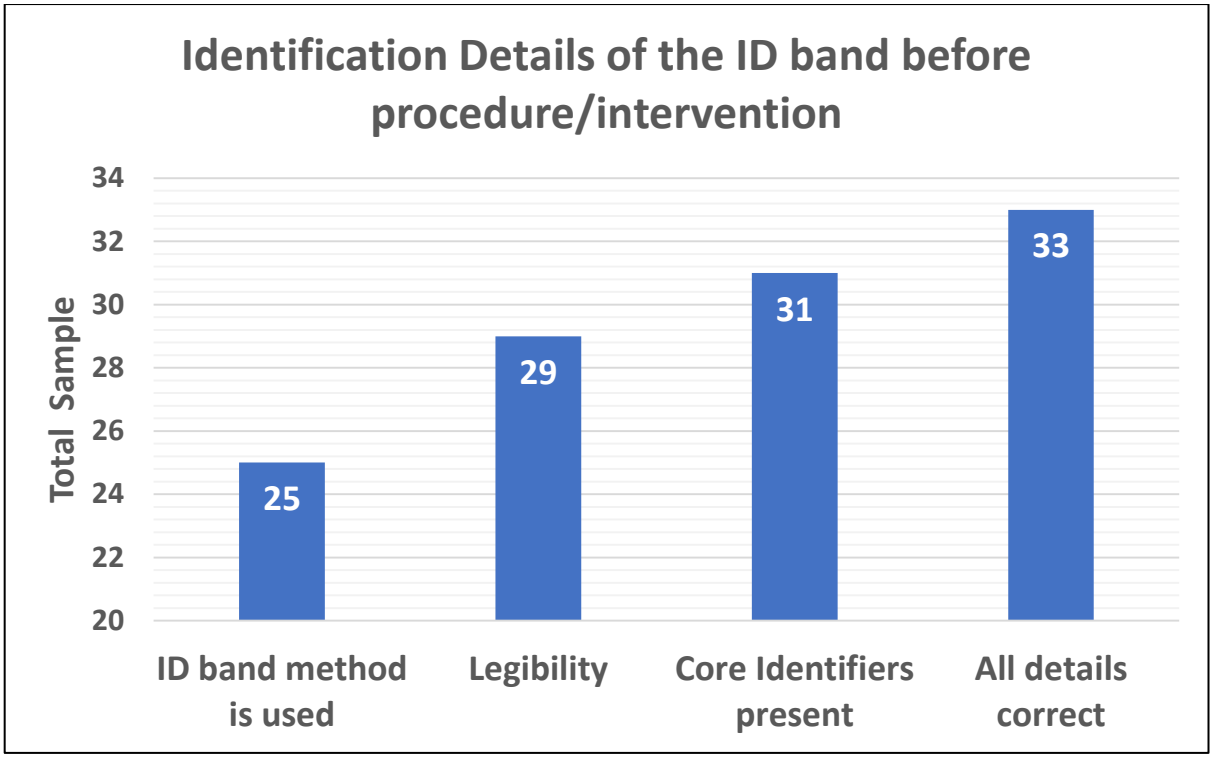


Figure: 5

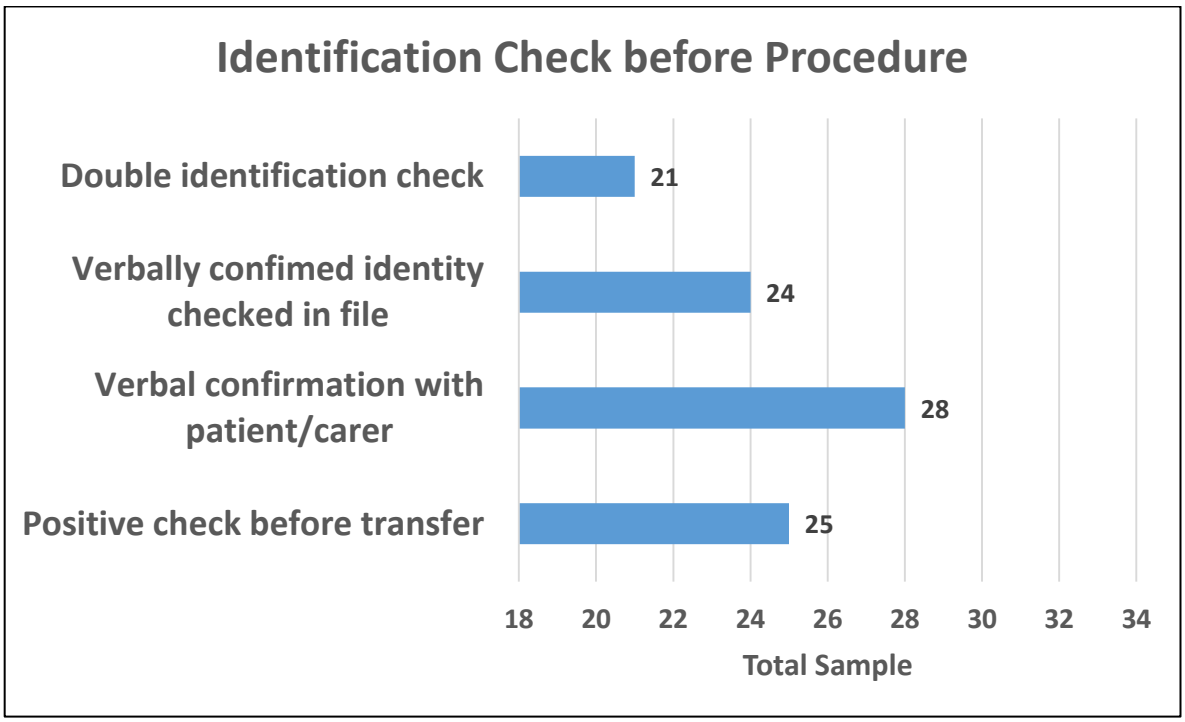


Figure: 6

Limitations

Our sample size was fairly small (n = 68). This was due to the limited time we had for this study and limited financial support. This study can also be conducted with a large sample size and for a longer duration and perhaps the result can then be generalised (For 1000 screening population, NABH recommends 278 sample size) (annexure 5)

Other Limitations also include the Study Exclusion criteria which are as follows:

- Intensive care unit
- Blood sample laboratory

Conclusions

The process of patient identification, is a prerequisite for providing successful and safe health care. In summary, it was concluded that many nurses, doctors and technicians in clinical settings do not verify patient identity before performing a task, which resulted in more than one third of staff not conforming themselves with the double identification procedure prior to medication administration. Our study also shows over three fourth of the total invasive procedures are compliant to double identification. On the contrary, non-invasive procedure shows less than one fourth compliance to double identification.

Although patient identification errors are infrequent, they may result in serious adverse events and are preventable. Improved training and better use of technology may improve the way health care workers verify patient identity, and additional research on these methods is warranted.

Recommendations

Additional training is one approach to improve the frequency and accuracy of health care workers verifying patient identity. Additionally, a barcoded wristband can provide two forms of identification in one easy-to-access place by encoding the patient name and identification number. The barcode frequently serves as a key to a database. When it is read, the scanner decodes the symbol and instructs a computer to look up or update the specific record that corresponds to that patient.

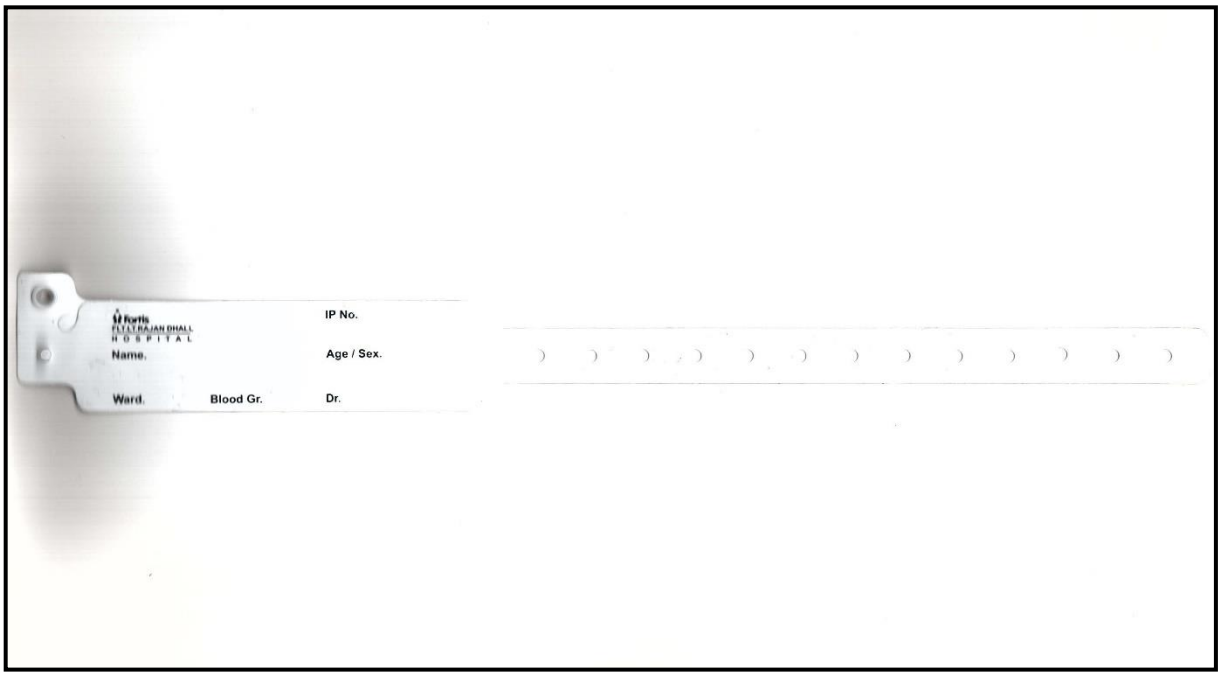
Combination of technology and training might overcome the limitations of the human mind during the time of verification procedures. In light of the critical requirement that a patient's identity band details be accurate and legible, it may be sensible to develop specific procedures for verifying all identity bands. This needs to be done immediately after they are applied by an individual other than the one who applied the band, to improve the results for the upcoming CQI 3j indicator of NABH.

References

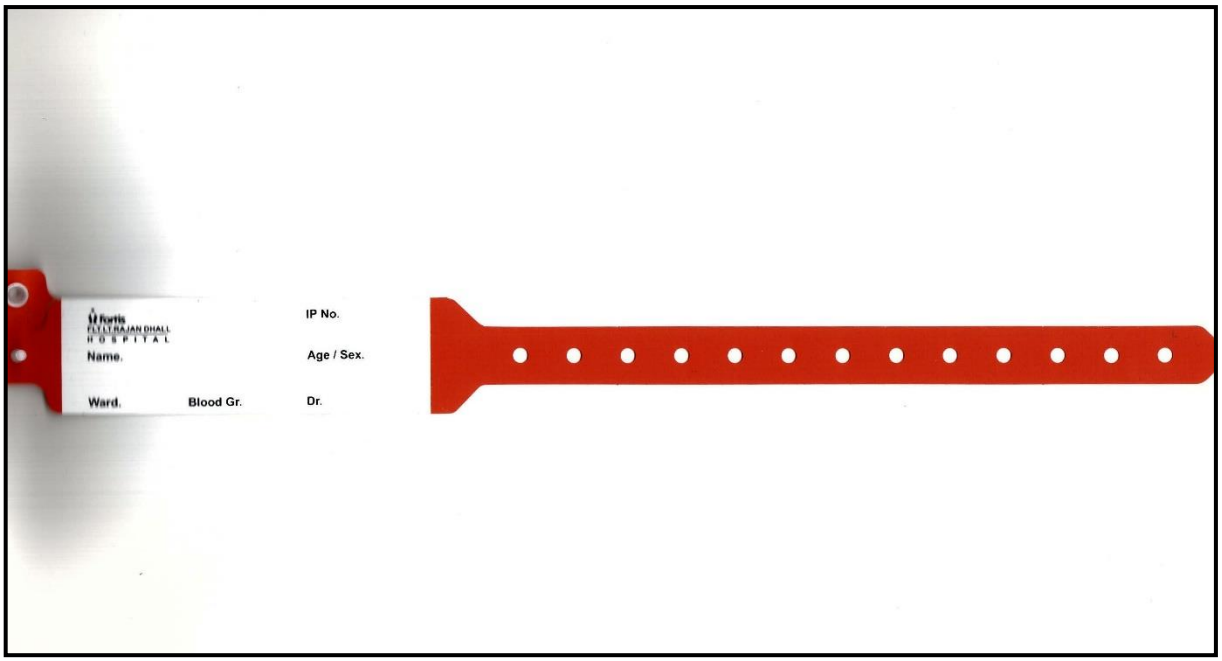
1. Singh, S. *et al* (2014) To formulate a selective patient safety-related policy for a tertiary care hospital. *International journal of research foundation of hospital and healthcare administration*, 2(2), p. 94-102. doi: 10.5005/jp-journals-10035-1022
2. Philip L. *et al* (2010) Patient Identification Errors Are Common in a Simulated Setting. *Annals of Emergency medicines*, 55(6), p. 503-509. doi: 10.1016/j.annemergmed.2009.11.017
3. Sevdalis, N. *et al* (2007) The Role of Patient Identification in Patient. *Research gate*. (https://www.researchgate.net/publication/272023403_The_Role_of_Patient_Identification_in_Patient_Safety.html)
4. Junghee, J., Jenna, L. M., Lori, A. C., and Philip L. H., (2013). Re-examining the requirements for verification of patient identifiers during medication administration: No wonder it is error-prone. *IIE Transactions on Healthcare Systems Engineering*, 3, p. 280-291. doi: 10.1080/19488300.2013.862329
5. WHO Collaborating Centre for Patient Safety Solutions (2007) Patient identification. *Patient safety Solutions*, 1(2), p. 1-4. (Retrieved from
6. Murphy, J. (2014) Joint Commission National Patient Safety Goals, 2014. *Topics in Patient Safety*, 14(1), p. 1-4.
7. Marquard *et al* (2011) Nurses' Behaviours and Visual Scanning Patterns May Reduce Patient Identification Errors. *Journal of Experimental Psychology: Applied*, 17(3), p. 247–256. doi: 10.1037/a0025261
8. Bártlová, S., Hajduchová, H., Brabcová, I., Tóthová, V., (2015). Patient misidentification in nursing care. *Neuroendocrinology Letters*, 36(2), p. 17-22. doi: 2354-4716
9. It's all in the Wrist: Improving Patient Safety with Barcode Wristbands (2013). *Zebra Technologies*, p. 1-11.

Annexures

Annexures 1

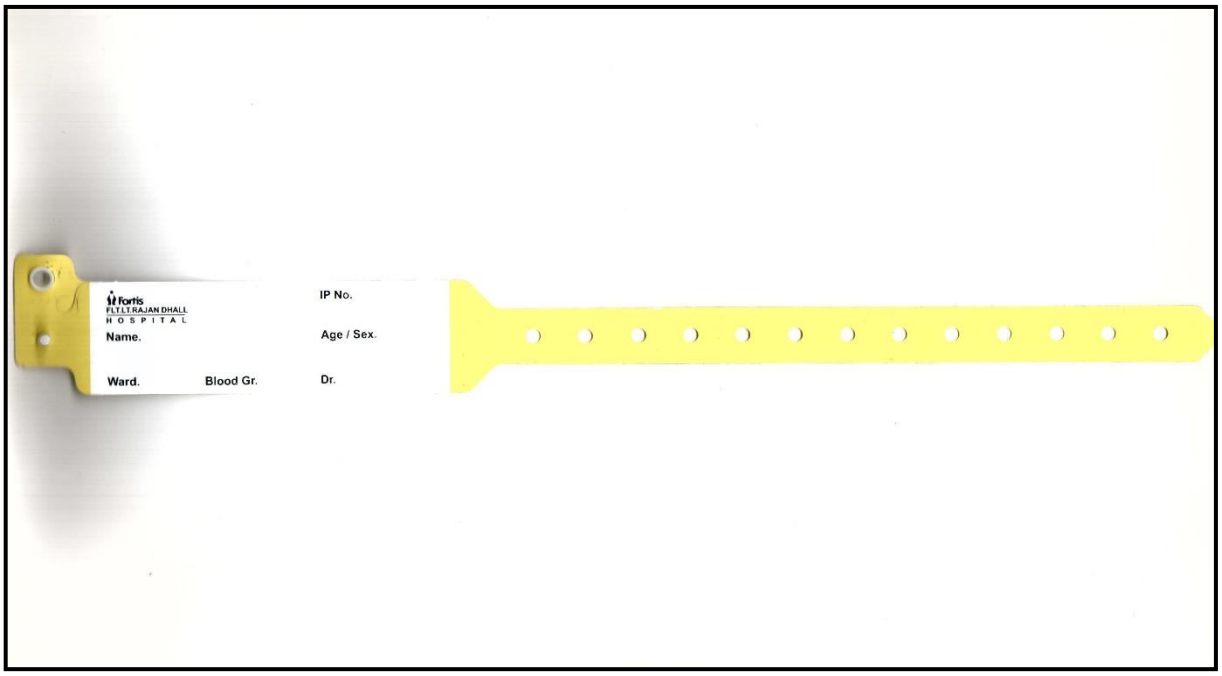


Picture 1: White Band, all the necessary details printed on the Band.



Picture 2: Orange Band, for patients who are vulnerable, all the necessary details printed on the Band.

Annexure 2



Picture 3: Yellow Band, for patients who are allergic, all the necessary details printed on the Band.

