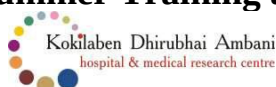


Summer Training at



**Kokilaben Dhirubhai Ambani Hospital and Research Centre,
Mumbai
(April - June, 2013)**

**WORK FLOW ANALYSIS OF CATHETERIZATION
LABORATORY SO AS TO OPTIMIZE ITS UTILIZATION**

**By
Anuradha Bose**

**Under the guidance of
Dr. Alok Kumar Mathur**

**Post Graduate Diploma in Hospital and Health Management
2012-2014**



**Institute of Health Management Research,
Jaipur
2013**

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CERTIFICATE

This is to certify that, Dr. Anuradha Bose, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from Institute of Health Management Research, Jaipur, Batch 17th has undergone summer training in Kokilaben Dhirubhai Ambani Hospital and Research Centre, Mumbai, Maharashtra, and has done project on:

- Work Flow Analysis of Catheterization Laboratory so as to optimize its utilization.

The candidate has successfully carried out the mentioned analysis assigned to her during her summer training from 8th April 2013 to 8th June 2013 and her approach to the analysis has been sincere, scientific and analytical.

I wish her success in all her future endeavors.



Prof. Alok Mathur
Associate Professor
Faculty and Mentor
IIHMR, Jaipur



Dr. Ashok Kaushik
Dean, Academic and Student Affairs,
IIHMR, Jaipur



Kokilaben Dhirubhai Ambani
hospital & medical research institute

Every Life Matters

10.06.2013

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Anuradha Bose** from Institute of Health Management and Research, Jaipur has successfully completed her training from 8th April to 8th June, 2013 at Kokilaben Dhirubhai Ambani Hospital. During this tenure she has worked on Work Flow Analysis of Cath Lab and has observed all the functional departments of the hospital.

We hereby wish her all the best for her future endeavors.

Dr. Ram Narain
Executive Director

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ACKNOWLEDGEMENT

I am indebted to all the professionals at Kokilaben Dhirubhai Ambani Hospital, Mumbai for sharing generously their knowledge and precious time which inspired me to do my best during the summer training.

I take this opportunity to express my gratitude to **Dr. Ram Narayan (Executive Director - clinical services)** mentor for the summer training, without whose help it would not have been possible to understand the structure, functioning and hospital operations. I also thank **Ms.Urvashi Bhasker (Assistant manager - clinical services)** for her guidance and unconditional support.

I am also thankful to **Dr. Jamshed Dalal (Head of department – cath lab) And the staff of Cath lab** for their guidance and help during the project on Work flow Analysis for maximizing the utilization of Cath Lab department.

It was a privilege to work and learn under the dynamic supervision of the management and other functionaries of the hospital. I am grateful to all the department heads and staff for giving me guidance in spite of their hectic schedule. Without their active cooperation and participation it would not have been possible to accomplish my task.

I offer my sincere thanks to **Dr. S. D Gupta** (Director, IIHMR Jaipur), **Col.A.Kaushik** (Dean Academics and Students Affairs, IIHMR Jaipur) and **Dr. A.K.Mathur** for their constant encouragement.

KOKILABEN DHIRUBHAI AMBANI HOSPITAL

AND

MEDICAL RESEARCH INSTITUTE

INTRODUCTION

The kokilaben Dhirubhai Ambani Hospital & Medical Research Institute became operational in the first week of **2009**. It is located in Four Bungalows, Andheri – West in the bustling heart of India's financial metropolis Mumbai.

The hospital project was initiated in 1999 by **Dr. Nitu Mandke** as a large scale heart hospital. In his life time he won hearts of many and repaired many more through unerring surgery. He won various awards like 'The Ranjiv Gandhi Gold Medal of Merit' in 1992; 'Indira Gandhi Sadbhavana Award' 1999; 'Outstanding Man of 20th Century' 2000; 'Pride of India' 2001; 'Sarvashri' Gold Medal 2000 and 'Maharashtra Gaurav Award' to name a few. With great passion Dr. Mandke built a substantial portion of the hospital building. Sadly his dream was cruelly cut short by fate when he succumbed to a massive heart attack in May 2003 leaving a dream unfulfilled and unfinished. The management of Mandke Foundation approached **Reliance ADA Group** who then took over this project and developed it into one of the most modern and multispecialty tertiary care hospital, naming the institute as – **KOKILABEN DHIRUBHAI AMBANI HOSPITAL AND MEDICAL RESEARCH INSTITUTE**. In honour of the initiator, the hospital's medical Convection Centre has been aptly dedicated to the memory of Dr.Nitu Mandke.

Vision and Mission

"We aim to be a global healthcare institution that combines the best in medical treatment with strong ethical principles and a culture of care and compassion."- Late Shri. Dhirubhai Ambani

The LOGO



The graphic 'C' represents KDA's belief in delivering uncompromised care. The 'i' represents the individual. The 12 colourful dots emerging from the 'i' represents 12 stages of life from pre-birth to the moment of passing away. The colours signify the different life stages providing an emotional meaning.

Values

Integrity

To deal with all stakeholders - Patients, Partners, Employees, Vendors and the Community - in a spirit of fairness and integrity

Transparency

To respect the patient's right to know at every touch point by providing information that is clear, concise, relevant and easy to understand.

Maximum Care

To re-evaluate every hospital system, process and procedure to ensure that patients and their loved ones receive maximum care and comfort.

Self-Improvement

To instill a process of learning and self-improvement at every level through continuous training, focused research and peer review.

Patient Dignity

To safeguard the dignity of patients by protecting their individuality and privacy at all times.