Annexure 3

Observation Checklist-1		
Identification before medication		
1.	What is the method used to identify the patient?	□ ID Band □ Photo ID □ Address □ None
2.	If ID band: Is it a single band (one only)	□ Yes □ No
3.	If No: What is/are the colour of the other band/bands?	□ Orange □ Yellow
4.	If orange: Is the patient vulnerable?	□ Yes □ No
5.	If Yellow: Is the patient allergic?	□ Yes □ No
6.	What core identifiers are present on the identification band?	□ Patient's name □ Age □ Sex □ UHID number □ IPID number □ Date of admission
7.	Are the patient identification details on the band correct?	□ Yes □ No □ Unable to verify
8.	Are the identifiers in black text on a white background?	□ Yes □ No
9.	If yes, are all the identifiers on the band legible?	□ Yes – hand written □ Yes – typed □ No
10.	Is the patient conscious or unconscious?	□ Conscious □ Unconscious
11.	Is the patient's identity confirmed verbally with the patient or carer?	□ Yes with patient □ Yes with carer □ No
12.	Is the verbally confirmed name of the patient checked with the patient's file?	□ Yes □ No

Annexure 4

Observation Checklist-2		
Identification before procedure/intervention		
1.	What is the method used to identify the patient?	□ ID Band □ Photo ID □ Address □ None
2.	If ID band: Is it a single band (one only)	□ Yes □ No
3.	If No: What is/are the colour of the other band/bands?	□ Orange □ Yellow
4.	If Orange: Is the patient vulnerable?	□ Yes □ No
5.	If Yellow: Is the patient allergic?	□ Yes □ No
6.	What core identifiers are present on the identification band?	□ Patient's name □ Age □ Sex □ UHID number □ IPID number □ Date of Admission
7.	Are the patient identification details on the band correct?	□ Yes □ No □ Unable to verify
8.	Are the identifiers in black text on a white background?	□ Yes □ No
9.	If yes, are all the identifiers on the band legible?	□ Yes – hand written □ Yes – typed □ No
10.	Is the patient's identity confirmed verbally with the patient or carer?	□ Yes with patient □ Yes with carer □ No
11.	Is the verbally confirmed name of the patient checked with the patient's file?	□ Yes □ No
12.	What is/are the type of procedure/(s) that the patient is required to undergo?	□ Invasive procedure □ Non-Invasive procedure
13.	Is patient identification check done before transferring the patient to the procedure room?	□ Yes □ No
13.	Is patient identification check done with two identifiers before initiating the procedure?	□ Double Identification □ Single Identification □ None

Annexure 5

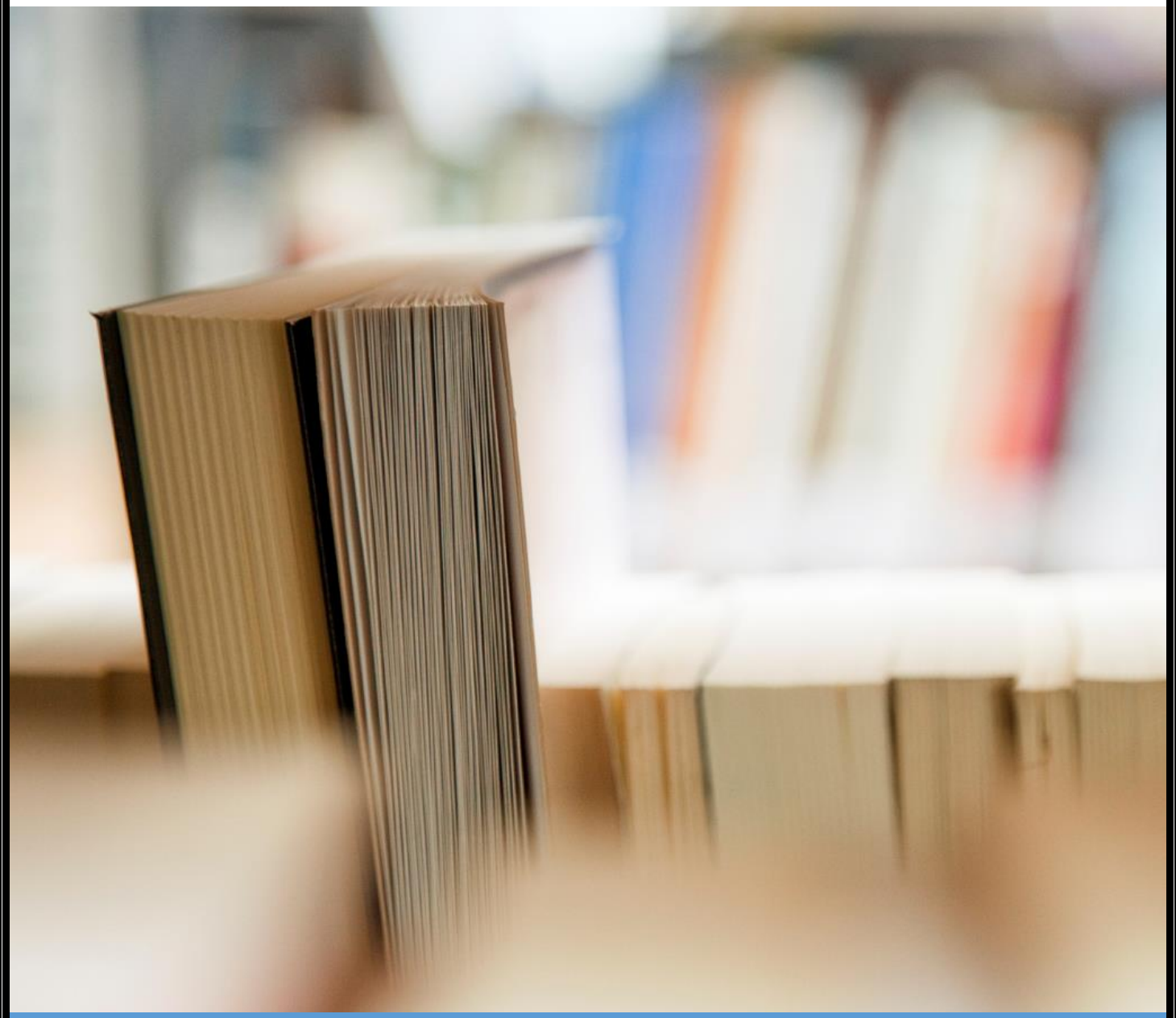
C. Sample size annexure

Screening Population	Sample Size*
50	44
100	79
150	108
200	132
500	217
1000	278
2000	322
5000	357
10000	370
20000	377

*For the recommended sample size, all the samples should be taken on continuous basis.

Picture 4: Sample size recommended by NABH (4th edition) for capturing CQI 3j indicator.

PROJECT 2



Incidence of patient identification errors observed before medication and procedure / intervention

TABLE OF CONTENTS

ABBREVIATIONS

CPA	Consumer Protection Act
CQI	Continual Quality Improvement
e	Electronic
HOD	Head of Department
ID	Identification Number
IMC	Indian Medical Council
MAR	Medical Administration Records
MoHFW	Ministry of Health and Family Welfare
NABH	National Accreditation Broad For Hospital
NICU	Neonatal Intensive Care Unit
OPD	Out Patient Department
OT	Operation Theater
PICU	Pediatric Intensive Care Unit
ROA	Route of Administration
RTI	Right to Information Act
WHO	World Health Organization

BACKGROUND

Prescription writing is one of the most important and basic skills that a doctor needs. It was seen in previous studies that a large number of medical errors include medication errors, which may be related to writing of an illegible prescription and dispensing of wrong, inappropriate medications which results in adverse events and death(2). Prescription errors accounts for 70% of medication errors (1) (Dean B., 2005). Studies show that the range of errors attributable to junior doctors, who are responsible for most prescriptions in hospitals, can vary from 2 to 514 per 1000 prescriptions and from 4.2 to 82% of patients or charts reviewed (3). Further studies, in which Legibility of doctors' handwriting was assessed, revealed that doctors' handwriting when was compared to other healthcare professional and administrators, was the worst of all (4). A study by *Rayan et al*.(1998) suggested, that the errors of prescribing are the most common form of avoidable medication errors, these need to be targeted and improved (5). As per the **'*Right to Information Act 2005***' (RTI Act-2005), it is the inherent right of every patient to have a correct and clear prescription (6) (Ian L.O. Buxton, 2006). After the introduction of ***Consumer Protection Act 1986*** (CPA-1986) in India, prescription has become a valuable, consumable linkage between the patient and the registered medical practitioner and it is also the ethical and legal duty of medical practitioner to write the prescription clearly and legibly, which are the essential features of every prescription (7) (WHO, 1995). A public notice by the Ministry of Health and Family Welfare (MoHFW) proposes a change in the Indian Medical Council (IMC) regulation. Union Health Minister, J.P. Nadda agreed that illegible prescription by doctors may lead to serious implications and even death in certain cases. Later, he approved the amendment to the Indian Medical Council Regulations, 2002, providing therein that every physician should prescribe drugs with generic names in legible and capital letters and they should ensure that there is a rational prescription and use of drugs (8).

Unfortunately, there is less awareness and recording of Adverse Drug Reactions and medication errors in India and very few physicians are following prescription guidelines. To improve the quality of life, it is very important to standardize the prescription at all levels of the healthcare delivery system. Various Prescription audit has to be conducted, to seek observation, evaluation and further recommendation on the prescribing practices of medical practitioners to make rational prescribing (*Sirisha, et al*. 2015).

INTRODUCTION

Prescription is a written directive, as for the compounding or dispensing and administration of drugs, or for other service to a particular patient. There are four parts to **a *drug prescription***.

1) **Superscription:** Consisting of the word recipe, take, or its sign, Rx

2) **Inscription:** The main part of the prescription, containing the names and dosage of the drugs

3) **Subscription:** Directions for mixing the ingredients and designation of the form (pill, powder, solution, etc.) in which the drug is to be made.

4) **Signature:** Directions to the patient regarding the dose and times etc. of taking the remedy, preceded by the word signa, designate, or its abbreviation, S. or Sig (9) (*Falex*, 2012).

The ***Medication Use Process*** is commonly divided into four stages:

1) The prescribing stage (writing / ordering the prescription)

2) The medication supply stage

3) The administration stage (administering the prescription)

4) The monitoring stage (counselling the patient about the prescription and monitoring treatment outcome) (11)

Prescription writing error (prescription errors, including illegibility) and administering errors are two most frequent types of medication errors. Prevention of errors at the prescribing stage is one of the most important steps towards reducing medication errors and it has been recognized as a priority in healthcare systems worldwide (12). The experts conclude that ambiguity or confusion in prescription order may be avoided in the beginning itself, by following some principles in prescribing stage. At the time of prescribing, always make sure that the prescription is legible and easy to read, complete doctor and patient details must be clearly mentioned, all text must be in clear hand writing and should be written in capital and all details pertaining to a drug must be mentioned clearly. Abbreviation of medicine name, archaic terminologies such as Q.D. or O.D should be avoided. (*Ian L.O. Buxton*, 2006) (6)

We are identifying the number of prescriptions complying with the prescription guideline pattern, laid down by the hospital in which the study was conducted. In that hospital, certain

policies and procedures have been established. As per those policies, certain criteria must be followed while writing a prescription in an inpatient department, to avoid medical errors.

1) Patient information: It is used in a prescription to individualize treatment plan and to avoid confusion, hence it is mandatory to write the patient demographics like name, age, sex, address, identification number and weight. It is also compulsory to fill allergy box to know the allergic status before prescribing the drugs.
2) Prescriber's information: Only a registered medical practitioner–medical officer, senior medical officer, and consultant shall prescribe medications. It is mandatory to prescribe all drugs with physician name and sign. So when there is any doubt regarding the drugs and follow-up, contact physician directly.
3) Drug information: Drugs are available in different dosage forms and strengths, it is mandatory for every doctor, to write the drug name in capital letter, and clearly mentioning all the required details (frequency, dosage form, route, strength, time) without any unaccepted abbreviations and overwriting. Leading zero should always be used (for example, 0.1mg) and avoid using trailing zero (for example, 1.0 mg). When medication is needed to be discontinued the word "discontinue" must be mentioned.
4) Legibility: Make sure that your prescription is legible and easy to read. Due to illegible handwriting nurses get confused and dispense look alike drugs to patient. It has been found that this is the most common error identifying from practitioners (13) (14) (*Sirisha, et al.,* 2015). Illegible prescriptions result in a lower quality of healthcare by loss of time and money, medication errors and patient harm, inefficient or faulty communications and create legal issues (*Bruner A et al.,* 2001) (15).

The National Accreditation Board for Hospital and Health care provider (NABH) has certain accreditation standards for hospitals on particulars of Continual Quality Improvement. The organization must identify key indicators to monitor the clinical structures, processes and outcomes, which are used as tools for continual improvement. One of the Objective elements is patient safety goals. Hence, the goal of this study is to capture the compliance of medication prescriptions written in capital and their legibility.

OBJECTIVES

- To study compliance rate of prescriptions written in capital letters according to CQI 3j indicator of National Accreditation Board of Hospital (4th Edition).
- To study compliance to Doctors and patient detail, Legibility of prescriptions, Strength and Dose, Frequency, Route of administration, Dosage form, abbreviation for drug, allergy detail and leading zeros in the dose.

PURPOSE

The hospital is presently running in its 3rd cycle. NABH mandates institutionalization of the revised standards (4th Edition) by 1st July. One of the CQI 3j Indicator "Compliance to medication prescription in capitals" will be reviewed in the study as was asked by the medical superintendent of the hospital.

SCOPE OF THE STUDY

Study the Medication Administration Records compliance to documentation standards as per NABH policy in wards and Intensive Care Units and study the drug chart of pediatric and Neonatal Intensive Care Units.

METHODOLOGY

Study Area

Convenient randomly selected Medication Administration Record sheets from wards and Intensive care Units were studied.

Study Design

Retrospective descriptive observational study.

Sample Design

In this study convenient random sampling technique will be used to select Medical Prescriptions (Medication Administration Record) from the Inpatient Department (Wards and Intensive Care Unit) during the functional hours.

Study Time

Various Medication Administration Record sheets from existing one month of hospital data were observed and required data was recorded over a period of 11 days from April 13th 2016 to April 25th 2016.

Study Tool

Prepared checklist (annexure 1). Microsoft Excel for Analysis of data

METHOD OF MEASUREMENT

A sample of 132 prescriptions were selected during the month of April 2016 to identify prescription errors pertaining to doctor's details, patient's details and medication details. Compliance rate of prescriptions written in capital and its legibility have been identified. Prescriptions were observed on the basis of the presence or absence of the understated details. Various parameters were identified in each prescription, which are as follows:

1. Doctors name and signature
2. Patient name, age, sex, ID number, weight, date of admission.
3. Drugs name written in capital
4. Strength and Dose of drug
5. Frequency of drug
6. Route of administration
7. Dosage form of drug
8. Abbreviation for drug name
9. Leading zero
10. Allergy details
11. Data for stat/once only/ pre medication drugs (in capital, overwriting, not signed with in 24 hour)
12. Legibility of prescriptions were assessed on the basis of the following points
    Point 1: Prescription details are clear and legible.
    Point 2: Prescription details are clear but require efforts to read.
    Point 3: Prescription details are not at all clear.
13. Legibility of Drugs were assessed on the basis of the following points
    Point 4: One drug name is not clear.
    Point 5: More than one drug name is not clear.
    Point 6: all drugs names are clear.

During this study, over a period of eleven days, five prescriptions were randomly observed every day from both, ward and ICU, to calculate the compliance of prescription in six different wings of wards and in five different ICUs, (In the hospital two floor were occupied

as wards, and each floor was named as "A" and "B" with three wings on each floor namely A1, A2, A3, B1, B2, B3). Every day, two prescriptions were also observed separately from Pediatric ICU and Neonatal ICU, to capture leading zeros.

Inclusion Criteria

- Inpatient department prescriptions (Wards and ICUs)
- MAR Sheet (Medication Administration Record) (annexure 2 & 3)
- Medication chart for Pediatric intensive care unit and neonatal intensive care unit (PICU and NICU) (annexure 4)

Exclusion Criteria

- Outpatient department prescriptions
- Some data of prescription like (generic name of drug, use of archaic terminologies, spellings of drugs, time and date of dosage, word "discontinued "mentioned or not) were excluded from study.
- Accuracy of prescriptions
- Doctor progress report

RESULTS

132 prescriptions of wards and ICUs were taken for observation for compliance rate of drugs written in capital and its legibility (annexure 1 table1 and 2; Graph 1 to 8).

Results were express in percentages for wards and ICUs respectively. Lacking with the ***physician's information*** is one of the drawbacks that may create a chance for medical errors. In this study when 624 and 652 drugs was observe in wards and ICUs respectively, doctor's name was present in 79.6% and 83.3%, whereas signatures were present in 92.3% and 96.3% (annexure 1 Table 1; Graph 1). ***Patient information*** is use to individualize treatment plan and to avoid confusion among patients. When 110 prescriptions were observe, it was found that, there was 100% compliance for patient's age, sex, ID number, date of admission, however compliance for patient's name was 94.5% and 96.4% and patient's weight was 83.6% and 81.8% (annexure Table 1; Graph 2).

In order to get information about the ***details pertaining to medications***, prescriptions were observe and it was found that compliance for strength of drug mention is 89.7% and 93.7, whereas dose was mention in 93.4% and 97.1%. Allergy detail was mention in 98.4% and 97.2%. In 98.4% and 99.7% frequency of drug was mentioned, whereas for route of

administration and dosage form it was (93.3 % and 97.1%) and (96.2% and 98.9 %), respectively (annexure 1 Table 2; Graph 3).

In the same no. of prescriptions it was also observed that out of 164 drugs in wards and 212 drugs in ICU for stat/once only/ pre medication, ***compliance for drugs in capital and stat*** not signed within 24 hours were, (49.3% and 95.8%)and (83.5% and 92.9%), respectively (annexure 1 Table 2 ; Graph 6).

98% and 100% of the drugs in the prescriptions were written in capital letters. (Annexure 1 Table 2; Graph 4, 5) Out of 74 drugs of PICU and NICU, 99% have correctly placed ***leading zeros*** (annexure 1 Table 2; Graph 8).

When legibility of prescriptions were observed, none of the prescription was not at all clear and point 3. About 61.8% and 70.9% of prescriptions were legible (point 1) and rests 38.2% and 29.1% were clear but requires effort to read (point 2). ***When legibility for drugs name*** was observed, in 23.6% and 18.2% of prescription one drug name is not clear (point 4), in 16.4% and 7.3% prescription more than one drug is not clear, rest of prescription that is, 60% and 74.5% all drug name are clear (annexure 1 Table 2; Graph 7).

TABLES AND GRAPHS FOR RESULT

Table 1: Compliance related to patient and doctors details in wards and ICU

Details Pertaining To Patient			
Criteria	**TOTAL**	**Compliance of ward**	**Compliance of ICU**
Patient name	n= 55	94.5%	96.4%
Patient age and sex	n= 55	100.0%	100.0%
Patient ID number	n= 55	100.0%	100.0%
Patient Weight	n= 55	83.6%	81.8%
Date of admission	n= 55	100.0%	100.0%
Details Pertaining To Doctor			
Doctor's Name present	N_w = 624 N_i = 652	79.6%	83.3%
Doctor's Signature present	N_w = 624 N_i = 652	92.3%	96.3%

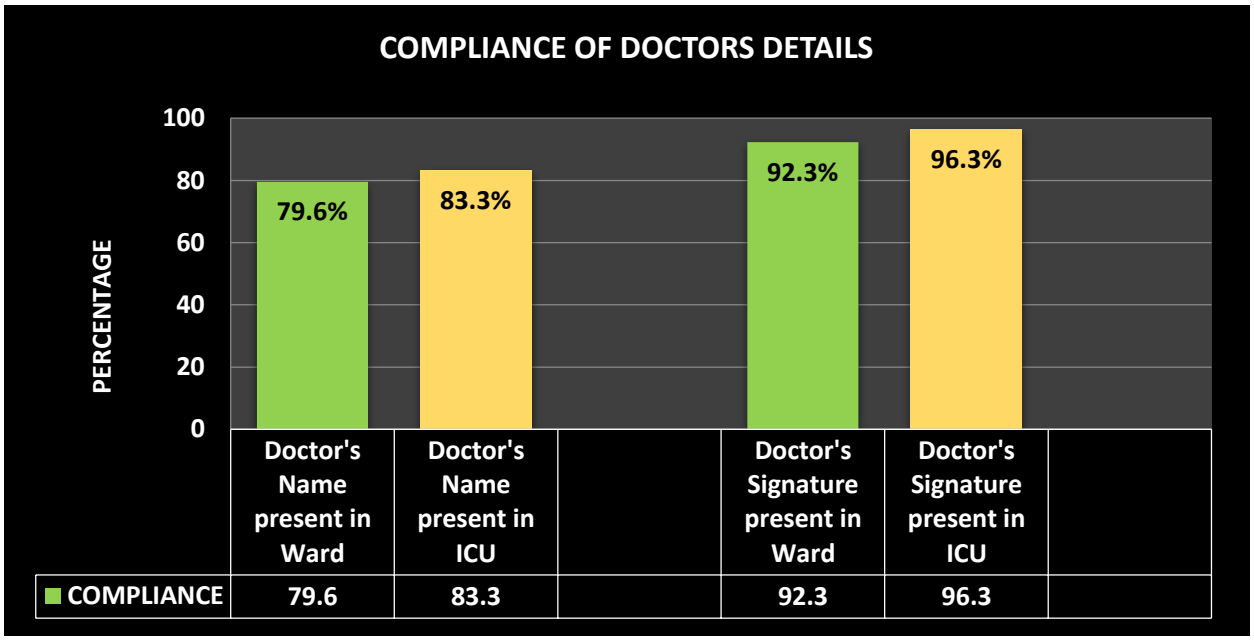
Caption: n = number of prescriptions observe, each in ward and ICU; N_W = number of drugs observed in wards; N_i = number of drugs observed in ICU.

Table 2: Compliance related to medication details

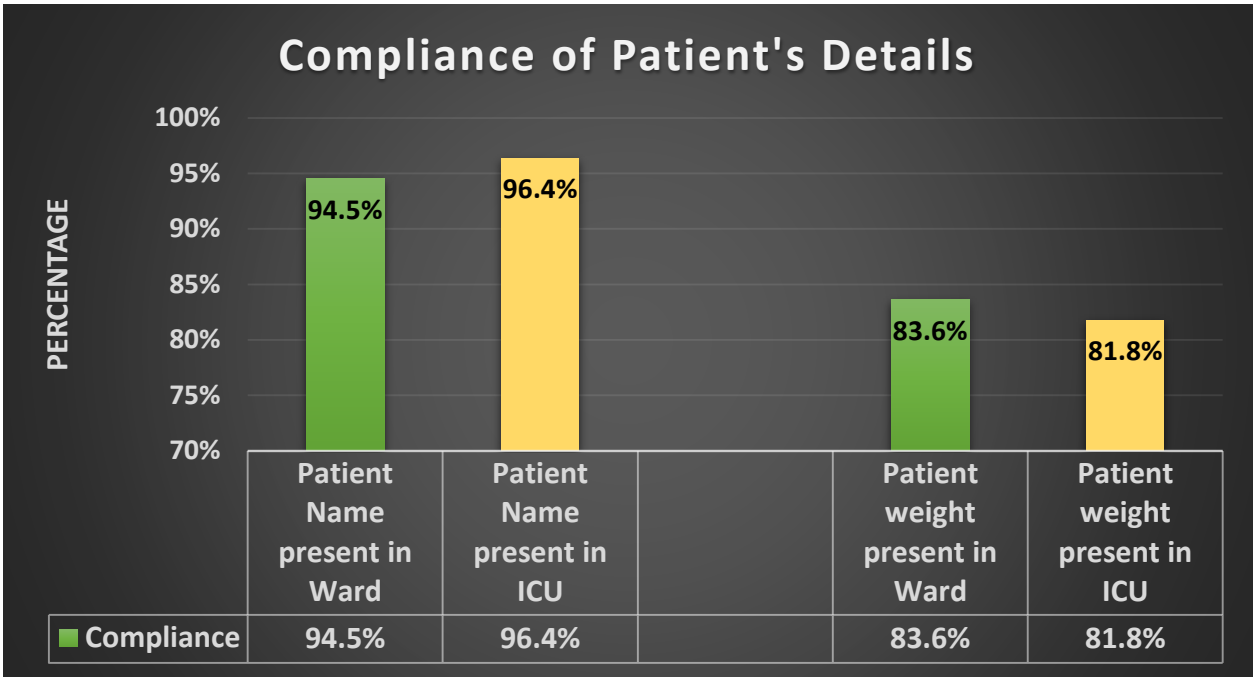
Details Pertaining To Medication			
Criteria	**Total**	**Compliance of ward**	**Compliance of ICU**
Drugs Written in Capital	$N_w = 624$ $N_i = 652$	98%	100%
Strength of drug mentioned	$N_w = 624$ $N_i = 652$	89.7%	93.7%
Dose of drug mentioned	$N_w = 624$ $N_i = 652$	93.4%	97.1%
Frequency of drug mentioned	$N_w = 624$ $N_i = 652$	98.4%	99.7%
Route of administration mentioned	$N_w = 624$ $N_i = 652$	93.3%	97.1%
Dosage form of medication mentioned	$N_w = 624$ $N_i = 652$	96.2%	98.90%
Abbreviation for drug name not mentioned	$N_w = 624$ $N_i = 652$	97.3%	97.0%
Allergy details mentioned	$N_w = 624$ $N_i = 652$	98.4%	97.2%
Stat drugs in capital (by nurses)	$N_w = 164$ $N_i = 212$	49.3%	95.8%
No Over writing in stat drug	$N_w = 164$ $N_i = 212$	100.0%	100.0%
Signed within 24hrs	$N_w = 164$ $N_i = 212$	83.5%	92.9%
Legibility of prescriptions scoring			
Point 1	n=55	61.8%	70.9%
Point 2	n=55	38.2%	29.1%
Point 3	n=55	0.0%	0.0%

Legibility of drugs name scoring			
Point 4	n=55	23.6%	18.2%
Point 5	n=55	16.4%	7.3%
Point 6	n=55	60.0%	74.5%
Pediatric ICU and Neonatal ICU			
Leading zeros present in PICU and NICU	N=74	-	99.0%

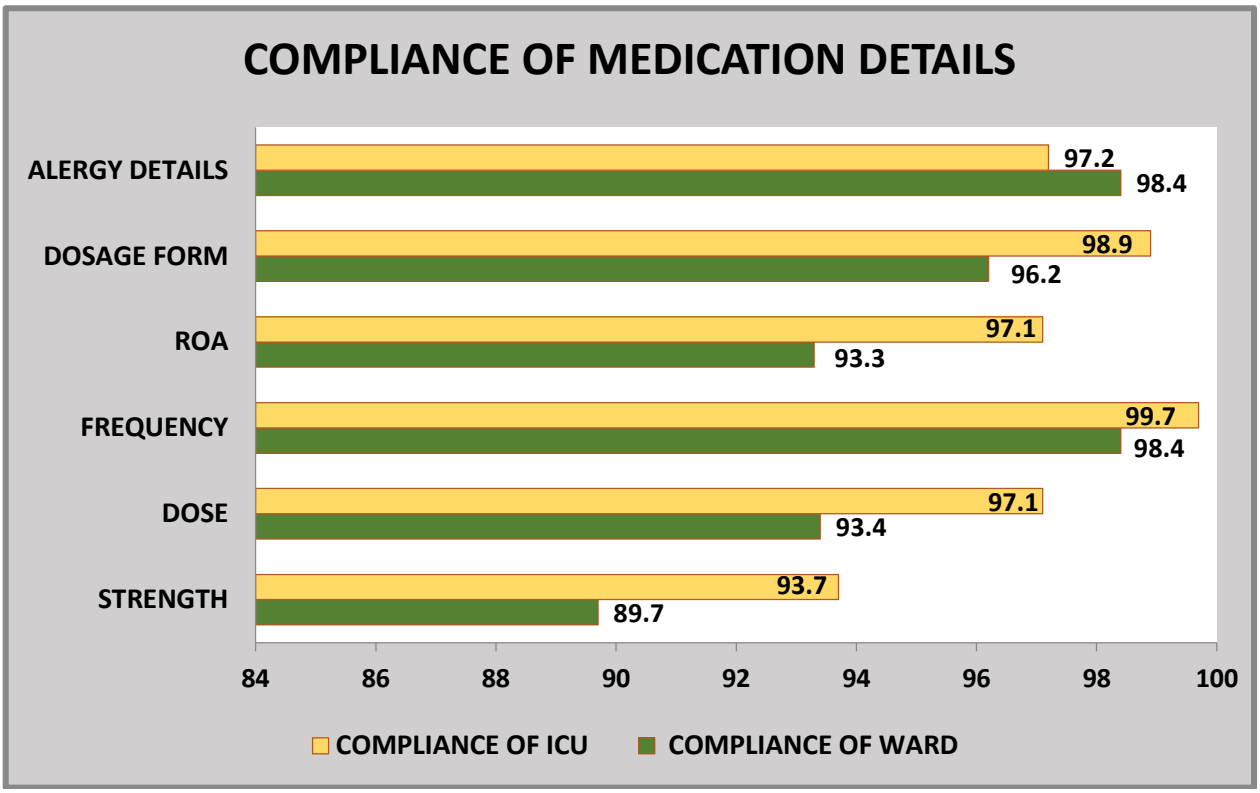
Caption: n = number of prescriptions observe, each in ward and ICU; N_w = number of drugs observed in wards; N_i = number of drugs observed in ICU; N = number of drugs in PICU and NICU



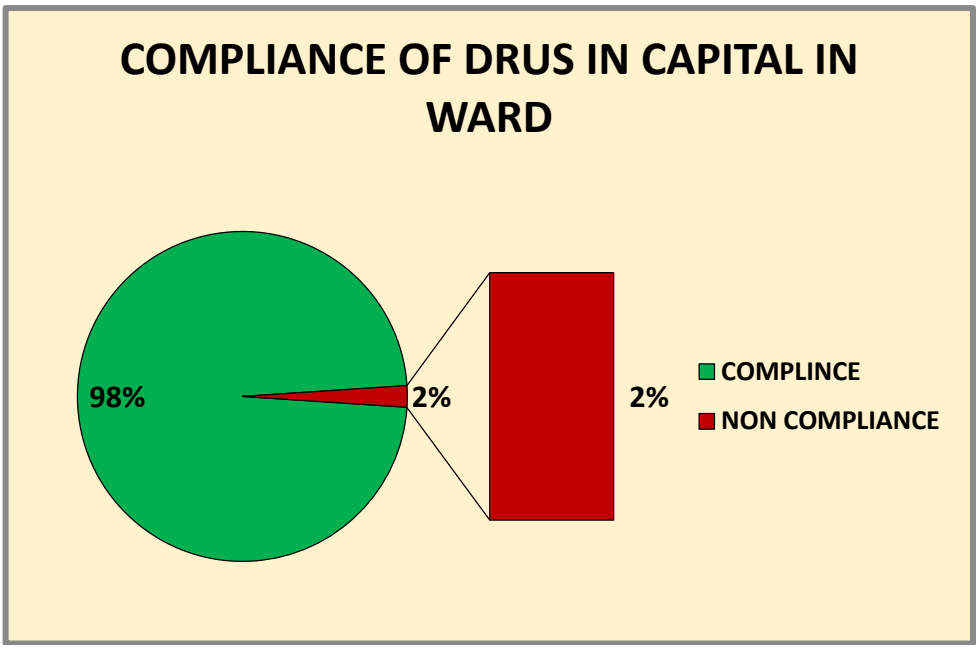
GRAPH 1



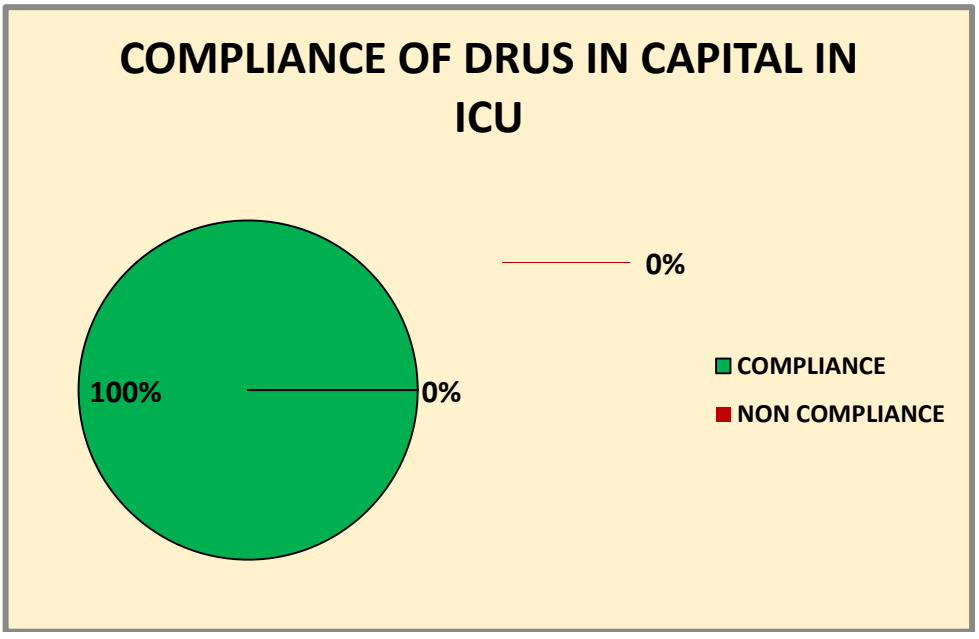
GRAPH 2



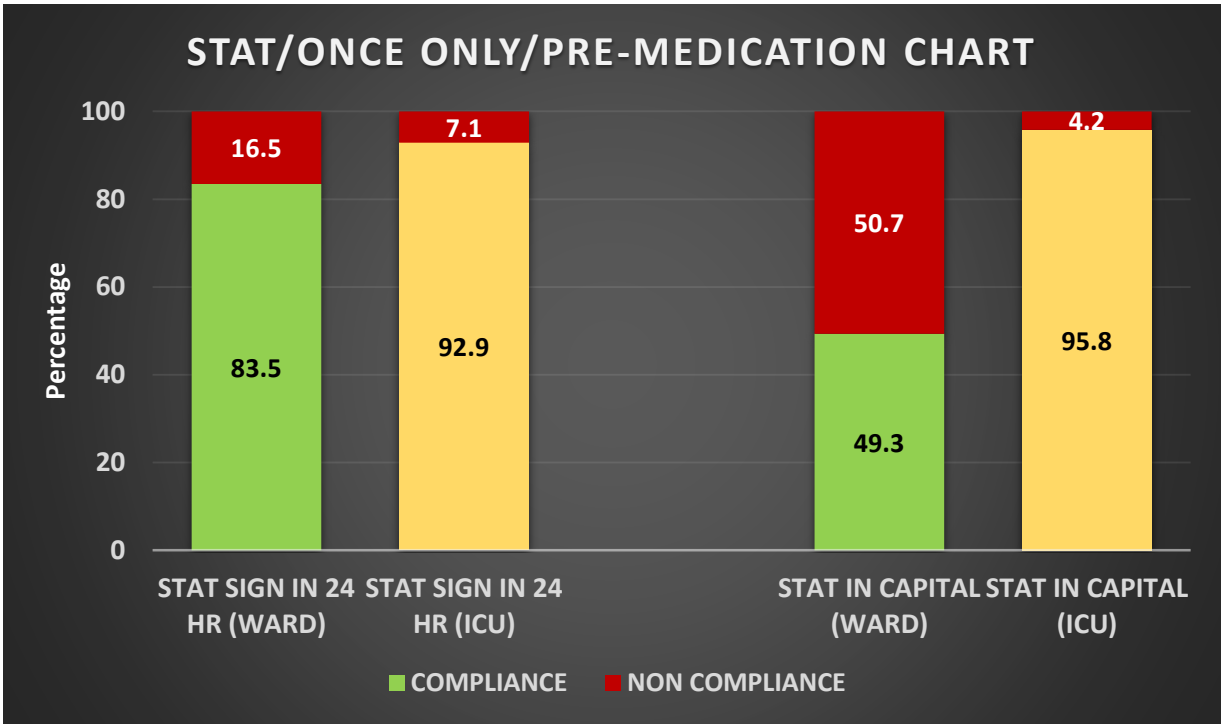
GRAPH 3



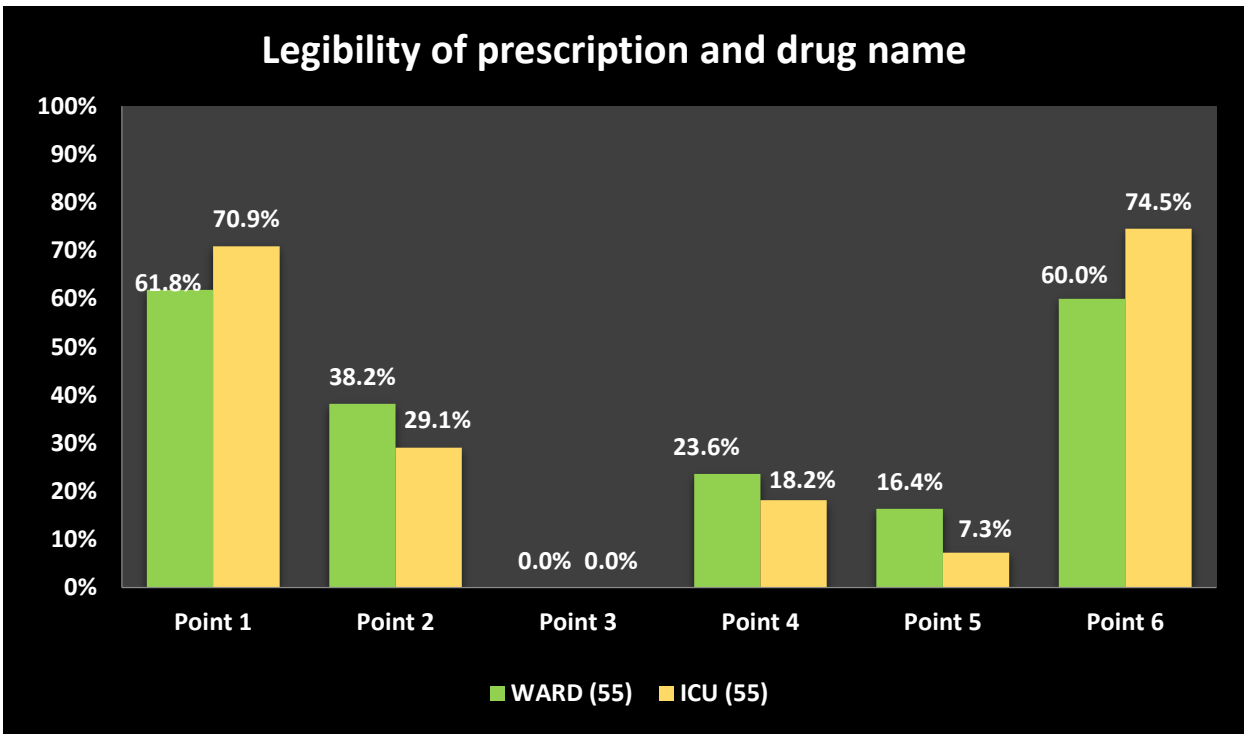
GRAPH 4



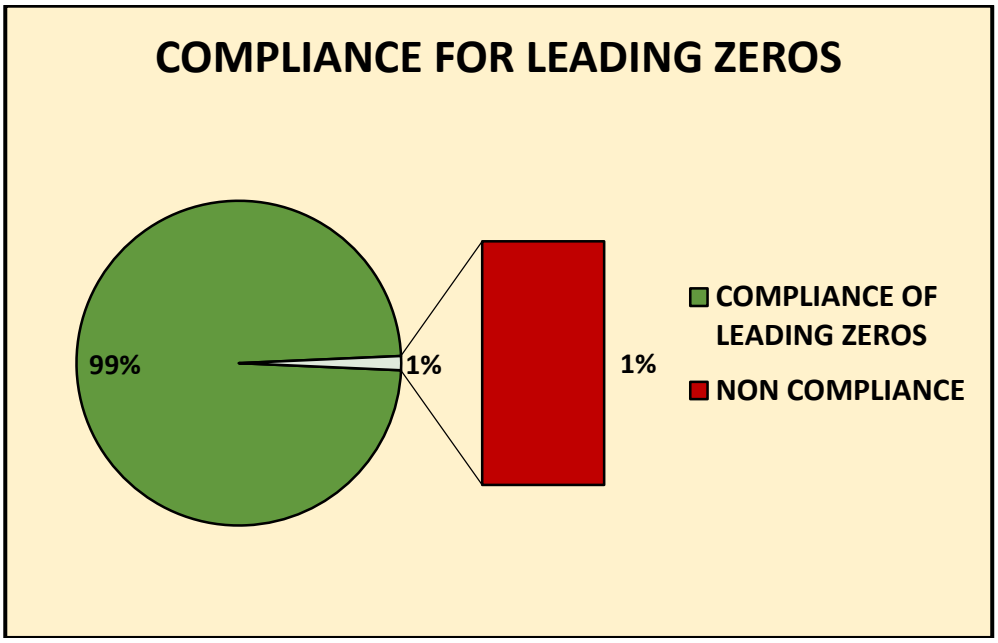
GRAPH 5



GRAPH 6



GRAPH 7



GRAPH 8

LIMITATIONS

- Due to time constraint, our sample size was not adequate as per the required standard sample size set by National Accreditation Board of Hospital and Healthcare Providers. This study can also be conducted with a large sample size and for a longer duration and perhaps the result can then be generalized. (For 1000 screening population, NABH recommends 278 sample size) (Annexure 5).