FACT SHEET of KDAH

Overview

- One million square feet of space
- 17 floors, two basements
- 30 Elevators
- Over 140 OPD clinics, diagnostics and day care services
- Dedicated wellness and health tourism facilities

Design Standards

Standard	Benefits
Following guidelines have been used	
AIA (American Institute of Architecture)	Reduction in sentinel events
ASHARE	Control over infection rates
ANA	Intelligent building systems for isolation

Total number of beds: 750

Number of critical care beds: 180

Type of Rooms

Suites	
Area of 750 sqft	Terrace garden
Exclusive entrances	Include visitor areas, a guest room and private terraces.
Nurse call systems with 2 way communication	

Single rooms	
Area of 320 sqft	Separate Patient zone and attendant zone
Nurse call systems with 2 way communication	

Twin rooms	
Dedicated bed head panels with medical gases	Dedicated Television sets
Couch for each patient relative	Nurse call systems with 2 way communication

General wards	
5 beds/ room	Air-conditioned
Dedicated bed head panels with medical gases	Nurse call systems with 2 way communication

ICUs	
Area of 200 square feet per bed	Electrical multifunction beds
Pendants for utilities	Nurse call systems with 2 way communication

Operation Theatres	
22 OTs	600 square feet
Laminar Air Flow & HEPA Filters	Surgical Control Panel

Convention centre	
State-of-the-art Audio Visual services	Comfort International styling
Atmosphere of Medical Hospital + informal hospitality climate	Flexi usage
70 to 500+ Capacity	Live Audio & Video for Seminars

Other services	
Business Centre	Beauty Salon
ATM	Food Court
Fine Dining Restaurant	Patient Resource Centre
Pharmacy	

Cath Lab in Kokilaben Dhirubhai Ambani Hospital

Introduction

Various Vascular diseases of heart and peripheries are the leading cause of deaths and disability in the world. Although a larger proportion of these disease is preventable, still they continue to rise mainly because of less information and inadequate measures.

India has highest incidence of heart related disease in the world and the number is increasing every day.

A **catheterization laboratory** or **Cath Lab** is an examination room in a hospital or clinic with diagnostic imaging equipment used to visualise the arteries of the heart and the chambers of the heart and treat any stenosis or abnormality found in heart also involving various other part of body like Brain and Peripheries.

It provides minimally invasive care and is most responsible for identifying and unblocking interruptions in blood flow to heart or to brain or in periphery.

The Catheterization Laboratory support both emergency and elective procedures. Not only do these services save life but also act as a vast source of revenue generation unit for hospital. There are regulation and guidelines mandate to ensure high quality of patient care. Additionally, advancement in technology continues to revolutionize the ability to provide the best possible care to every patient.

In addition to quality guidelines, financial metrics are also important to catheterization laboratory because the total revenue of hospital on average is compromised 30-50 percent from a cardiovascular programme. **“Cardiovascular programs which increasingly rely on procedure performed in Cath Lab – have long been the linchpin of hospital profitability”** (Medical Buyer).

A close eye on financial department is necessary to maintain an appropriate resource and healthy revenue. Patient flow through the Catheterization Laboratory is most important and should be closely monitored.

Rationale

Catheterization Laboratory represent significant amount of expenditure in the hospital budget after operation theatre. Considering the magnitude of cost incurred in the Catheterization Laboratory, hospital administrator should be more concerned about the efficient utilization of Catheterization Laboratory. So, in order to maximize the utilization of Catheterization Laboratory, it is essential to find out what all factors lead to non productive time of Catheterization Laboratory. If, the Catheterization Laboratory is underutilized, inefficient or disorganized, there could be missing out on a valuable revenue stream. Hence it justifies **the need and the importance of study of optimum utilization with minimum wastage of resource.**

This study will help the department to assess the existing workload and identify the means of facility, functioning and patient scheduling while ensuring quality care for patient undergoing various catheterization procedure and better utilization time in providing such critical care.

As administrative point of view catheterization Laboratory are very significant for a hospital as it saves time and manpower and other important resources which might have consumed if these surgeries would have been performed in operation theatre.

Broad Objective

To study the utilization of Catheterization Laboratory of Kokilaben Dhirubhai Ambani Hospital And Medical Research Institute.

Specific Objectives

However the specific objectives are-

- Study the existing process flow of Catheterization Laboratory.
- Observe the present patient scheduling being followed.
- Calculate the average utilization.
- Calculate the key metrics of Catheterization Laboratory (Turn Around Time, Inpatient Waiting time etc.)
- Identify the gap in process hampering the utilization of Catheterization Laboratory.
- Suggest ways of enhancing the ways of existing facility.

Methodology

Type of study – Descriptive observational study

Place of study – Cath Lab of kdah

Study population – All patient undergoing procedure of Catheterization during the duration of study in Kokilaben Dhirubhai Ambani Hospital from 8am to 6pm. (Excluding Sunday)

Sample size – 310 patients (Sample is collected in 30 days).

By direct observation, informal interview with staff which include (8 Consultants, 3 Technician, 1 Store incharge, 12 nurses, 1 receptionist, 4 Health Care Assistants, 2 House Keeping staff), and from Records and Registers.

The entire process is divided into Pre Procedure, Procedure and Post Procedure and the time taken in each step is recorded analysed and bottleneck at each and every step is identified and corrective measures are suggested to achieve the optimum utilization of Catheterization Laboratory.

Data Collection

Primary Data collection

Direct observation and informal interview - To study the functioning of Catheterization Laboratory and for recording the time at every step.

Process mapping – Entire patient flow is understood and mapped.

Secondary Data Collection

Records and Registers were used to collect data.

Time line of study

Observation and data collection – 12th April 2013 to 17th May 2013

Data analysis and framing of suggestion – 2nd June 2013

Observation and discussion

This study was conducted in Catheterization Laboratory of Kokilaben Dhirubhai Ambani Hospital which offers super specialized care in area of Cardiology, Cardiothoracic and Vascular surgery.

Location

Catheterization Laboratory was located in Central Zone of 3rd floor.

Number of Laboratory

Kokilaben Dhirubhai Ambani Hospital has Provision of 4 Catheterization laboratory, but present only two are working.

One of the Catheterization Lab is dedicated for Cardiac Procedure (adult cardiac procedures only) and another for Non Cardiac procedure (includes Paediatric Cardiac Procedure).