- Other limitations also include study exclusion criteria.
    a) Outpatient department prescriptions
    b) Some data of prescription like (generic name of drug, use of archaic terminologies, spellings of drugs, time and date of dosage, word "discontinued "mentioned or not) were excluded from study.
    c) Accuracy of prescriptions
    d) Doctor progress report

CONCLUSIONS

The study revealed that the level of completeness of handwritten prescriptions was low in terms of doctor's details and patient's weight, which indicates unsatisfactory commitment of the prescribers to follow the hospital guidelines of prescribing. Remaining compliances showed less discrepancy. Majority of prescriptions showed compliance to medication written in capital but still the compliance to clear and legible prescriptions is only three fourth of the total prescriptions.

RECOMMENDATIONS

- Additional research studies must be conducted in the hospital as per the NABH sample size, to assess the prescribing practices of practitioners on their prescription.
- The study highlights the need of more training programs and regular assessments to train and sensitize the prescriber about prescribing skills and the importance of neglected criteria. Also encourage them to follow the hospital prescription guidelines to make 100% compliance for the upcoming CQI 3j indicator of NABH.
- Various studies have shown that electronic prescribing can reduce the incidence of medication error by more than 50% and improve the quality of life and patient safety. (16) So there is a need to move towards electronic prescribing to allow the hospital immediate benefit of improving legibility, completeness and elimination of transcription errors.
- After implementation of e-prescriptions, studies can be conducted to compare them to handwritten prescriptions.

REFERENCES

1. Dean B., Vincent C., Schachter M., Barber N. (2005). The incidence of prescribing errors in hospital inpatients: an overview of the research methods, *Drug Safety*, 28, p: 891–900
2. Ian L.O. *et al*, (2006) Principles of Prescription order writing and patient compliance, *Goodman and Gilman's The Pharmacological Basis of Therapeutics 11th edition. Macgraw Hill*, p: 1777-1786
3. Ross S., Bond C., Rothnie H., Thomas S., Macleod MJ. (2009). what is the scale of prescribing errors committed by junior doctors? A systematic review, *Br J Clin Pharmacol* 67, p: 629–40
4. Lyons R *et al.* (1998). Legibility of doctors' handwriting: Quantitative comparative study, *BMJ*, 317, p: 843-844
5. Rayan *et al* (2015) *World Journal of Pharmacy and Pharmaceutical Sciences*, 4(10), p: 296
6. Ian L.O. *et al*, (2006) Principles of Prescription order writing and patient compliance, *Goodman and Gilman's The Pharmacological Basis of Therapeutics 11th edition*. Macgraw Hill, p: 1777-1786
7. WHO Drug action Committee (1995). Model Guide to Good Prescribing, (52)
8. Health Ministry to ask doctors to write prescriptions in capital letters (2015). *Times of India.*
9. Farlex Partner Medical Dictionary, *Farlex* (2012)
10. Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, Seventh Edition (2003). Saunders
11. Practice Guideline and Tools, Ministry Of Health Singapore
12. Four Units of a University Teaching Hospital in Nigeria (2011) *Journal of Public Health and Epidemiology*, 3(11), p: 513-519
13. Sirisha *et al* (2015). *IAJPS*, 2(3). ISSN 2349-7750
14. Fortis Policy on safe and rational prescription of medicines (2015)
15. Bruner A, Kasdan ML. (2001). Handwriting errors: harmful, wasteful and preventable. *J KY Med Associates* (99), p: 189-192
16. Albarrak A. *et al*, (2014) Assessment of legibility and completeness of handwritten and electronic prescriptions. *Saudi Pharmaceutical Journal*, 26(6), p. 522-527. doi: 10.1016/j.jsps.2014.02.013
17. Dr. Ballal, R., Dr. Elkhawad, A., (2015) Medication And Prescribing Errors Encountered In Khartoum Dental Hospital. *World Journal of Pharmacy and Pharmaceutical Sciences*. 4(10), p. 294-309. (Retrieved on – 13/04/16)
18. Srinivasan K., Chitra S., (2016). Prescription writing- The mistakes we make: A Prospective Study. *Medical Science*. 20(78). (Retrieved on – 13/04/16)
19. Mandal P. et al (2013). An Assessment of Legibility and Accuracy of Prescriptions through Prescription Surveys. *IOSR Journal of Nursing and Health Science*. 1(5). p. 1-3. (Retrieved on – 13/04/16)

ANNEXURES

Table 1: Checklist

Details pertaining to doctors		
S. No.	**Identification Criteria**	**Response**
a)	Doctor's name written on the prescription	Total ____ No name ____
b)	Doctor's signature	Present ____ Absent ____

Details pertaining to Patients		
S. No.	**Identification Criteria**	**Response**
a)	Patient's full name	Present ____ Absent ____
b)	Patient's age and sex	Present ____ Absent ____
c)	Patient's ID number	Present ____ Absent ____
d)	Patient's weight	Present ____ Absent ____
e)	Date of admission	Present ____ Absent ____

Details pertaining to Medications		
S. No.	**Identification Criteria**	**Response**
a)	Name of drug written **legibly** Legibility of prescriptions was assessed on the basis of the following points: • Point 1: Prescription details are clear and legible. • Point 2: Clear but requires effort to read • Point 3: Prescription details not at all clear Legibility of drug name was assessed on the basis of the following points: • Point 4: One drug name is not clear • Point 5: More than one drug name is not clear • Point 6: All drug names are clear	Point 1 ___ Point 2 ___ Point 3 ___ Point 4 ___ Point 5 ___ Point 6 ___
b)	Name of drug written in **CAPITAL.**	No. of drugs prescribed ___ No. of drugs not written in capital ____
c)	**Strength and Dose** of the prescribed drugs not mentioned	Not Mentioned Strength ____ Dose ____
d)	Is the **frequency of drugs** prescribed mentioned?	Not present ____
e)	Is the **route of administration** of the prescribed drugs mentioned	Not present ____
f)	Is the **dosage form of the medications** mentioned	Not present ____
g)	**Abbreviation for drug name** used in the prescription	Present ____
h)	Use of **leading zeros** in dose of the drug used	Present ____
i)	**Stat/once only/pre medication drugs** consultations signed by the consulting doctor within 24 hours or not	No. of drugs ____ Drugs not in capital ____ Overwriting present ____ Not Signed in 24 hrs. ____
j)	**Allergy** details mentioned	Present ____ Absent ____

ANNEXURE-2

Fortis
FLT. LT. RAJAN DHALL
HOSPITAL

Patient's Name : ____________________

UHID : ____________ IPID : ____________

Age : ____________ Sex : ____________

D.O.A. : ____________ Unit : ____________

MEDICATION ADMINISTRATION RECORD

Previous Hospitalization Yes ☐ No ☐	Weight in kg	Special Diet
Blood Group :	Diagnosis:	
Drug Hypersensitivities/Allergies:	Surgery/ Procedure : Date of Surgery:	
Previous Medications:		

Standard Timings :Once a day : 10am, Twice a day :10am - 10pm,

:Four times a day : 12 - 6 - 12 - 6, Q8 Hrly :6am - 2pm - 10pm Key: WH = Withheld

Note : Actual timings may vary as per ward routine. Administration of drugs half- an-hour before and after is acceptable

DRUG	Generic Name	Date										
		Time	Time	Inital	Time	Initial	Time	Initial	Time	Inital	Time	Initial
Special Instructions	Route											
Dose	Freq											
Doctor's Name	Signature											

DRUG	Generic Name	Date										
		Time	Time	Inital	Time	Initial	Time	Initial	Time	Inital	Time	Initial
Special Instructions	Route											
Dose	Freq											
Doctor's Name	Signature											

DRUG	Generic Name	Date										
		Time	Time	Inital	Time	Initial	Time	Initial	Time	Inital	Time	Initial
Special Instructions	Route											
Dose	Freq											
Doctor's Name	Signature											

All Drug Names Will Be Written In Capital Letters By Doctor

Revised In-October 2010

FF LRDH/Nsg/18/II-0310

ANNEXURE-3

As Required Prescriptions

Drug				Date																
Dose	Max. Freq.	Route	Start Date	Time																
Doctor,s Name		Signature		Dose / Route																
Additional Instructions				Given By																

Drug				Date																
Dose	Max. Freq.	Route	Start Date	Time																
Doctor,s Name		Signature		Dose / Route																
Additional Instructions				Given By																

Record of Drugs Not administered or Withheld

Date	Time	Name of Drug	Reason Not Administered	Ordered By Doctor	Nurse Initial

Stat / Once Only / Premedication Drugs

Date	Drug (Approved Name)	Dose	Time	Route	Doctor's Signature	Given By	Checked by I / C

Date	Shift	Name of Nurse (in capitals)	Emp. Id.	Initials	Date	Shift	Name of Nurse (in capitals	Emp. Id.	Initials

All Drug Names Will Be Written In capital Letters By Doctor

ANNEXURE-4

TREATMENT CHART							
S.No.	Drug & Dose	Time					VOL. IN 24 hrs
	ANTIBIOTICS	08:00	12:00	16:00	20:00	24:00	
1							
2							
3							
4							
5							
6							
	IONOTROPES						
1							
2							
3							
4							
5							
	SEDATION ANALGESIA / PARALYSIS						
1							
2							
3							
4							
	OTHERS INCLUDING I.V. FLUIDS						
1							
2							
3							
4							
5							
6							
7							

ANNEXURE-5

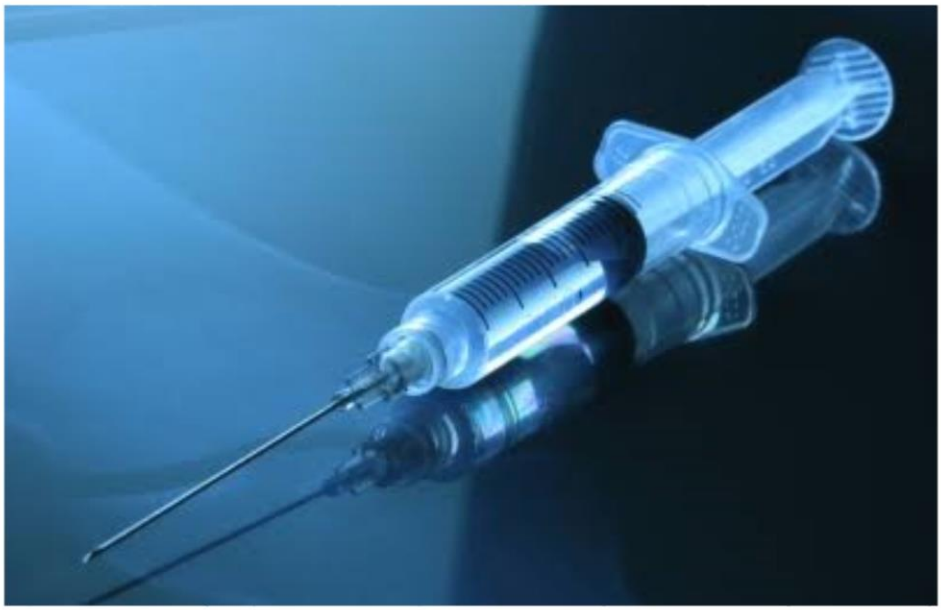
C. Sample size annexure

Screening Population	Sample Size*
50	44
100	79
150	108
200	132
500	217
1000	278
2000	322
5000	357
10000	370
20000	377

*For the recommended sample size, all the samples should be taken on continuous basis.

Sample size recommended by NABH (4th edition) for capturing CQI 3j indicator.

PROJECT 3



Incidence of patient identification errors observed before medication and procedure / intervention

Table of Contents

Abbreviations

3TC	Lamivudine
AIDS	Acquired Immunodeficiency Syndrome
AZT	Azidothymidine
CDC	Centers for Disease Control and Prevention
CQI	Continuous Quality Improvement
EPINet	The Exposure Prevention Information network
GDA	General Duty Assistants
HB	Hepatitis B
HBIG	Hepatitis B Immunoglobulin
HBsAg	Hepatitis B serum Antigen
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
IM	Intramuscular
IV	Intra Venous
LFT	Liver Function Test
NH	National Health
NRTI	Nucleoside Analog reverse-transcriptase Inhibitors
NSI	Needle Stick Injuries
PEP	Post Exposure Prophylaxis
PI	Prescribing Information
SED	Safety Engineered Devices
SI	Sharp Injuries
STAT	immediately
WHO	World Health Organization
ZDV	Zidovudine

Introduction

Needle stick injuries (NSI) are wounds caused by sharps such as hypodermic needles, blood collection needles, IV cannulas or needles used to connect parts of IV delivery systems. Most exposures among health-care workers are caused by percutaneous injuries with sharp objects contaminated with blood or body fluids (Puro *et al*., 2001). Besides needle, sharps also include scalpels, lancets and broken glass.

The causes for needle stick injuries (NSI) include various factors like type and design of needle, recapping activity, handling/transferring specimens, collision between HCWs or sharps, during clean-up, passing or handling devices and/or failure to dispose of the needle in puncture proof containers (Wilburn SQ, 2014). Because of the environment in which they work, many HCWs from physicians, surgeons, and nurses to housekeeping personnel, laboratory technicians and waste handlers are at an increased risk of accidental sharps injuries. As a result, these workers are prone to occupational acquisition of various blood borne pathogens, including the microorganisms causing HIV/AIDS, Hepatitis B and C, Malaria, Infectious mononucleosis, diphtheria, herpes, tuberculosis, brucellosis, spotted fever and syphilis. (Wilburn SQ, 2014) However, the risk of infection from these pathogens is either lower than that from HBV, HCV and HIV, or has only been poorly estimated.

Estimates by the U.S. Centers for Disease Control and Prevention (CDC) put the number of sharps injuries in healthcare in excess of half a million each year, which is about 1,000 percutaneous injuries per day. When coupled with increasing workloads, it can seriously threaten HCWs' health and well-being. (Susan Q. Wilburn *et al.*, 2004) (Panlillio *et al.*, 2004). As a measure of likelihood of injury among hospital workers, it has been estimated that 28 sharps injuries occur annually for every 100 occupied hospital beds (Perry, Parker & Jagger, 2009).

There are only a few studies about the economic issues involved. The economic burden from Sharp Injuries have been defined by Scotland NH in 2005 which are:

1) Testing for infection in the injured worker and, if known, the patient on whom the sharp had been used.
2) Post exposure prophylaxis (PEP) to prevent or manage potential blood-borne virus transmission.

3) Short and long-term treatment of chronic blood-borne viral infections that are transmitted to injured workers.
4) Staff absence and replacement.
5) Counselling injured workers.
6) Legal consequences (litigation and compensation claims).

From above, 1st and 2nd points include post exposure management. The others are potential and vary from one HCW to another. A burden of amounts varying from €4 million to €7 million is expected to result from Sharp Injuries due to the above mentioned costs. (Saia M. *et al.*, 2010). This retrospective study aims to provide an average estimated cost that a hospital has to bear annually from the moment a Sharp Injury occurred to a HCW to the follow-up of the victim for the next six months.

The protocol of management of Sharp Injuries in the hospital under study is as follows:

1. First aid
2. Counselling
3. Risk assessment
4. Relevant laboratory investigations based on informed consent of the source and exposed person
5. Depending on the risk assessment, the provision of short term (4 weeks) of antiretroviral drugs
6. Follow up and support

This study aimed at estimating the cost of post exposure management of SIs in health care workers of the hospital. The cost of SIs is relatively difficult to study because of the types of costs involved; they are direct, indirect and potential. However the costs which are included in the study are:

a. Cost of laboratory tests.
b. Cost of initial treatment.
c. Some of the HCWs also required other tests such as complete blood cell count and liver function test in addition to the routine tests.
d. The cost of additional laboratory tests, vaccinations and immunoglobulin therapy.
e. Antiretroviral therapy.

Background

Preventive medical treatment following exposure may decrease the likelihood of infection with HIV and HBV (Cardo et al., 1997; CDC, 2001). The average direct costs, including laboratory costs for tests of both source patients and exposed employees, labour costs associated with testing and counselling, and the costs of post-exposure prophylaxis, are estimated to be $3,042 (ranging from $1,663 to $4,838) (O'Malley, Scott, Gayle, Dekutoski, Foltzer, Lundstrom, *et al.*, 2007). A study which was conducted from the year 2007 to 2014 in a tertiary healthcare hospital in India calculated cost of 203 occupational sharp injuries as ₹ 423,555. The cost here included the cost of laboratory tests, initial treatment, blood cell count and liver function test in addition to the cost of additional laboratory tests, vaccinations and antiretroviral therapy. In a study, an internet search along with interviews of 13 experts, grey literature was identified. Information was also taken from trade associations, clinician and industry perspectives, as well as safety guidelines from six different countries. The countries that were involved were the United States, United Kingdom, Germany, France, Italy, and Spain. Estimated Costs as the Result of Total and Injection/IV-related NIs were identified by calculating number of incidences and on the basis of treatment range per needle stick injury of a HCW. The annual economic burden for each country came out as $118 million and $591 million, £4 million, €133 - €190 million, $6.1 million, under €7 million and €6 million to €7 million for the United States, United Kingdom, Germany, France, Italy, and Spain respectively.

Although occupational HIV and hepatitis seroconversion is relatively rare, the risks and costs associated with a blood exposure are serious and real. Costs include the direct costs associated with the initial and follow-up treatment of exposed healthcare personnel, which are estimated to range from $500 to $3,000 depending on the treatment provided (*United States General Accounting Office*, 2000). Costs that are harder to quantify include the emotional cost associated with fear and anxiety from worrying about the possible consequences of an exposure, direct and indirect costs associated with drug toxicities and lost time from work, and the societal cost associated with an HIV or HCV seroconversion; the latter includes the possible loss of a worker's services in patient care, the economic burden of medical care, and the cost of any associated litigation (Sharps Injury Prevention Workbook, 2005).

Objectives

- To identify the number of medical occupational sharp injuries among the exposed Health Care Workers (HCW) in the hospital from the available records.
- To estimate the total cost of investigations and treatment provided to the exposed Health Care Workers (HCW) in the hospital.

Purpose of the Study

The hospital is required to carry out investigations and provide treatment in the event of sharp injury or blood and body fluid exposure. This is an expense for the healthcare facility. An estimate of the cost which healthcare facility has to bear for all types of occupational sharp injuries was prepared as it was required by the medical superintendent of the hospital.

Scope of the Study

All Health Care Workers (HCW) in the hospital who were exposed to occupational sharp injuries/ needle stick injuries.

Methodology

Study Area

The tertiary healthcare hospital.

Study Population

Total number of Health Care Workers (HCW) of the hospital who were exposed to medical occupational sharp injury.

Study Design

Retrospective, descriptive, observational study.

Sample Design

All the sharp/needle stick injury case reports were taken as the sample of the study. These reports includes all lab reports with investigations and post exposure prophylaxis and/or treatment details provided to the HCWs. Follow-up tests and consultations were also included.

Study Time

The sharp injury/needle stick injury reports from April 2013 to March 2016 were studied over a period of 11 days.

Tool for the Study

Microsoft Excel for data analysis.

Methods of Measurement

All the NSI/SIs reports from April 2013 to April 2016 were considered and the tests, prophylaxis and/or treatment provided to the HCWs were noted. The employee category, circumstances that led to NSI/SIs, unit involved among other parameters were also acquired from the NSI/SI reports. As per the institutional protocol, basic tests and follow-up tests were conducted. The flow chart (Chart 1) shows the management of sharp injury at the hospital. The testing and treatment following a SI/blood and body fluid exposure in any unit are as follows:

1. NSIs and wounds should be washed with soap and water and should not be squeezed. Mucous membranes should be flushed with water or normal saline thoroughly.
2. Report and give the details of injury to infection control staff or any other designated person.
3. The source patient should be evaluated for HCV, HBV and HIV if the status is unknown.
4. Exposed HCW is also tested for HBV, HCV and HIV.
5. If source is negative, then no further action is taken.
6. Injection for tetanus (Tetanus toxoid 5 ml, IM) is preferably administered if not taken in past 10 years for all sharp injuries.
7. If source is HBV positive or negative, recommended post-exposure prophylaxis for Hepatitis B Virus is given in Table 1.
8. If source is HCV positive or negative, post-exposure management according to baseline test results are given in Table 2.
9. If source is HIV positive or negative, treatment for HIV is given in Table 3. Post Exposure Chemoprophylaxis for HIV when the source patient is drug naive is given in Table 4.

Table 1: Recommended Post-Exposure Prophylaxis for Hepatitis B Virus[1]			
Vaccination and antibody response status of exposed workers[a]	**Treatment**		
	Source HbsAg positive	**Source HbsAg negative**	**Source unknown or not available for testing**
Unvaccinated	HBIG[b] 3x1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated[c], known responder[d]	No treatment	No treatment	No treatment
Previously vaccinated[c], Known non responder	HBIG[b] x1 and initiate revaccination[e] or HBIG[b] x2	No treatment	If known high risk source[f], treat as if source were HbsAg positive
Previously vaccinated[c], Antibody response unknown	Test exposed person for anti-HBs 1. If adequate, no treatment is necessary 2. If inadequate, administer HBIGx1 and vaccine series	No treatment	Test exposed person for anti-HBs 1. If adequate, no treatment is necessary 2. If inadequate, administer vaccine series and recheck titer in 1-2 months

[a] Persons who have previously been infected with HBV are immune to re-infection and do not require PEP.
[b] Dose 0.06 ml/kg body weight IM stat.
[c] Vaccinated with full three-dose series.
[d] Responder is defined as a person with previously documented adequate levels of serum antibody to HBsAg (serum anti-HBs ≥10 mIU/mL); non-responder is a person with previously documented inadequate response to vaccination (serum anti HBs < 10 mIU/mL). It is recommended testing for anti-HBs at the time of exposure.
[e] The option of giving one dose of HBIG and re-initiating the vaccine series is preferred for non-responders who have not completed a second three-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.
[f] High-risk is defined as sources who engage in needle-sharing or high-risk sexual behaviors, and those born in geographic areas with HBsAg prevalence of ≥ 2% (Weinbaum CM, 2008).

[1] Fortis Healthcare Limited, SOP No. 06

Table 2: Hepatitis C Post-Exposure Management According to Baseline Test Results	
Clinical Scenario	**Follow-Up**
Source patient is HCV-antibody negative	No further testing or follow-up is necessary for source patient or the exposed worker[a]
Source patient is unavailable or refuses testing	Exposed worker: Follow-up HCV antibody at 3 and 6 months[a]
Source patient is HCV-antibody positive and HCV RNA negative	Manage the exposed worker as if the source patient has chronic hepatitis C (see Post-Exposure Follow-Up for HCV below)[b]
Source patient is positive for both HCV antibody and HCV RNA ***and*** **Exposed worker is HCV-antibody negative**	• Source patient: Counsel and manage as chronic hepatitis C regardless of status of exposed worker • Exposed worker: Follow up as outlined in Post-Exposure Follow-Up for HCV, below
Exposed worker tests positive for both HCV antibody and HCV RNA	Counsel and manage as chronic hepatitis C

[a] If at any time the serum ALT level is elevated in the exposed worker, the clinician should test for HCV RNA to assess for acute HCV infection.
[b] A single negative HCV RNA result does not exclude active infection.

Table 3: Treatment of HCWs for HIV[2]				
Exposure	**Status of the source (see below)**			
	HIV + and Low risk*	**HIV + and high risk****	**HIV status unknown**	**HIV status negative**
Mucous membrane/non intact skin; small volume (drops)	Consider 2 -drug PEP	2 -drug PEP	Consider 2 - drug PEP	No PEP is required if the source blood is confirmed HIV negative
Mucous membrane/non intact skin; large volume (major blood splash)	2 - drug PEP	3 – drug PEP	Consider 2 - drug PEP	
Percutaneous exposure: Not severe, solid needle, superficial	2 - drug PEP	3 – drug PEP	Consider 2 - drug PEP	
Percutaneous exposure: severe, large bore hollow needle, deep injury, visible	3 - drug PEP	3 – drug PEP	Consider 2 - drug PEP	

* Low risk: Asymtomatic or viral load < 1500 copies/ml. ** High risk: Symtomatic with opportunistic infections, or AIDS, acute seroconversion, high viral load.

[2] Fortis Healthcare Limited, SOP No. 06

Table 4: Post Exposure Chemoprophylaxis for HIV (when source patient is drug naïve)[3]	
Basic regimen: **2 drugs (NRTIs)** **(4 weeks therapy)**	Zidovudine (AZT/ZDV) - 300 mg twice/day is used for all types of exposure + Lamivudine (3 TC)- 150 mg twice a day is added to increase the effectiveness of ZDV and to prevent resistance to ZDV
Expanded regimen: **3 drugs (2 NRTIs +PI)** **(4 weeks therapy)**	Basic regimen (AZT/ZDV + 3 TC) + Nelfinavir 750 mg three times daily or any other boosted protease inhibitor. (for higher risk categories – consult the expert)

[a] In case of high risk exposure from a source patient who has been exposed to or is taking antiretroviral medications, consult an expert to choose PEP regimen, as the risk of drug resistance is high.

Inclusion Criteria

This study has not taken into consideration the cost of all tests such as:

HB Surface Antibodies (Quant), Liver Function Profile, Serum, HIV-1&2 Antibodies Test, Hepatitis B Surface Antigen, Serum, Hepatitis C Antibodies, Serum, CBC, EDTA Whole Blood Smear, Alanine Aminotransferase, Aspartate Aminotransferase, HCV RNA Quantitative, WBC Differential Count, Creatinine Serum, Blood Urea Nitrogen Serum, Uric Acid Serum, Electrolyte Serum, Haemoglobin & Haematocrit, EDTA Whole Blood, Erythrocyte Sedimentation Rate, Urinalysis.

The cost of medication and antiretroviral therapy has also been taken into consideration such as Hepatitis B Immunoglobulin, Tab. Douvir, Tetanus Inj., Allegra (120mg), Crocin.

Exclusion Criteria

The study does not include costs incurred from:

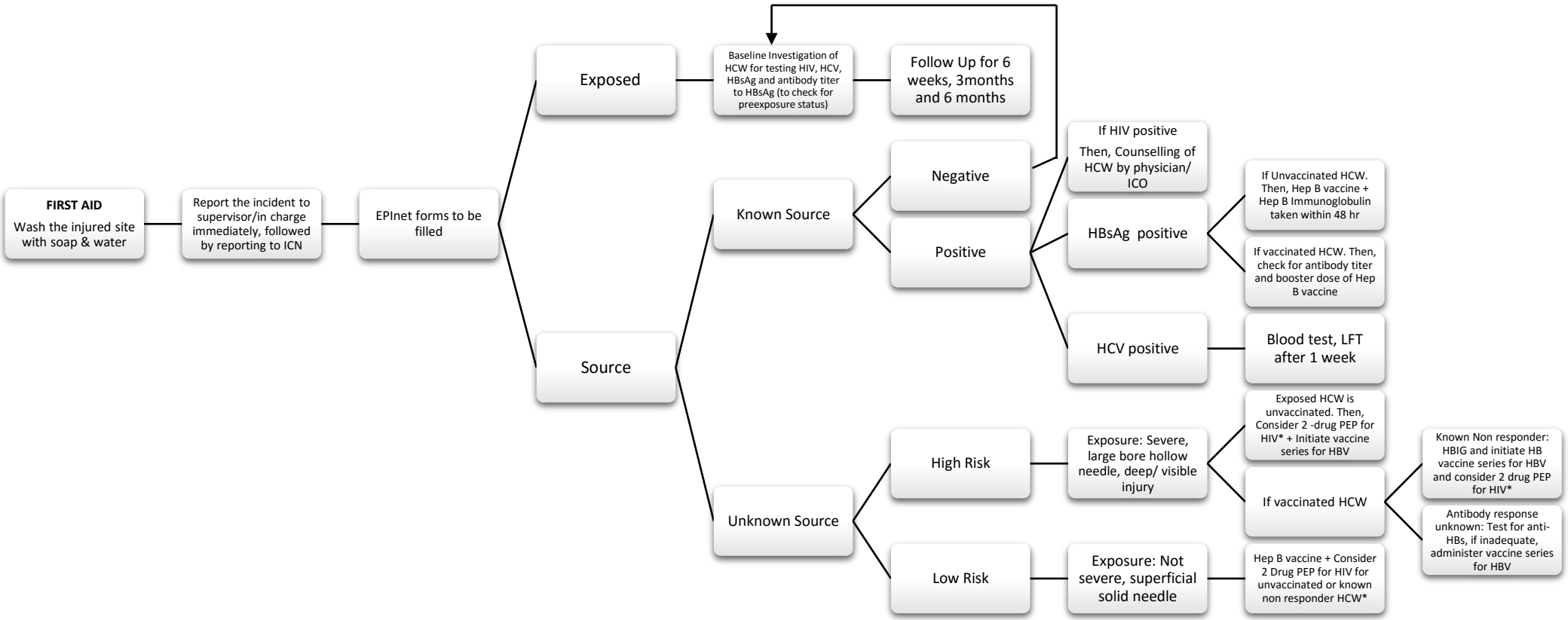
Doctor's Consultation

Vaccination against Hepatitis B Virus

Counselling cost

[3] Fortis Healthcare Limited, SOP No. 06

Figure 1: Flowchart for Management of sharp injury at the hospital



*In cases of unknown source, post-exposure prophylaxis for HIV should be started only under physician consultation.

Results

Incidence of Sharp Injuries

In this retrospective observational study, data was collected from the hospital records and SIs/NSI reports were studied from April 2013 to March 2016. 51 NSI/SIs were encountered during this period (Table 5 and 6). Occupational SIs among different group of HCWs are not uncommon. Various occupational groups of HCW exposed to sharp injuries have been shown in a pie distribution in Figure 1. One can clearly see in the figure that, nurses in the hospital suffered the maximum sharp injuries with percentage share of 29 per cent. While share of GDA is slightly below with 27 per cent also, housekeeping share is still high at 25 per cent.

Table 5: Showing the incidence sharp injuries among HCWs based on their professions

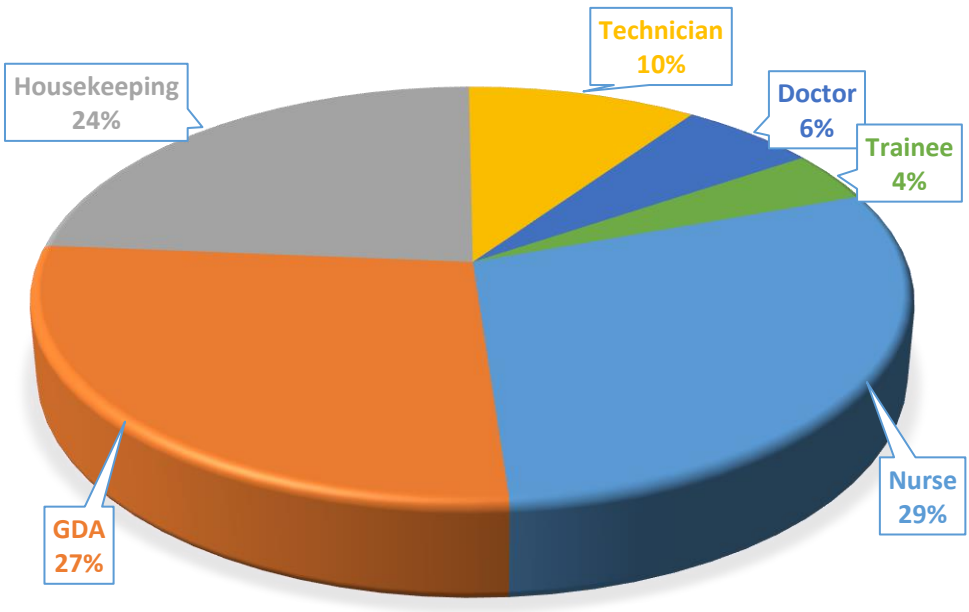
Employee Category	Apr 2013-Mar 2014	Apr 2014-Mar 2015	Apr 2015-Mar 2016
Doctor	3	0	0
Nurse	7	5	3
Housekeeping	5	4	3
GDA	6	4	4
Technician	2	0	3
Trainee	0	1	1
Total	**23**	**14**	**14**

Over three years from April 2013 to March 2016, trend of incidence of sharp injuries show a decline with some months recording high incidences. Monthly incidence of SIs have been plotted (i.e. from April 2013 to March 2014, from April 2014 to March 2015 and from April 2015 to March 2016) as shown in Graph 1. In this graph, sharp injuries that took place from May 2013 to September 2013 were highest and was two third of the total in that year. This increase is also witnessed again in the month of December 2014, which recorded four sharp injuries in a month.

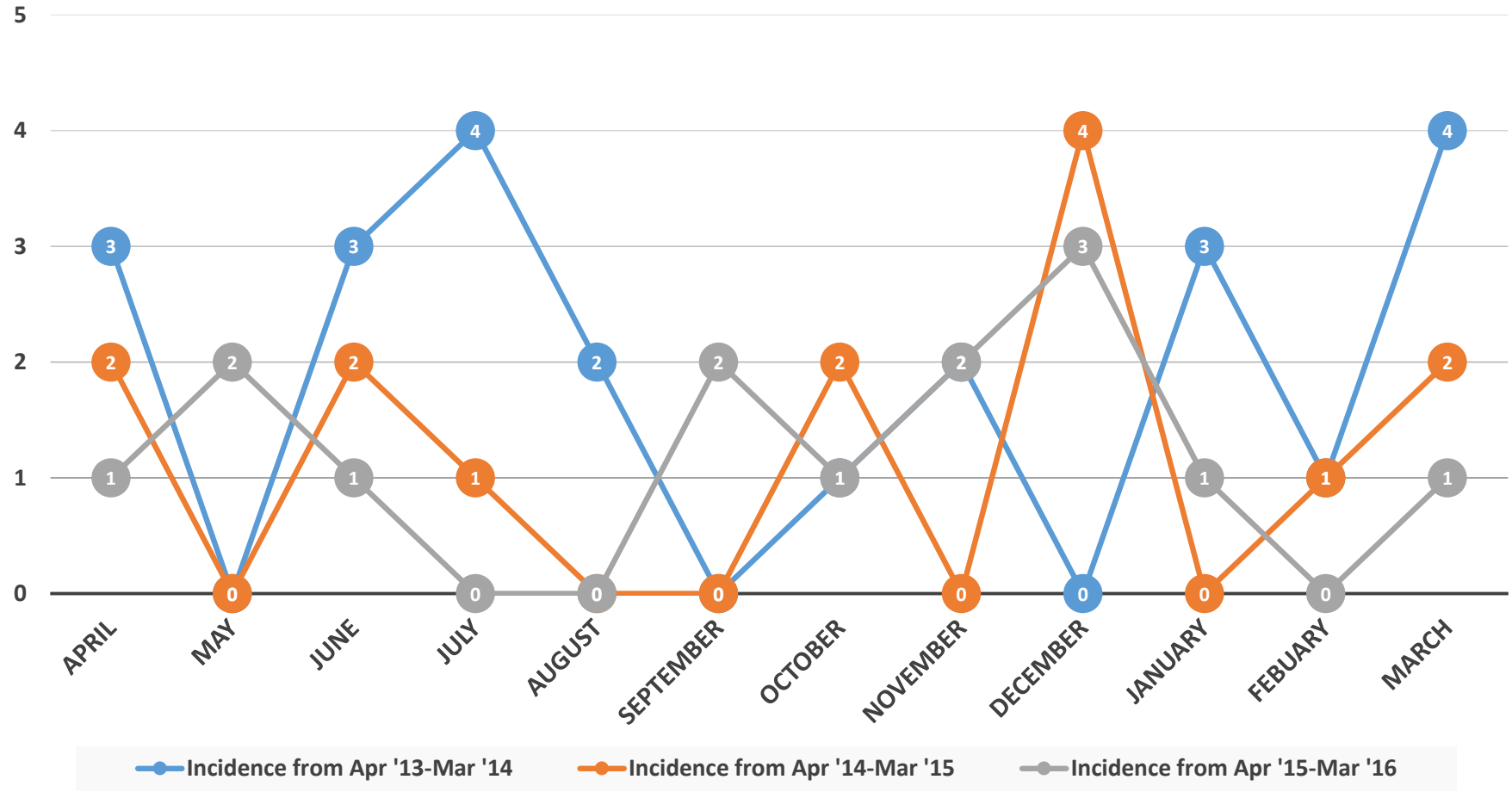
Table 6: Annual Incidence of sharp injuries during the study period

Incidence from Apr '13-Mar '14	Incidence from Apr '14-Mar '15	Incidence from Apr '15-Mar '16	Total SIs
23	**14**	**14**	**51**

Figure 1: Occupational Group of HCW Exposed to Sharp Injuries



Graph 1: Incidence of Needle Stick Injuries from Apr 13' to Mar 16'



Following is a table that shows reasons for high incidences of SIs/NSI in a month during the study period (April 2013 to March 2016). With an average of 1.4 incidence per month, sharp injuries of more than 2 in a month will fall in the category of high incidence.

Year	Incidence	Reasons for Incidence
April, 2013	3	2 Doctors got NSI at the same time while suturing. A housekeeping staff got NSI while handling Biomedical waste.
June, 2013	3	2 NSI occurred at the time of withdrawing of blood, due to shaking of patient's hand. 1 NSI due to negligence of Housekeeping staff.
July, 2013	4	3 NSI (I doctor, 1 GDA and 1 technician) during procedures. 1 NSI at the time of garbage handling by housekeeping.
January, 2014	3	2 NSI (GDA and Nurse) occurred at the time of 2 different procedures. 1 GDA got NSI at the time of needle disposal.
December, 2014	4	3 NSI (2 GDA, 1 nurse) at the time of procedure. 1 NSI while handling container having sharps by housekeeping staff.
December, 2015	3	1 NSI during biomedical waste mixing. 1 NSI during transport of sharps 1 NSI at the time of procedure.

Cost of Sharp Injuries to the Hospital

Post exposure management of SIs incurs cost. The cost is due to certain laboratory investigations, medications, and follow-up tests. The cost of SIs also comprises various other costs like, absence from work, counselling of injured workers, and legal consequences. Many of these may not occur in the same time frame as that of investigations and/or treatment. In this retrospective study, only the cost of investigations and treatment provided to HCWs has been calculated.

There were various tests conducted as per the hospital protocol following an exposure. All test which were part of the reports during the study period have been listed in the Table 7. The costs of these test over the years changed. Table 7 also shows what the cost of each test/investigations was during that year.