Other Rooms

Other than procedure room its has a Pre procedure Area, a Post Procedure Area, Monitor Room Attendant waiting Area, One Store, and one Consulting room.

Timings

Working hours of the Catheterization Laboratory is from 8am to 8pm

Procedure is schedule only from 8am to 6pm.

Appointment system

Appointment for the procedure is given by the receptionist who is also responsible for making the Schedule of the procedure. She receives calls for appointment from Consultants, assistant of consultants and also directly from the patients.

Two type of appointment system was followed

1. First come first basis.
2. In case of emergency priority is give to the emergency case.

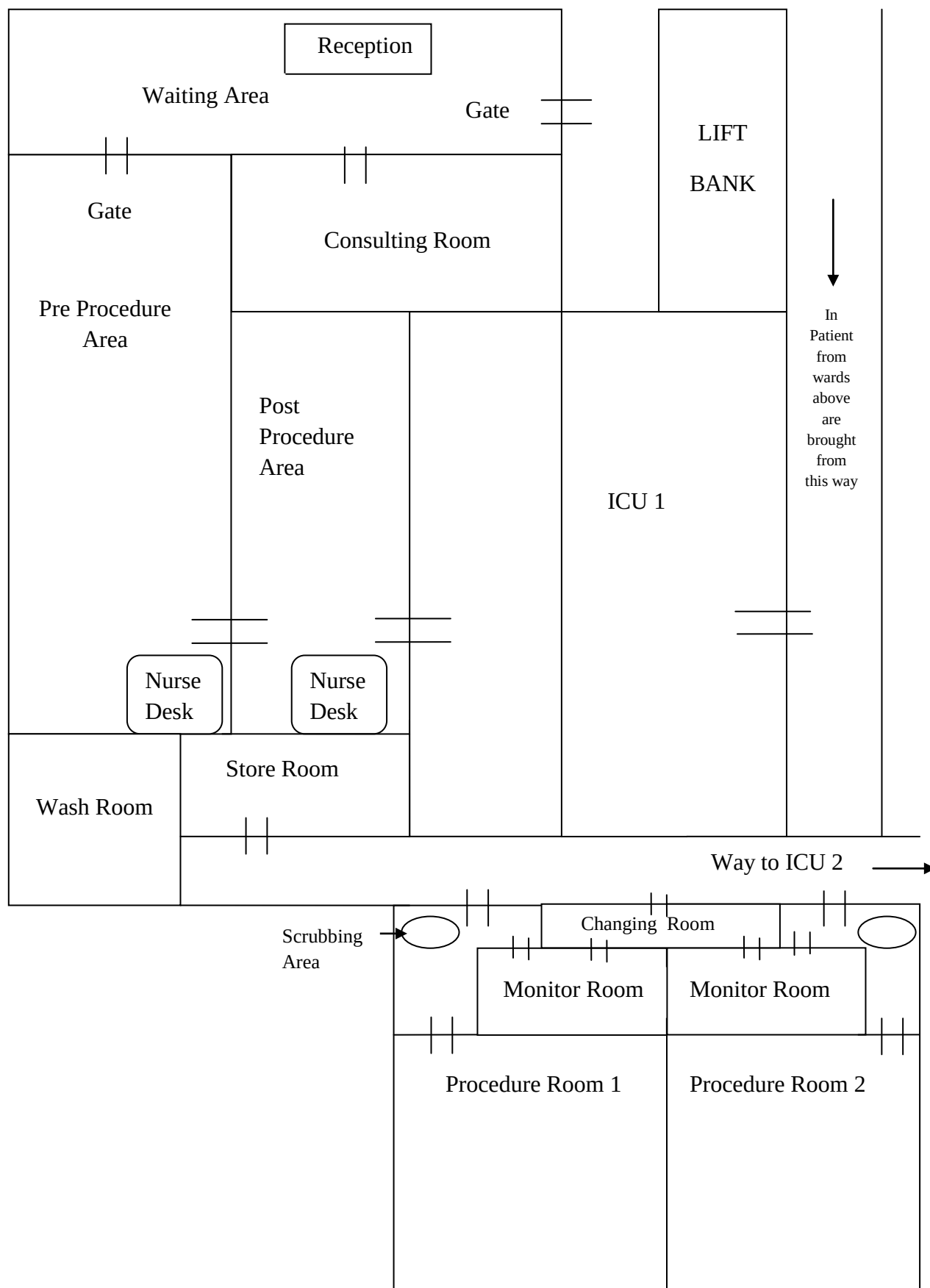
When Doctors take appointment they get appointment according to the sequence they have called.

Similarly, when patient calls they get appointment depending on slot available along with availability of respective Doctor.

Services Provided

Diagnostic	Therapeutic
Adult Cardiac Angiography	Adult Cardiac Angioplasty
Paediatric Cardiac Angiography	Paediatric Cardiac Angioplasty
Cerebral Angiography	Cerebral Angioplasty
Peripheral Angiography	Peripheral Angioplasty
Fluoroscopy	Biventricular Pacemaker Insertion
Biopsy	Aneurysm Coiling
Venogram	Septal closure devices
PICC Line Insertion	Thrombus aspiration with IVC filter Insertion
Electro Physiology Study	Trans Arterial Chemo Embolisation
Renal Angiography	Battery replacement
	Balloon Valvotomy (BPV,BMV.BAV)
	Carotid shunting

Lay out



Record Books Maintained -

- Coronary Angiography Register.
- Coronary Angioplasty Register.

- Paediatric Procedure Register.
- Peripheral Angiography Register.
- Peripheral Angioplasty Register.
- Inpatient Register.
- Day Care patient Register.
- Laboratory book.
- CSSD register.
- Narcotic Register.
- Crash Cart check list.
- Inventory Book.

Equipments

Major equipment used inside is

- Patient table
- A ceiling mounted Image intensifier
- Catheterization Laboratory system, Set of viewing monitors, C- Arm, lead glass,
- ECG machine, Crash cart , Warmer,
- Saturation machine, Defibrillator,
- Anaesthesia machine and infusion pump

Major consumables

- Catheter – diagnostic & guiding
- Stent – absorbable and non absorbable
- Drugs
- Lead aprons
- Contrast
- Syringes
- Sheath (femoral, Radial, Paediatric)

Manpower

DOCTORS

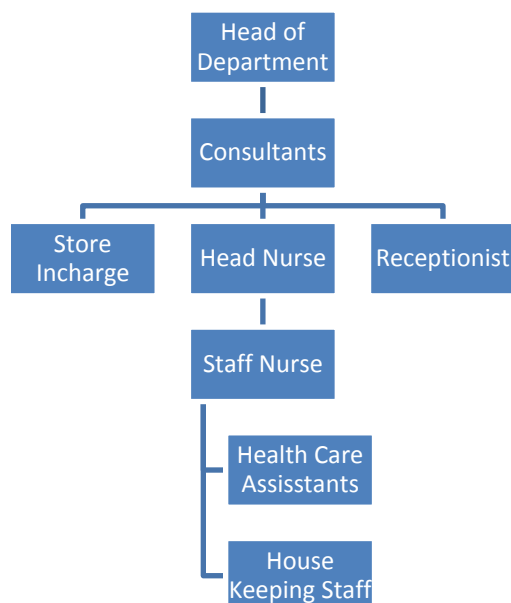
- 4 Cardiac Consultants.
- 1 Paediatric Consultants.
- 4 Standby Adult Cardiac Anaesthetists.
- 1Cardiac Device Specialist.
- 1 Vascular and Endovascular Surgeon.
- 1 Interventional Neuro Radiologist.
- 3 Standby Neuro Anaesthetists.
- 2 Interventional Radiologists.
- 2 registered Medical practitioner.

Other Staff

- 3 Technicians.
- 1Head Nurse.
- 11 staff nurse.

- 4 Health Care Assistant.
- 4 House Keeping Staff.
- 1 Store In charge.
- 1 Receptionist.

Organogram



Duty shift and job profiles

Store In charge – 8am to 6pm

He was responsible for the store. He kept track on supply and demand of stent, balloons, and drugs etc. He was also responsible for indent of consumable used during procedure in patient bill.

Receptionist – 9am to 5pm

She was responsible for giving appointments, making schedule of procedure a day prior, circulating the same to each and every department of the hospital. She was also responsible for typing the reports and getting them signed from the concerned doctor and finally giving the report to patients.

Technician- 8am to 6 pm

Their work includes operating Catheterization Laboratory System, Checking for proper functioning of equipment and computer systems and Sheath removal.

Head nurse- 8am to 4pm

Coordinate between consultant and patient, Coordinated with nurse of other wards and ICU for shifting of Inpatient for procedure, coordinate with ICU and Ward Staff for post procedure bed allocation, coordinate with admission and discharge for smooth flow of patient in department. Solving day to day problem of the laboratory related to maintenance and staff.

Solving conflict by coordinating with concern person. Checking all financial clearance of the patient.

Staff Nurse – they have two shift from 8am to 4pm and 12 noon to 8pm

In morning shift 6 nurse and in evening shift 5 nurse

Various responsibilities are preparation of patient for procedure, assisting doctor during procedure, shifting the patient after procedure to ICU, Ordering of food, sending Investigation, online collecting reports of Investigation.

Health Care Assistant- they have two shift from 8am to 4pm and 12 noon to 8pm

2 Health care assistants in each shift. One male and one female in each shift.

They assist nurse in rendering proper care to patient. Help patient in changing clothes, escort patient to washrooms, provide urinals when required. They help in transferring of patient from bed to the patient table.

House Keeping – they have two shift from 8am to 4pm and 12 noon to 8pm

2 housekeeping for each shift. One male and one female in each shift.

Responsibility is to clean the Catheterization Laboratory after every procedure, removal of dirty linen and cloths.

Registered Medical Officer – 8am to 5pm

Various responsibility performed by them were recording history of patient prior procedure, prescribing investigations which are required, making discharge files of patient.

Process Mapping

Process Mapping of Scheduled Patient

Doctors Plan Procedure between 9am to 5am



Inform the Head Nurse or Receptionist



Receptionist makes schedule a day prior and circulates it to every department



Patients arrives in the Pre Procedure Area, if Day care, History is taken, consent is taken, clearance from billing department is checked, if In Patient all documents are checked.



If Rescheduling is done then concern Doctor is informed by the Head Nurse.