Table 7: Costs of each test/investigations for 3 years

Tests/Investigations	Apr 2013-Mar 2014 (₹)	Apr 2014-Mar 2015 (₹)	Apr 2015-Mar 2016 (₹)
HB Surface Antibodies (Quant)	1710	1300	1310
Liver Function Profile, Serum	1360	1000	1450
HIV-1&2 Antibodies Test	780	600	610
Hepatitis B Surface Antigen, Serum	870	650	600
Hepatitis C Antibodies, Serum	1860	1400	1410
CBC, EDTA Whole Blood Smear	600	500	535
ALT (Alanine Aminotransferase)	220	200	210
AST (Aspartate Aminotransferase)	220	200	280
HCV RNA Quantitative	17110	6000	6020
WBC Differential Count	200	200	290
Creatinine Serum	270	250	260
Blood Urea Nitrogen Serum	430	350	300
Uric Acid Serum	250	200	210
Electrolyte Serum	560	450	635
Haemoglobin & Haematocrit, EDTA Whole Blood	180	150	190
Erythrocyte Sedimentation Rate	180	150	160
Urinalysis	170	150	270

Table 8: Cost of each Vaccination and Medication for 3 years

Vaccination + Medication	Apr 2013-Mar 2014 (₹)	Apr 2014-Mar 2015 (₹)	Apr 2015-Mar 2016 (₹)
Hepatitis B Immunoglobulin	3675	3675	3675
Tab. Duovir	760	760	760
Tetanus Inj.	9.5	9	10
Allegra (120mg)	85.5	93	102.5
Crocin	15	13.5	16

Table 8 shows the lists of vaccination and treatment provided to a HCW. The cost shown here is the cost of each drug or vaccination therapy against any exposure to sharp. This cost has shown less considerable amount of variation over the years than the cost of test. This has reflected on to the total cost of post-exposure management for three individual years. Considerable decrease is quite evident from March 2014 to March 2015. This decrease is followed by a negligible increase in the total cost for the next following year (Figure 2).

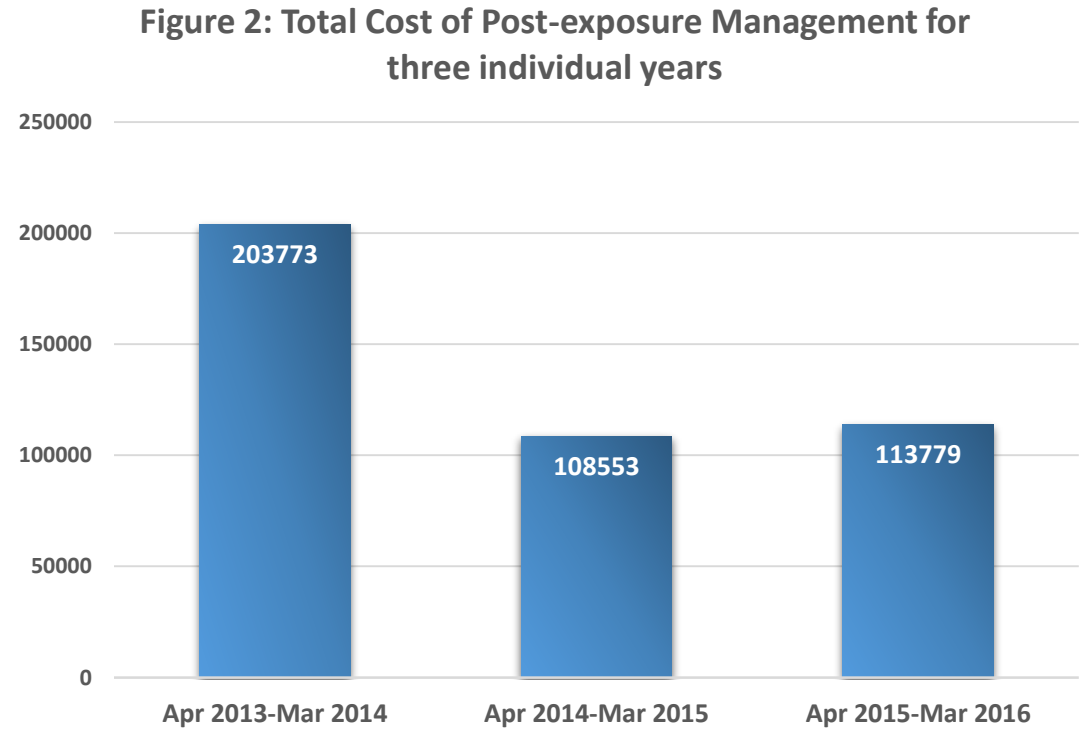


Table 9: Total Costs of Tests for 3 years

Tests	Total Cost (₹)
Hepatitis B Surface Antibodies (Quantitative)	59,900
Liver Function Profile, Serum	14,420
HIV-1&2 Antibodies Test	79,710
Hepatitis B Surface Antigen, Serum	72,410
Hepatitis C Antibodies, Serum	12,0430
Complete Blood Count, EDTA Whole Blood Smear	1135
ALT (Alanine Aminotransferase)	210
AST (Aspartate Aminotransferase)	280
Hepatitis C Virus, RNA Quantitative	17,110
White Blood Cell Differential Count	200
Creatinine Serum	270
Blood Urea Nitrogen Serum	430
Uric Acid Serum	250
Electrolyte Serum	560
Haemoglobin & Haematocrit, EDTA Whole Blood	150
Erythrocyte Sedimentation Rate	150
Urinalysis	150
Total	**3,67,765**

Table 10: Total Costs of Vaccination and Medication for 3 years

Vaccination + Medication	Total Cost (₹)
Hepatitis B Immunoglobulin	55,125
Tab. Duovir	3,040
Tetanus Inj.	56.5
Allegra (120mg)	102.5
Crocin	16
Total	**58,340**

Table 9 and 10 shows the total cost of tests/investigations and vaccination and treatments respectively. This was the combined cost of 3 years (April 2013 to March 2016).

The actual cost due to SIs and their post exposure management is considerable. In this study, the **total cost of post exposure management of SIs/NSI which the hospital has to bear is ₹426,105 and average cost per SI is ₹ 8355** (Table 11). More information for average cost per SI/NSI is given in Tables 12 and 13.

Table 11: **Total Costs of SIs/NSI to the Hospital**

Total Cost of Tests (₹)	**Total Cost of Vaccination + Medication (₹)**	**Total Cost for Apr 2015- Mar 2016 (₹)**
3,67,765	**58,340**	**4,26,105**
Average Cost per SI/NSI		**8,355**

Table 12: **Average Cost per SI/NSI for Tests and Vaccination + Medication for three individual years**

Year	Incidence of SIs/NSI	Total Cost of Tests (₹)	Average Cost per SI/NSI (₹)	Total Cost of Medication + Vaccination (₹)	Average Cost per SI/NSI (₹)
April 2013 – March 2014	**23**	1,84,610	**8027**	19,163.5	**833**
April 2014 – March 2015	**14**	89,400	**6386**	19,153	**1368**
April 2015 – March 2016	**14**	93,755	**6697**	20,023.5	**1430**

Table 13: Average Cost per SI/NSI for three individual years

Year	Total Cost (₹)	Incidence of SIs/NSI	Average Cost per SI/NSI (₹)
April 2013 – March 2014	2,03,773	23	**8,860**
April 2014 – March 2015	1,08,553	14	**7,754**
April 2015 – March 2016	1,13,779	14	**8,127**

Limitations

- This method of costing does not take into consideration the probable underestimation of the problem and the cost due to underreporting. Underreporting is a major global problem associated with SI reporting. The incidence of underreporting is to the tune of 50-75%. The magnitude of the cost of SIs, which would be grossly underestimated due to underreporting would be very high. If one were to expect reporting of all SIs, the cost incurred may be higher.
- Our limitation in the study also include the exclusion criteria.

Conclusions

During the analysis of reports of SIs/NSI for 3 consecutive years, a decline in the incidence of sharp injuries was seen considerably from 2013-2014 to 2014-2015. The number has since remained same so far at 14 per annum in 2015-2016. The increasing cost of investigation of SIs is also a matter of concern and it also indicates the economic burden on the health care institutions. However the individual cost of each test have declined due to progress in technology and competitive pricing. This has brought down the total cost for management of any sharp injury.

Recommendations

Education, training, decreased patient load per HCW, positive work environment and following standard precautions are already in place to help prevent SI/NSI.

Seeking alternatives to use of needles wherever possible, using newer devices with safety features, ensuring adequate training in safe use and disposal of needles, and following preventive practices like vaccinations for hepatitis B should be stressed.

According to a CDC report, use of safety engineered devices would reduce SIs/NSIs by 76 per cent (Lal, P. 2007). It is a matter of interest if use of safety-engineered devices (SEDs) would reduce the health care cost considering their high procurement cost. (Chakravarthy, et al 2015). Since these devices have been shown to reduce the SIs, they must be subsidized by governmental participation, thus making it available at lower cost in order to make it affordable to all healthcare institutions.

References

Annette Prüss-Üstün, E. R. (2003). Sharps injuries. *Environmental Burden of Disease Series*(3), 1-40. Retrieved May 12, 2016

Deval L. Patrick, T. P. (2010). Sharps Injuries among Hospital Workers in Massachusetts. *Massachusetts Department of Public Health Occupational Health Surveillance Program*.

Elizabeth Hamlyn, P. E. (2007). Occupational exposure to HIV and the use of post-exposure prophylaxis. *Occupational Medicine*(57), 329-336. doi:10.1093/occmed/kqm046

Jalina Laishram, A. K. (2013, Oct 01). Prevalence of needle stick injuries among nurses in a tertiary care hospital and their immediate response. *International Journal of Medicine and Public Health, 3*(4), 257-260. doi:10.4103/2230-8598.123446

Lal P, S. M. (2007). Perception of risk and potential occupational exposure to HIV/AIDS among medical interns in Delhi. *J Commun Dis, 39*, 95-99.

Limited, F. H. (n.d.). Occupational Exposure to Blood and Body fluids. *Standard Operating Procedure for Infection Prevention and Control(6)*, 51-59.

Mario Saia, F. H. (2010, March 22). Needlestick Injuries: Incidence and Cost in the United States, United Kingdom, Germany, France, Italy, and Spain. *1*, 41-49. Degli , Scrovegni, Italy. Retrieved May 12, 2016

Murali Chakravarthy, S. R. (2015). Cost of postexposure management of occupational sharp injuries in an Indian tertiary health care facility: A prospective observational study in a tertiary care hospital. *The Journal of National Accreditation Board for Hospitals & Healthcare Providers*, *2*(2), 47-52.

Sumathi Muralidhar, P. K. (2010, March 15). Needle stick injuries among health care workers in a tertiary care hospital of India. *Indian Junior Medical Research, 131*. New Delhi, Delhi, India. Retrieved May 15, 2016

Zingman, B. S. (2013, January 30). HIV Prophylaxis Following Occupational Exposure: Guideline and Commentary. *Medscape*. Retrieved May 22, 2016, from http://www.medscape.com/viewarticle/778035_12

PROJECT 4

Implementation and compliance of safety checklist for interventions in Cardiac Catheterization Laboratory

Table of Contents

Abbreviations

ACS	Acute coronary syndrome
BAE	Bronchial Artery Embolization
BMV	Balloon Valvuloplasty
BP	Blood pressure
CABG	Coronary Artery Bypass Grafting
CAG	Coronary Angiography
Cath Lab	Catheterization Laboratory
CCL	Cardiac Catheterization Laboratory
DMAIC	Define, measure, analyze, improve, control
ECG	Electrocardiogram
eGFR	Estimated Glomerular Filtration Rate
EPS	Electronic prescription service
EPS	Electrophysiology Studies
ET tube	End tracheal tube
Hb	Hemoglobin
HR	Heart rate
IABP	Intra-aortic Balloon Pump
ICD	Implantable Cardioverter Defibrillator
ID	Identification
INR	International Normalized Ratio
IV	Intra venous
IVC	Inferior Vena Cava
K^+	Potassium
LVF	Left Ventricular Function
NIBP	Non- invasive blood pressure
PCI	Percutaneous Coronary Intervention (Coronary Angioplasty)
PLT	Platelet Blood Test
PPI	Permanent pacemaker implantation
PTCA	Percutaneous Transluminal Coronary Angioplasty

PTRA	Percutaneous Transluminal Rotational Atherectomy
RFA	Radiofrequency Ablation
RR	Respiratory rate
Sats	Saturation
SpO2	Saturation of peripheral oxygen
SSCL	Surgical Safety Checklist
TPI	Temporary pacemaker implantation
WHO	The World Health Organization

Background

The cardiac catheterization laboratory is a home to a host of extremely complex procedures to do with the heart. It is a high-risk environment in a hospital. (1). Each year more than 100 million people undergo cardiac surgery (2).With increasing volume and complexity of procedures comes greater potential for error. Millions of errors were reported worldwide when surgical and non-invasive procedures were underway. Errors are not intentional but it leads to different categories of harm to the patients ranging from minor reversible disabilities to loss of life (3).Eight hospitals in eight cities with a diverse set of socioeconomic environments were included in a World Health Organization program called Safe Surgery Saves Lives. It was started under the leadership of Atul Gawande, a surgeon at the Brigham and Women's Hospital in Boston. Following the same program, in the American College of Surgeons, National Surgical Quality Improvement Program was defined. Three thousand seven hundred and thirty three patients were enrolled at baseline and three thousand nine hundred and fifty five patients were enrolled after implementation of the program. After implementation of program, the rate of any complication decreased from 11 per cent at baseline to 7 per cent. The total in-hospital mortality dropped from 1.5 per cent at baseline to 0.8 percent after program implementation. (11)

It was noticed that operation theatre was the only area where the surgical safety checklist was being used. In spite of the fact that cardiac catheterization laboratory procedures also bear similar risk to a patient, no checklist was used. Since 2010 it has been mandatory for all United Kingdom operating theatre teams to use safety checklists before operating. Yet despite this there are no standardized systems currently in place in Cardiac Catheterization Laboratory (1). In Patel *et. al.* study it was observed that before intervention, the completion and compliance of checklist was very low even though everyone was briefed adequately about the procedure. The major contributing factors behind low compliance rates were behavior and negligence of the staff (4).In addition to above, it was also seen that WHO surgical safety checklist reported *55% of staff thought it caused unnecessary time delay*. (5). However, the reverse of this was seen in interventional studies. These interventional studies concluded that after intervention the scenario of the results were very different. It was observed that interventions like providing trainings, taking sensitization sessions, videos on how to do and how not to do the safety

checklist run and encouraging the staff about its importance, can create a significant increase in the compliances of checklist completeness. It can even achieve 80 per cent of compliance target for the cardiac catheterization procedures safety checklist. Furthermore, a study also concluded that the checklist use is directly proportional to the reduction in surgical morbidity and mortality rates and positive impact on team work, which plays an important role in improving patient safety. (4). In a similar type of study about SSCL for cardiac catheterization procedure, a rise in the compliances for pre- and post-intervention observed were 20 per cent and 76 per cent respectively (6) (7)

In one of the study it was also quoted by Dr. Elizabeth Haxby, Lead Clinician in Clinical Risk at Royal Brompton Hospital, that "the team recorded efficiency benefits when using the checklist, with some procedures showing shorter than average duration and more efficient and fewer interruptions. A reduction was seen in screening time where the checklist was used, meaning less radiation exposure for patients." Even patients felt safer when a checklist was used. In a study, almost 60% of patients felt safer that staff was implementing the checklist. Whereas for those who were in the control group in which a checklist was not used, almost 90% said they would have liked one to be used. (1) Hence, appropriate use of practical safety tool ensures added benefits to patients during preoperative, intra operative and postoperative periods in a timely and efficient way. (3)

Introduction

Surgical procedures are multidisciplinary in nature and involve the use of various equipment, multiple experts, numerous consumables, radiation, and various other requirements. Although surgical and procedural teams are credentialed and skilled, errors still can happen due to a minor slip of total number of swabs used before and after the surgery, and this can lead to major medico legal implications and catastrophic effects on physicians and hospitals. To avoid such errors and to prevent medico legal cases, hospitals can implement a simple, effective, tested and useful tool i.e. Safety Checklist. (4)A *checklist* is ''a formal list used to identify, schedule, compare, or verify a group of elements or; a checklist is used as a visual or oral aid that enables the user to overcome the limitations of short-term human memory''. (9) Checklists not only help with memory recall, they also ensure a minimum standard of care i.e., to make

sure that all elements of a process or intervention are delivered reliably. Appropriate use of this practical tool ensures added benefits to patients during preoperative, intra operative, and postoperative periods in a timely and efficient way. (8)

Due to the above mentioned reasons, higher management and leadership commitment toward surgical safety is a prime requirement and doing this through a reminder checklist is an innovative idea. That is a reason safety checklist was implemented for cardiac catheterization procedures.

The safety checklist divides into 2 parts

1. Safety checklist for ward (ref. annexure 1)
2. Safety checklist for Cath lab (ref. annexure 2)

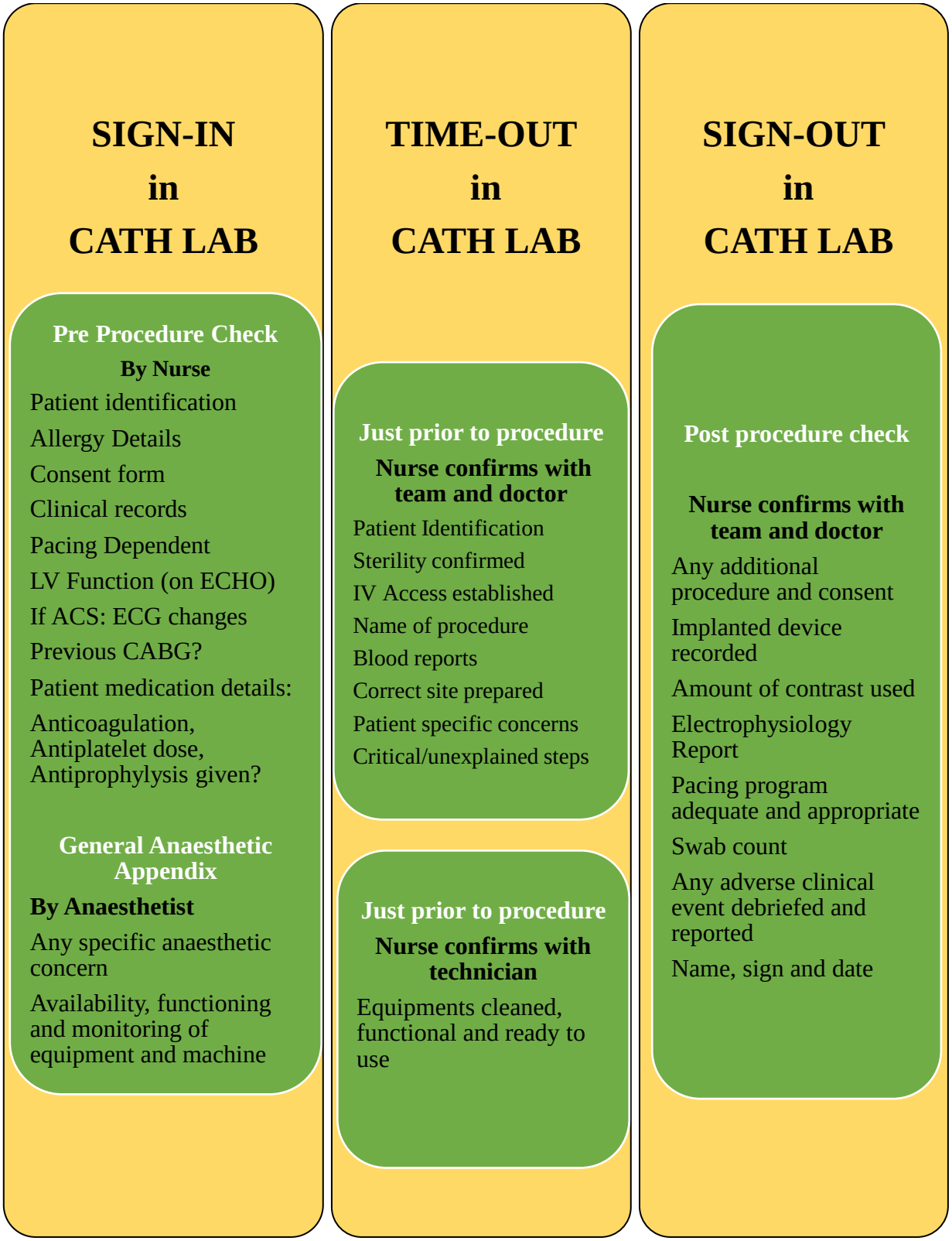
1. Ward safety checklist: This part of the checklist need to be filled in the ward, prior to the shifting of the patient from the ward to the Cath lab. It includes:

- Patient details: contains name, age, sex, ID, weight and Date of birth
- Patient confirmation based on various parameters like identification, allergy, consent for surgery and pregnancy status.
- Last oral intake details of patient according to different procedures.
- Comorbidities.
- Patient's history of drug details
- Various parameters that nurses and doctors will take care of prior to transfer of patient to the Cath Lab i.e. IV access check , vital sign check, patient's accessories removal, surgical approach site checked and prepared and blood details verification.