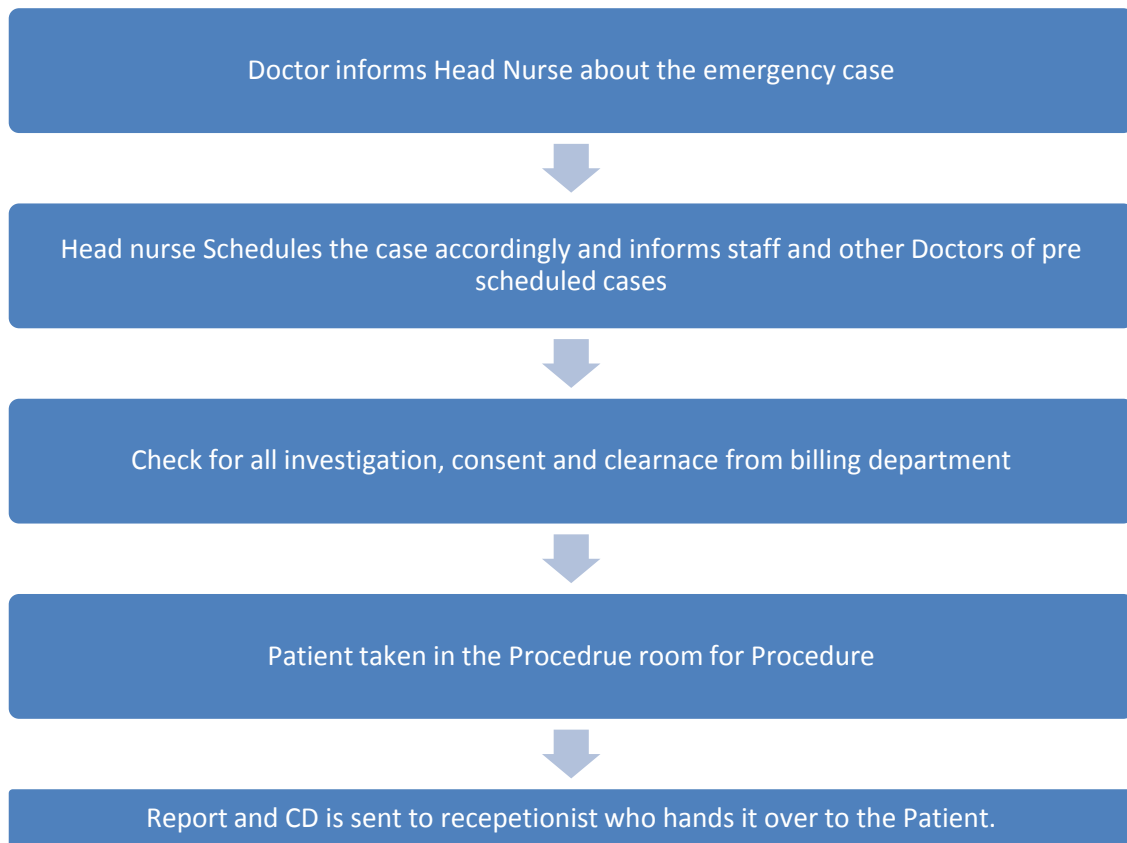


Patient taken in procedure room for procedure

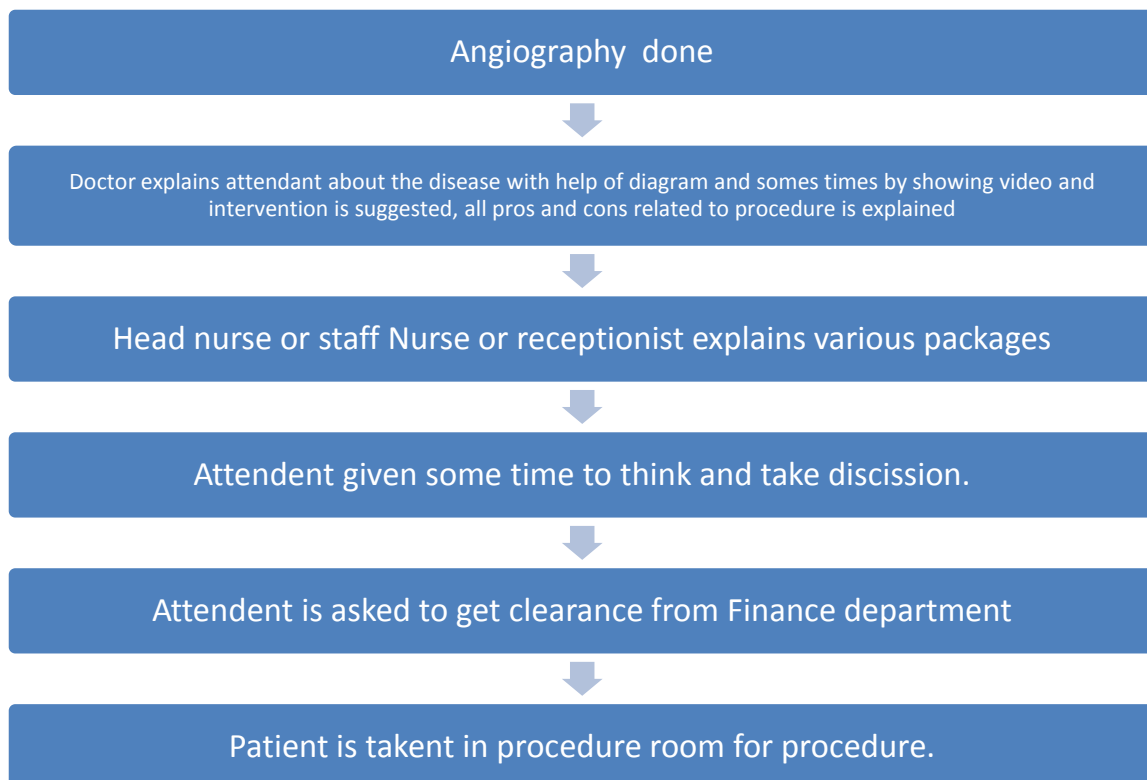


Report and CD is sent to receptionist who hands it over to the Patient.

Process Mapping of Emergency cases

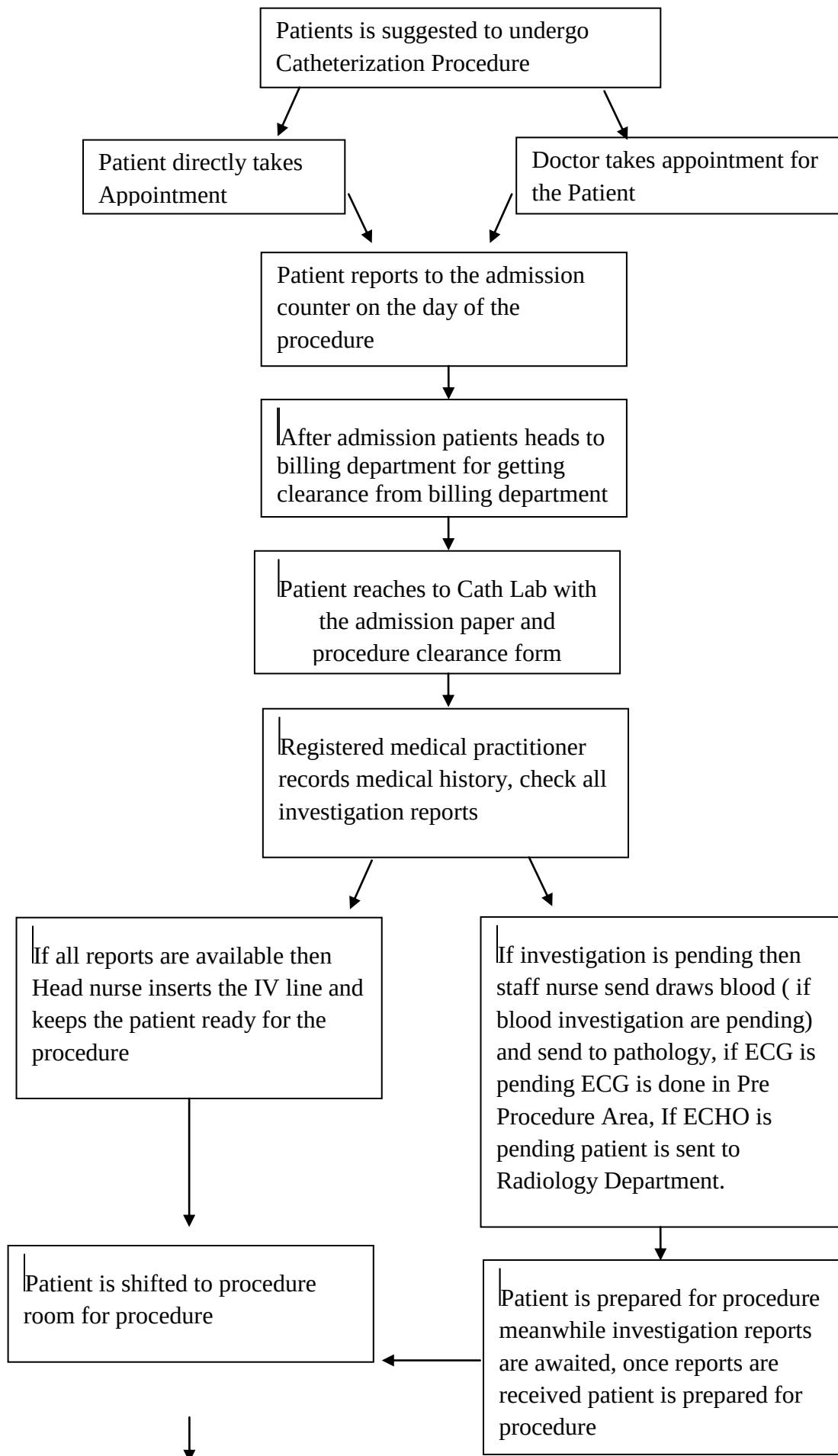


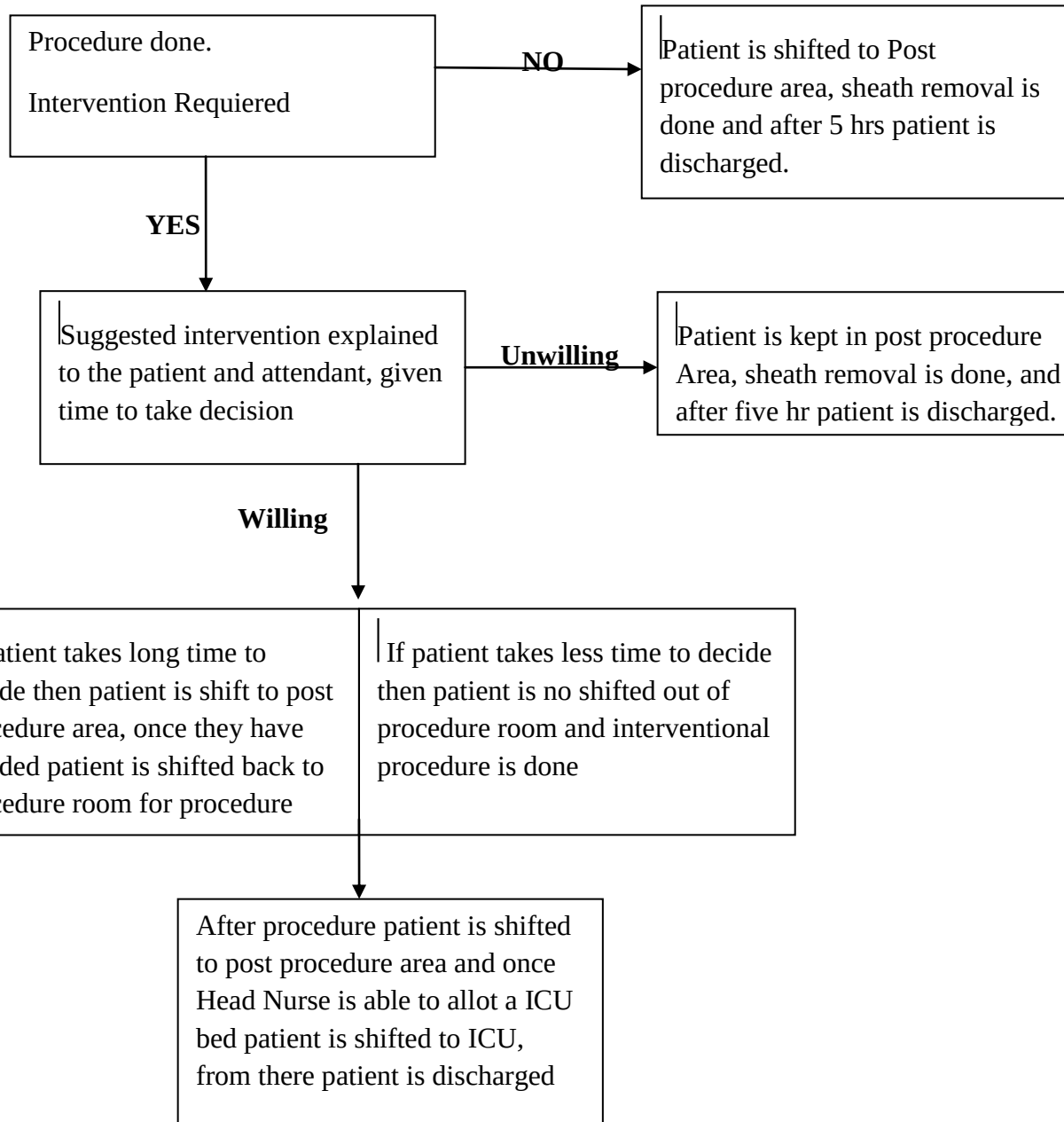
Process Mapping of Intervention Procedures