2. Cath lab safety checklist: consists of three parts: (ref. Table 1)

- Sign-In in Cath lab (pre procedure check)
- Time-Out in Cath lab (just prior to procedure start)
- Sign-Out in Cath lab (post procedure check)

Figure 1: Cath lab safety checklist process



Developing a safety checklist in the cardiac catheterization laboratory will improve procedure safety, high risk environment safety and patient experience. (1).

Procedure safety

By implementing the SSCL, team will achieve a safety climate, a safety net to ensure that no part of the process was forgotten, and it also create a collaborative atmosphere where team members better understood their roles and had more opportunities to raise concerns.

In addition to the above, efficient procedures with fewer interruptions and less of screening time, will be performed, because details had all been covered in the team brief and checklist. (1)

Safety in a high-risk environment

The cardiac catheterization laboratory is a high-risk environment and extremely complex heart related procedures will be performed in this laboratory. So introducing safety checklist as part of a safe procedure process is an important intervention that the hospital is undertaking.

Patient's safety

In cardiac catheterization laboratory, the team uses the checklists while patients were awake. Even patient will feel safe because the hospital is using safe procedure process and all procedures will take place under standard protocols.

DMAIC is an acronym for five interconnected phases: **Define, Measure, Analyse, Improve, and Control.** In general it can be implemented as a standalone quality improvement procedure. In this study we used DMAIC as a data-driven quality strategy to implement the checklist and to improve processes in the cath lab.

D – Define Phase:

- Planning of the project
- Define the project goals and Benefits.
- Plan for a change
- Opportunity for improvement

M – Measure Phase:

- Measure the process to determine current performance
- Observation of the whole procedure
- Data Collection

A – Analyse Phase

- Problem identification
- Analyse and determine root cause of poor performance and its effect
- Highlight the issues and concerns

I – Improve Phase

- Improve processes by eliminating and addressing the defects and root causes
- Generate, evaluate, and optimize solution
- Give a Recommended Action Plan
- Implementation of Improved Action Plan

C-Control Phase

- Control the improved process and future process performance
- Regular monitoring
- Regular training and education programs

Figure 2: DMAIC Flow Chart

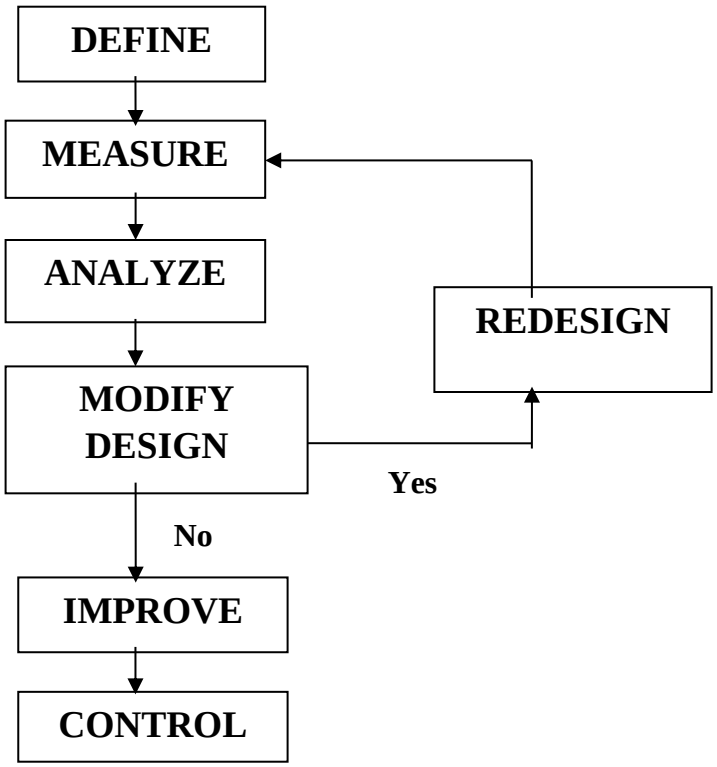


Figure 3. DMAIC PROCESS

Objectives

- To introduce and implement the safety checklist for interventions in Cardiac Catheterization Laboratory.
- To identify the compliance of safety checklist for procedures in Cardiac Catheterization Laboratory.

Purpose

Surgical safety is an important aspect of patient safety. Hospital was using Surgical Safety Checklist for all surgical cases performed in the operation theater. However, it was now asked by the medical superintendent of the hospital to do an intervention by implementing the safety checklist in the Cath Lab. The purpose was thus to implement the safety checklist and find its compliance in cardiac catheterization laboratory (CCL), so that further improvements can be suggested.

Scope of the study

The Safety checklist for is applicable for the following staff of Cath Lab:

- Doctors
- Nurses
- Technicians

Methodology

Study Area

Cardiac Catheterization Laboratory of a tertiary healthcare hospital

Study Design

Interventional, retrospective, descriptive, observational study

Sample Design

In this study, all the procedures performed in CCL, were observed to identify the compliance of recently implemented safety checklist in CCL.

Study Time

The study was conducted over a period of 19 days (9th May 2016 to 27th May 2016).

- Review of Literature for Checklist – 2 days (9th and 10th May 2016).
- Formulation, approval and revision of checklist by guides (11th to 19th May 2016).
- Training – 2 days (20th and 21st May 2016).
- Implementation and analysis of the checklist for the procedures in Cardiac Catheterization Laboratory was done for 5 days (23rd to May 27th 2016).

Study Tool

- Implemented checklist (Ref. Annexure 1 and 2),
- Safety checklist audit tool (Ref. Annexure 3)
- Microsoft Excel for Analysis of data

Inclusion Criteria

All interventional cardiology procedures performed in the Cardiac Catheterization Laboratory. This includes:

CAG, Angio Check, PTCA,

Peripheral/Carotid Plasty /PTRA,

TPI, PPI/ICD/Combo Device, EPS, RFA,

IABP, BMV, BAE, IVC Filter

Exclusion Criteria

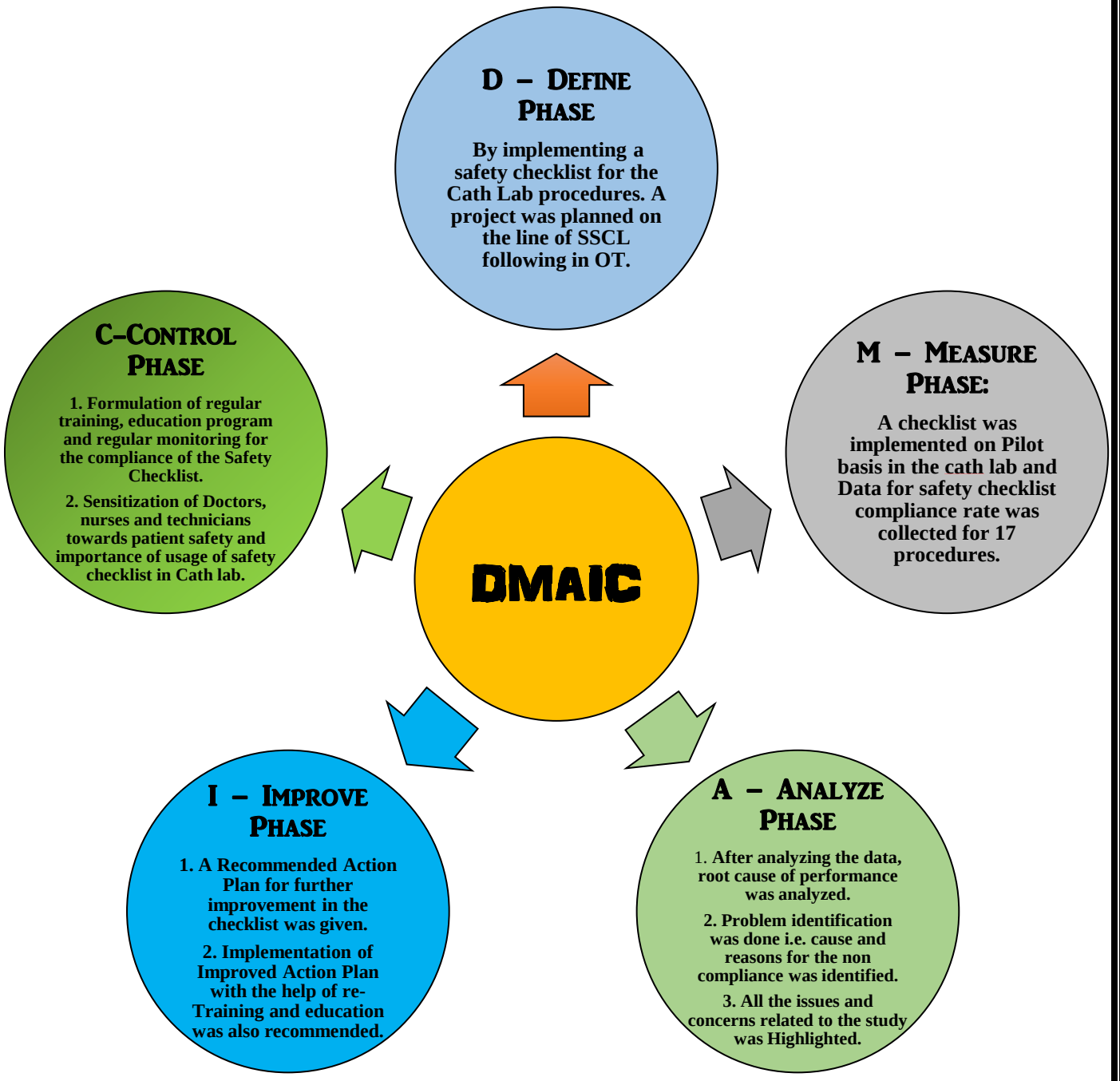
All interventional radiology procedures performed in the Cardiac Catheterization Laboratory

Methods Of Measurements

In the study, implementation of safety checklist for all procedures of Cath lab was done over a period of 19 days. This was done by a standalone quality improvement procedure called DMAIC. How the five interconnected phases of DMAIC i.e. Define, Measure, Analyze, Improve, and Control, were carry out in the study has been explained in Figure: 4

After the implementation, compliance of checklist for all the procedures of Cath lab was observed for 5 days i.e. from 23th May 2016 to 27th May 2016.

Figure 4: Method of the Study



Results

There was no culture of safety checklist in the Cath lab. Hence implantation of the same was a big challenge. Daily sensitization sessions were held with the nurses for addressing their concerns related to checklist. During these sessions we observed various issues which may affect the compliances of the checklist in future. These issues were mainly related to the behavior and negligence of the nursing staff. i.e.

1. Taking SCL as additional documentation burden,
2. Unable to categorize the steps into pre, just prior and post procedure,
3. Unable to differentiate between "No" and "N/A (Not Applicable)", thus wrongly filling in the options.
4. Complaining of inadequate staff for performing the steps which was a major excuse for non-compliance.

We overcame this by approaching all the nursing staff and by eliciting their interest in it, so that the checklist can be used by everyone. Majority of staff improved themselves quite quickly after seeing and understanding the benefits of the checklist process. No staff was left out or not included in the project. We had complete continuity which played an important role in the success of implementation of the project in the Cath Lab. (Ref. Graph 4)

Analysis of Checklist Compliance

During the study, Cath lab safety checklist of 17 number of procedures were observed. It was seen that in **Sign-in** section, for patient details, drugs details and patient's history non-compliance (NC), partial compliance (PC) and compliance (C) was (NC= 0, PC=11, C=6) (**NC= 1, PC=6**, C= 10) (NC= 0, PC= 7, C= 10) respectively. Furthermore in **Time Out** section it was observed to be (NC=1, PC= 0, C= 16) for steps that nurse confirmed with the team and technicians, while for the steps nurse confirm with doctors it was (NC=0, PC= 14, C= 3). Lastly in the **Sign Out** section it was observed that for additional procedure and adverse event check the result was (NC= 1, PC=7, C=9) whereas for other post procedure details and checklist singing details result came out as (NC= 1, PC=8, C= 7) and (NC= 3, PC= 0, C=14) respectively.

{(Ref. Graph 1, 2, 3) (Ref. Table 1.) and for audit tool (Ref. Annexure 2)}.

During auditing the checklists, filled in by the staff, it was seen that various issues may be faced by the nursing staff, which leads to partial and non-compliance of the checklist. These issues are highlighted in Table no. 2

Tables

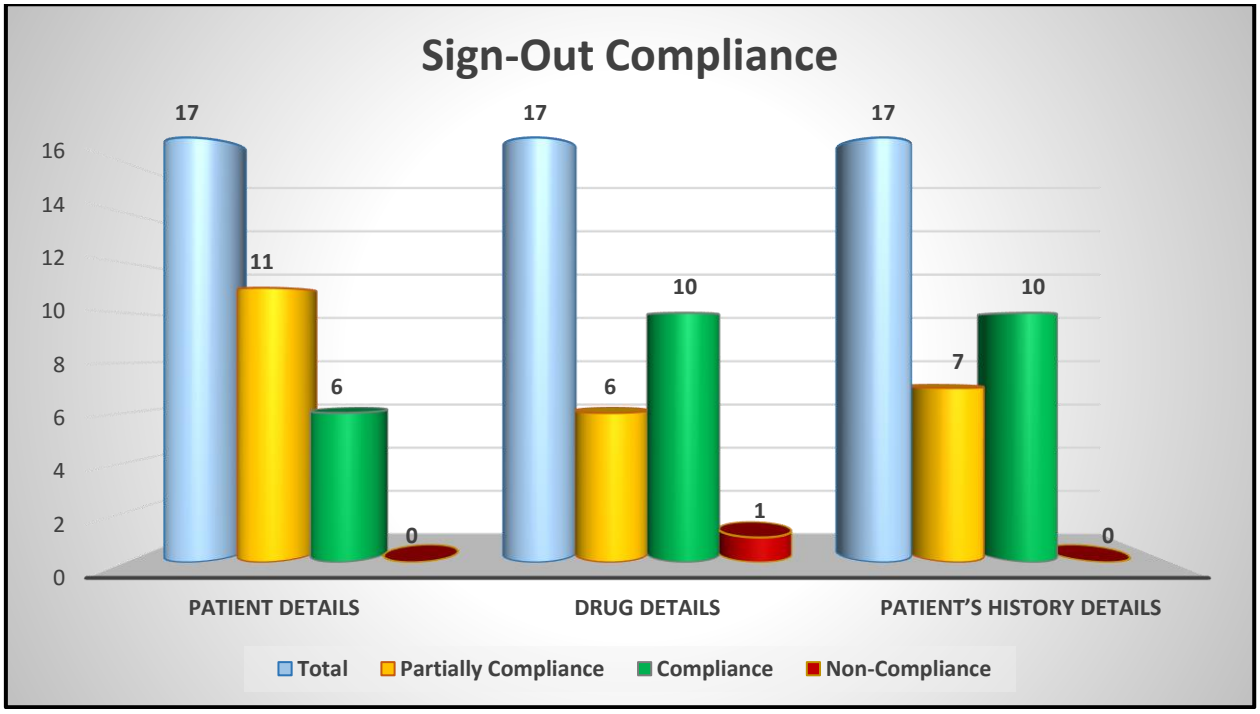
Table no. 1. Percentage Compliance of Safety Checklist Completeness

Criteria	Total no. of procedures	Non-Compliance	Partial Compliance	Compliance
Sign-in				
Patients' details	**17**	**0**	**64.7 %**	**35.3 %**
Drug details	**17**	**5.9 %**	**35.3 %**	**58.8 %**
Patients' history	**17**	**0**	**41.2 %**	**58.8 %**
Time Out				
Steps confirmed with team and technician	**17**	**5.9 %**	**0**	**94.1 %**
Steps confirmed with doctor	**17**	**0**	**82.4 %**	**17.6 %**
Sign Out				
Additional procedure and adverse events	**17**	**5.9 %**	**41.2 %**	**52.9 %**
Other post procedure details	**17**	**5.9 %**	**52.9 %**	**41.2 %**
Checklist signing details	**17**	**17.6 %**	**0**	**82.4 %**

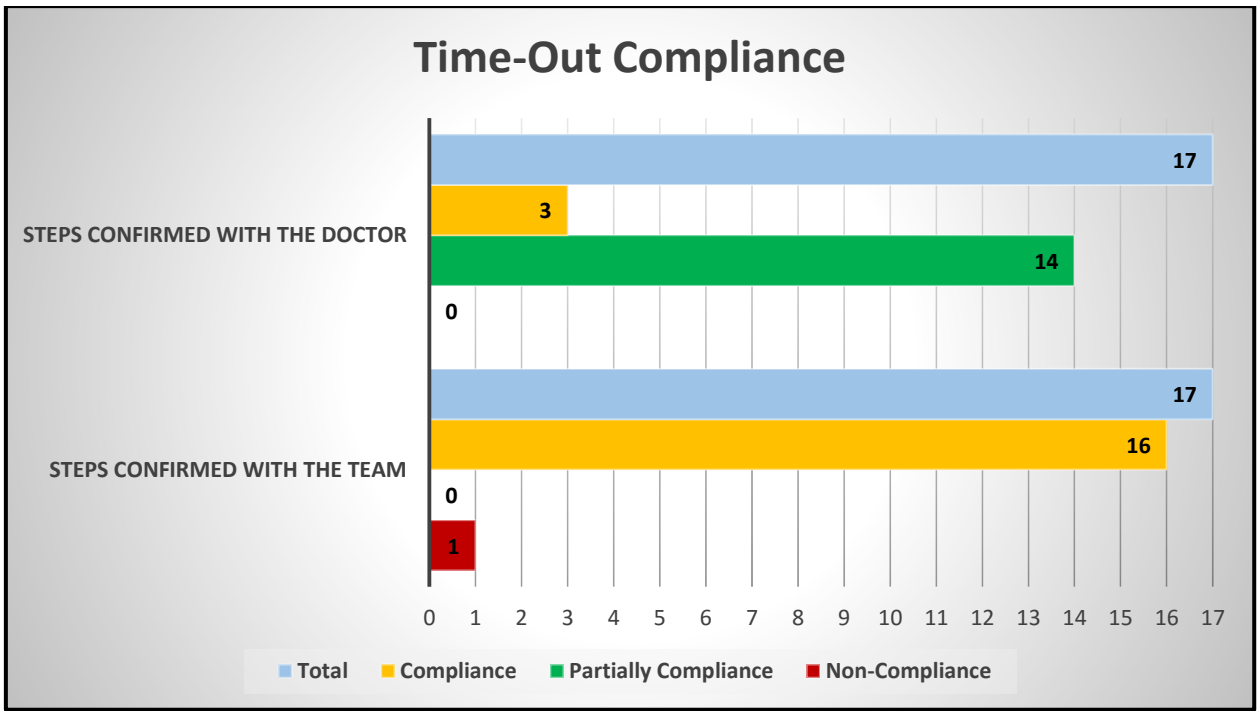
Table 2. Reason for partial and non-compliance in the checklist (Observed while auditing the checklists)