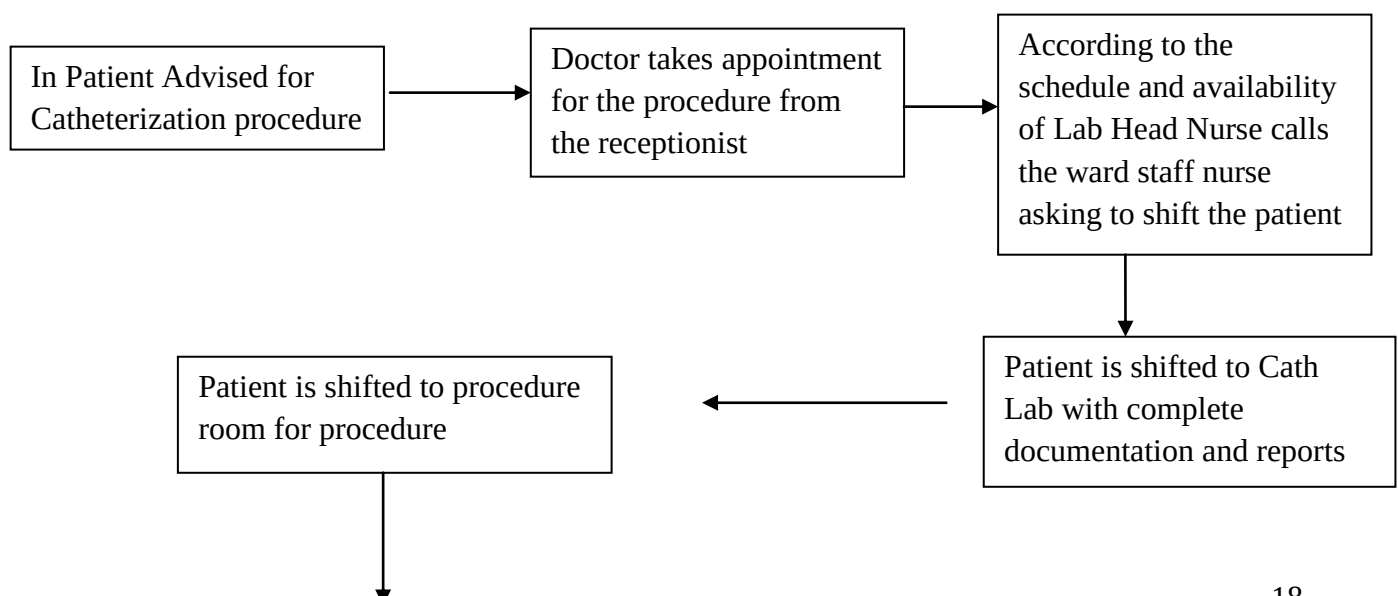
Patient Flow

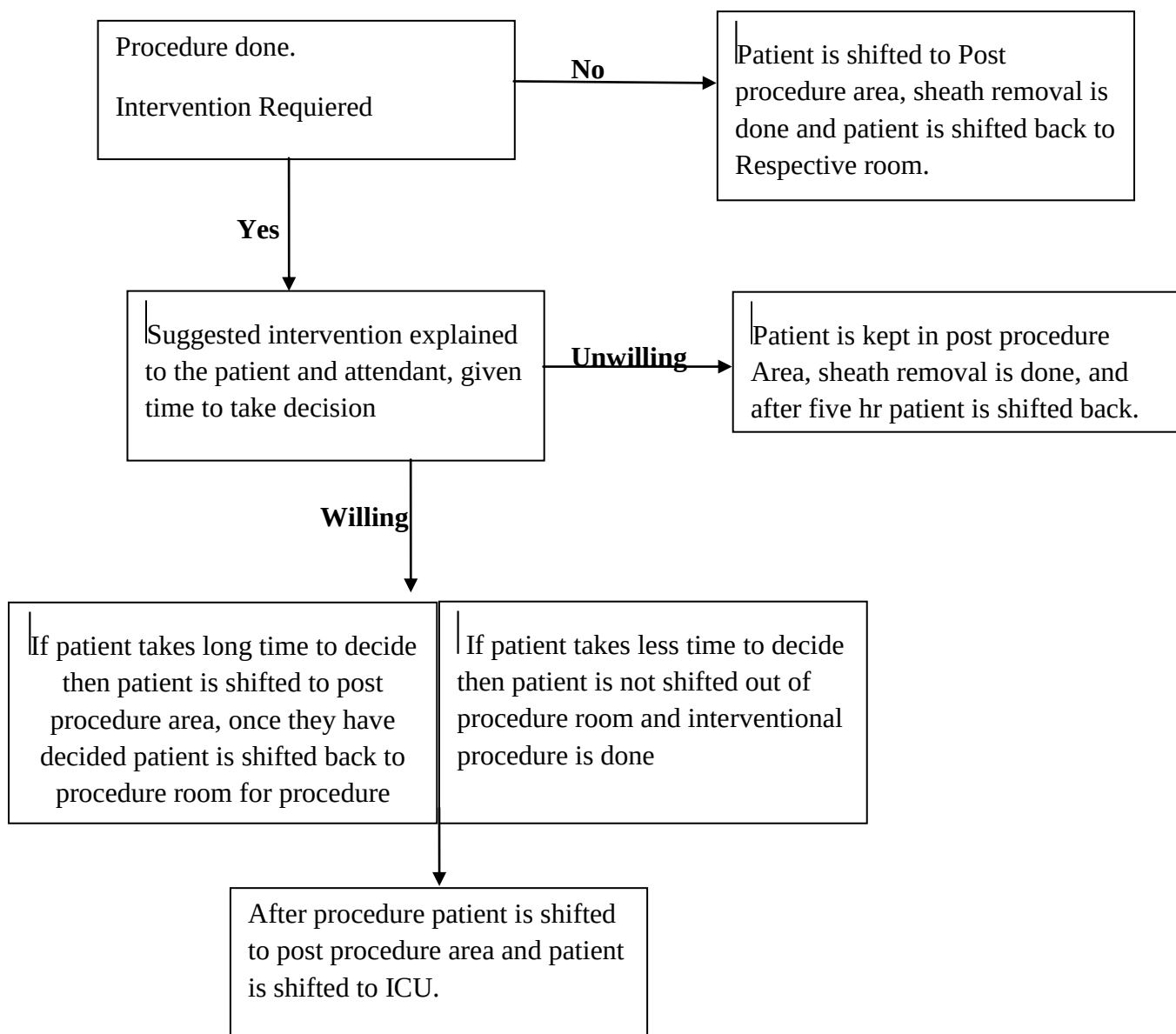
Patient Flow for Day Care Patient





Patient Flow of In Patient





Indenting Procedure

Consumables – After every patient the indent form is filled by technician for respective patient and is given to store in charge who files it in the bill of the patient by sending it online to the billing department.

Store incharge is responsible for the availability of all consumables. In case of drugs he sends the indent to the pharmacy in ground floor whereas for stents and guiding wires and balloons etc he directly contacts with the dealer.

Condemnation Procedure – Instruments/Linen are sent to CSSD, Equipments sent to biomedical department and if repair is not possible, they condemn them and items related to maintenance department are sent to the department who are responsible for it.

Maintenance – No regular maintenance done which ideally should be done in every 3 months. Maintenance personnel are called only when required.

Cleaning and Housekeeping – it is done by housekeeping staff 4 times in a day and as and when required. Cleaning of procedure room is done after every procedure. Once in two week fumigation is done in the procedure room.