SIGN IN	
Criteria	**Reasons for partial or non-compliance**
Patients' Details	1. Investigation reports were not completed 2. Allergy detail was not mentioned 3. Consent tab was checked as 'No' in one procedure **Nurses, even after knowing the concept, wrongly filled in these parameters.**
Drugs Details	1. Nurses were leaving either any one or all parameters of this column as blank **The concepts were clear, hence it was due to negligence of the nurses.**
Patient History	1. Nurses were leaving 'ECG changes in case of ACS' as blank 2. Nurses were leaving pacing dependent column as blank 3. In one of the case all parameters were left as blank **Nurses were unable to clearly understand these parameters.**
TIME OUT	
Criteria	**Reasons of partial or non-compliance**
Steps confirmed with team	1. All steps to be confirmed with the team were left blank in one procedure (at a time of emergency case) **Negligence of nurse was the reason for non-compliance**
Steps confirmed with doctors	1. Blood report details were not reviewed was the reason for partial compliance 2. 'If any critical steps' tab should be asked by doctors. This was not done in two procedures **As mentioned by nurses, blood reports were not completed.**
SIGN OUT	
Criteria	**Reasons of partial or non-compliance**
New procedure and adverse event details	1. Sign out steps were not performed in one procedure (at the time of emergency case) 2. In two procedures clinical adverse events were not mentioned. 3. New procedure was not done, yet in the 'new consent signed' tab option for five procedures "No" was filled in place of "N/A" **Negligence of nurses as they were confused between "No" and "N/A" and hence it was being wrongly filled.**
Other post procedure details	1. Sign out steps were not performed in one procedure (At the time of emergency case) 2. Other post procedures details were poorly non-compliant, only one out of five opportunities were filled. **Nurses are confused between "NO" and "N/A" and hence it was being filled wrongly.**
Signing details	1. It was left blank in two procedures **Negligent behavior on part of Cath Lab staff.**

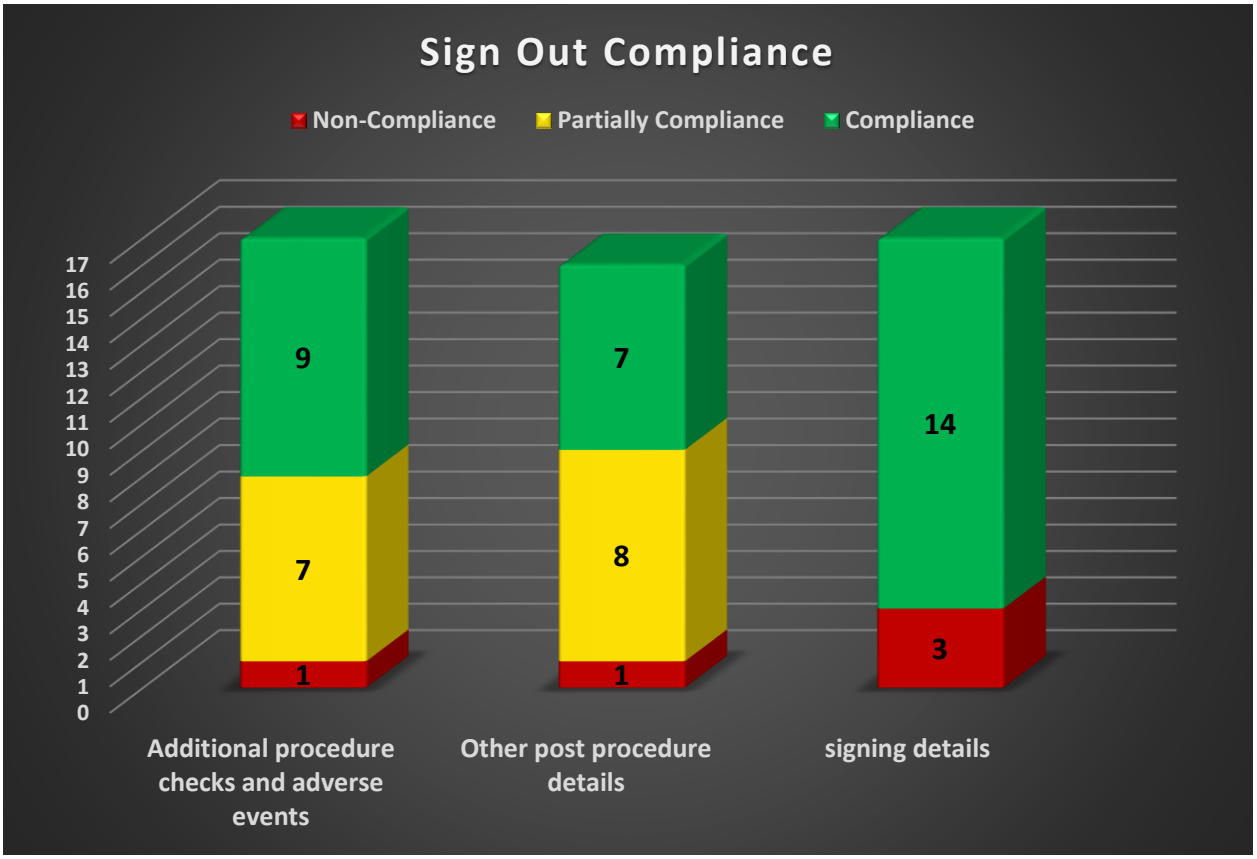
Graphs



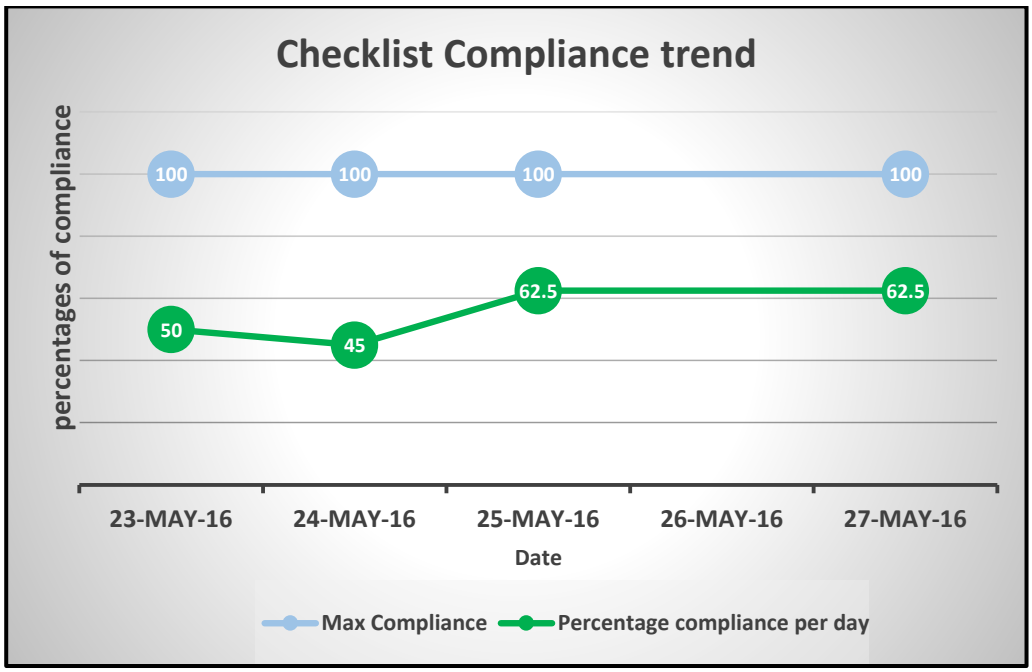
Graph 1



Graph 2



Graph 3



Graph 4

Conclusions

- Initially, during implementation phase, the major contributing factors we faced as a result for non-compliance were mostly related to behavior and negligence of Cath Lab nursing staff. But later the majority of staff improved quite quickly in their delivery. This further encouraged adoption of the SCL for majority of the risk-bearing procedures, for better patient safety.
- While identifying the compliance for the SCL, it was concluded that, in sign-out part, patient's details have low compliance and high partial compliance, which need attention and focus. In time-out part, steps confirmed with Doctor have very low compliance and high partial compliance. It was marked "No' in most of the procedures under the criteria 'blood report reviewed.' It has to be looked upon as it is the most essential part of the procedure. Finally, in time out part, other post procedures details needs more attention as the compliance is less than partial compliance.
- In some instances, unacceptable rate of non-compliance was observed such as drug details not confirmed during sign-in, no time-out steps confirmed with team and technician. The entire sign-out part was not done in one procedure, along with non-compliance of signing details.

Limitations

- Due to time constraint following limitations were faced:
    a. Ward checklist was filled in Cath Lab only, as undertaking training program for all nurses of the hospital was a time taking procedure.
    b. The DMAIC procedure was carried out only till Analyzing phase and rest of the two phases were recommended to the hospital.
    c. Sample size for the study was small.
- The audit was limited to compliance of SCL. Better compliance with the safety protocol can be measured only by observation of live audit. But as a part of the first phase of implementation, we only measured the compliance rate.
- Documentation completion does not necessarily equate to effective use of the checklist and measured compliance may not reflect its effective use by the team.
- All Exclusion criteria as mentioned in the study.

Recommendations

- Effective use of the checklist and not merely a documentation completion exercise can be achieved by further conducting a live audit for procedures and by monitoring the compliance of checklist for them. The live audit can cover how the entire process of sign-in, time out and sign-out is taking place in the Cath Lab.
- All deficiencies and issues which were identified in the pilot study can be corrected. This can be done by conducting re-trainings programs highlighting those major issues in it, by showing videos for how to do and how not to do the SCL process run. Regular sensitization sessions should also be conducted.
- After doing all the required changes in the checklist, the finalized checklist has to be implemented in the Cath lab. In addition to that a constant reinforcement, regular monitoring, retraining and leadership involvement has to be vital till the time the SCL will not be totally adopted and accepted by all in a correct way.

References

1. New Checklist makes the Cardiac cauterization lab a safer place for pateints, *The Health Foundation.* (2014)
2. World Health Organization. *Surgical Safety Checklist* 2009. (Available from: http://www.who.int/patientsafety/safesurgery/en/ index.html)
3. WHO. (2009). World Alliance for Patient Safety: Implementation Manual Surgical Safety Checklist. *World Health Organization*, 1, 7.
4. Patel. (2015, July). Implementation of surgical safety checklist for all invasive procedures. *The Journal of National Accreditation Board for Hospitals & Healthcare Providers*, 2(2).
5. Sewell, Ttyer *et al*. Implementation studies of World Health Organization surgical safety checklist, 2011. doi. bmjqs-2012-001797-s.
6. Braham DL, Richardson AL, Malik IS. Application of the WHO surgical safety checklist outside the operation theatre: Medicine can learn from surgery. *Clinical Medicine* 2014; 14:468-474
7. Safe Surgical Checklist – Importance of adaption for the Catheter lab. Catherine Theron Cardiac Catheter Labs/Cardiac Short Stay Unit Morriston Hospital, Swansea.
8. World Health Organization. *Surgical Safety Checklist* 2009.
9. Pham JC, Aswani MS, Rosen M, Lee H, Huddle M, Weeks K, *et al*. Reducing medical errors and adverse events. *Annu Rev Med*. 2012; 63:447–63.
10. Cahil, T. J., Clarke, S. C., Simpson, I. A., & Stables, R. H. (2014, December). A patient safety checklist for the cardiac catheterization laboratory Article in Heart. *British Cardiac Society*, 101(2), 1-2.
11. Haynes AB, Weiser TG, Berry WR, Lipsitz SR, Breizat AH, Dellinger EP, *et al*. A surgical safety checklist to reduce morbidity and mortality in a global population. *North England Junior Medicine*. 2009; 360:491–9.
12. Cardiac Multidisciplinary Integrated Care Pathway. *Southend University Hospital NHS Foundation Trust.* (2012).
13. Regueiro, A. *et al.* (2013). Minimizing Risk in the Cardiac Catheterization Laboratory. *Rev Esp Cardiol.* 66(55). 342-345

Annexures

WARD CHECKLIST

By Nurse

Patient Details

Procedure Name: _____
Consent form completed: **Yes** ___ **No** ___
Patient Double Identification Check: **Yes** ___ **No** ___

Patient Weight: _____kg
Patient Height: _____ cm
Pregnancy Status: Yes ___ No ___ N/A ___

Known Allergies?Yes ___ **No** ___ to which agent, _____

Last oral intake

In Device Implantation	**In PCI/CAG/EPS/RFA**
No diet and clear fluids taken for 6 hours prior to PPI Yes ___ No ___ N/A ___ Time from: _____	No fluids taken for 2 hours prior to procedure Yes ___ No ___Time from: _____

Comorbidities

Diabetes? Yes ___ No ___ If yes, when was the last dose taken? _____	Creatinine level checked? Yes ___ No ___ If yes level is _____mg/dl	Is O_2 required? Yes ___ No ___

DRUGS: Is the patient on

Oral Anti-coagulation? Yes ___ No ___ Drug name: _____ Drug Dose: _____ Last taken? ___/___/__ Time at ____:____	Metformin? Yes ___ No ___ Last taken? ___/___/___ Time at ____:____

Prior To Transfer To Cath Lab

By Nurse

IV access established and checked? Yes ___ No ___

Base line vital signs HR _____ RR _____ Sats _____ BP _____	Does the patient have any: Denture ___, Hearing Aid___, Glasses ___, Jewellery ___.

Part Prepared Check By Doctors (at the time of taking consent)

If radial/brachial approach	**If femoral approach**
Right radial pulse present: Yes ___ No ___ Left radial pulse present: Yes ___ No ___ Allen's Test done: Yes ___ No ___	Right Pedal pulse present and marked? Yes ___No ___ Left Pedal pulse present and marked? Yes ___ No ___

Blood

Hb	PLT	INR (if applicable)	K^+	eGFR

Checklist completed by: Name:	Signed:	Date:

CATH LABORATORY CHECKLIST

Sign in (Pre-Procedure Checks)

Confirmed by Nurse

Patient double identification checked? Yes ___ No___	**Allergy details verified?** Yes ___ No ___	**Consent form completed?** Yes ___ No ___
Investigation reports completed? Yes ___ No___	Is patient on Anti Coagulation? Yes ___ No___ N/A ___	LV function (on ECHO) <35% ___ >35% ___ N/A___
Antibiotic prophylaxis given? **(for device implantation)** Yes ___ No___ N/A ___	Pacing dependent? Yes ___ No___ N/A ___	If ACS: ECG changes? Yes ___ No___ N/A ___
Previous CABG? Yes ___ No___ N/A ___ If yes, Number of grafts? _____	Antiplatelet loading dose given? Yes ___ No___ N/A ___ Name of agent _____ Dose of agent _____	

General Anaesthetic Appendix by: Anaesthetist (if planned for GA)

Is the anaesthetic machine check complete?	Yes ___ No___	**Monitoring systems, functioning and attached, alarms set:**
Is there a risk of difficult airway or aspiration?	Yes ___ No___	☐ ECG
What is the patient's ASA grade?	_____	☐ SpO_2
Are there any patient- specific anaesthetic concerns?	Yes ___ No___	☐ NIBP/ Invasive BP
Is the correct monitoring equipment available?	Yes ___ No___	☐ Defib patches attached
Is defibrillator available and checked?	Yes ___ No___	

Time-Out (Just prior to procedure)

Nurse confirms with team

Patient double identification done? Yes ___ No___ **IV access established and checked?** Yes ___ No___	Has sterility been confirmed? Yes ___ No ___ Is the correct site prepared and draped? Yes ___ No ___
Name of the procedure _____	Patient specific concerns, drugs, equipment or blood needed? Yes ___ No___
Blood reports reviewed? Yes ___ No___	Any critical or unexplained steps? Yes ___ No___ If yes, _____

Nurse confirms with technician

Equipment cleaned, functional and ready for use:

- ☐ Infusion pump
- ☐ Oxygen tubing and mask
- ☐ SATS probe and BP cuff
- ☐ Diathermy (if applicable)
- ☐ Defibrillator
- ☐ Laryngoscope and ET tubes

Sign Out (Post Procedure Checks)

Nurse confirm with the team

Name of the additional procedure if done? _____	Electrophysiology report completed? Yes ___ No___ N/A ___	
In case of any additional procedure new consent has been taken and signed? Yes ___ No___ N/A___	Pacing programmed appropriately and adequately? Yes ___ No___ N/A ___	
Implanted devices recorded? Yes ___ No___ N/A ___	Any swab count done **(in case of device implantation)** Yes ___ No___ N/A ___	
Amount of contrast used? _____	Was there any adverse clinical events? Yes ___ No ___ Has there been debrief? Yes ___ No ___ Has the event(s) been reported? Yes ___ No ___	

Checklist Completed by: **Name:**	**Signed:**	**Date:**

Annexure 2

SAFETY CHECKLIST AUDIT TOOL

Procedure No.						
Procedure Name						
Patient ID						
Sign in(Pre-Procedure Checks)						
1. Patient details verified and confirmed						
Patient double identification checked?						
Allergy details verified?						
Consent form completed, checked?						
Investigation reports completed, checked?						
2. Drugs details mentioned						
Is patient on Anti Coagulation, checked?						
Antibiotic prophylaxis given?(for device implantation)						
Antiplatelet loading dose given? Name and Dose of agent mentioned						
3. Patient's history mentioned						
Pacing dependent?						
LV function (if on ECHO) mentioned						
If ACS: then ECG changes? Mentioned						
Previous CABG? If yes, Number of grafts mentioned?						
4.General Anaesthetic Appendix mentioned in case of GA.						
Time-Out(Just prior to procedure)						
5. Steps confirmed by nurse with the team						
Patient double identification done, with Dr. or team and mentioned?						
IV access established and checked, asked by team and mentioned?						
Has sterility been confirmed, asked by team and mentioned?						
Is the correct site prepared and draped, asked by team and mentioned?						

Equipment cleaned, functional and ready for use						
6. Steps confirmed by the nurse with the Doctor						
Name of the procedure asked by Dr. & mention?						
Blood reports reviewed, asked by Dr. and mentioned?						
Patient specific concerns, drugs, equipment or blood needed, asked by Dr. and mentioned?						
Any critical or unexplained steps asked by Dr. and mentioned?						
Sign Out(Post Procedure Checks)						
7. Additional procedure checks and adverse events						
Name of the additional procedure if done, mentioned?						
In case of any additional procedure new consent has been taken and signed?						
Was there any adverse clinical events? Has there been debrief? Has the event(s) been reported?						
8. Other post procedure details checked						
Amount of contrast used asked by Dr. and mentioned?						
Electrophysiology report completed?						
Pacing programmed appropriately and adequately mentioned?						
Any swab count done (in case of device implantation) mentioned?						
Implanted devices recorded?						
9. Checklist signing details						
Name mentioned?						
Signature mentioned?						
Date mentioned?						