ANALYSIS OF STUDY

To achieve the objective following s timings were captured

1. Time (Patient called from ward)
2. Time (Patient Arriving to Pre Procedure Area)
3. Scheduled Time
4. Time (Patient Taken into Cath Lab)
5. Time (Patient Preparation Done)
6. Time (Anaesthesia Started)
7. Time (Procedure Started)
8. Time (Procedure Finished).
9. Time (Patient moved out of Cath Lab).
10. Time (Patient moved out from Post Procedure Area).

Metrics for Planned Cases

1) Time patient held in Pre Procedure Area.

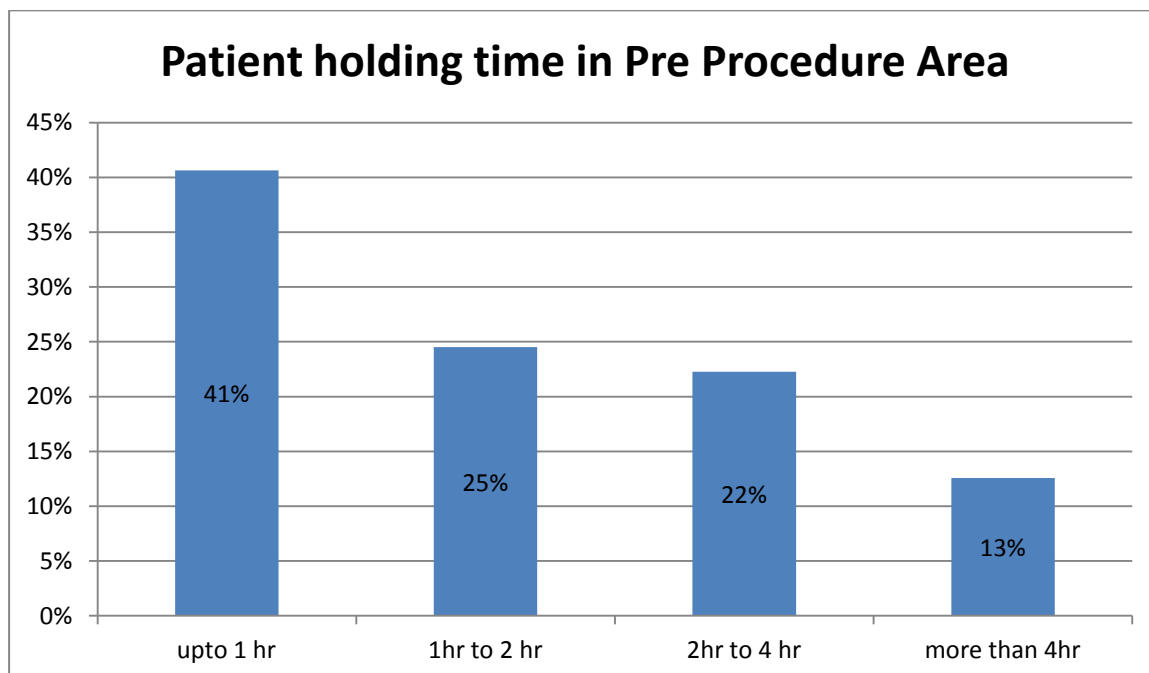
Formula - Time (Patient Taken Into the Cath Lab) – Time (Patient Arrives in Pre Procedure Area).

Median Time - 1 hr 20 min

This time is for both Day-Care as well as for Inpatients.

Standard waiting time is 1 hr

(According to a study done Cardiac Catheterization Laboratory Operations Management
Paper By:Adam Pegan,Basma Khurshid,and Lindsay Nieman 12/2/2011)



As above table shows that only 41% of patients are taken in the procedure room within 1 hr.

35% of patients have to wait for more than two hours in pre procedure area before the procedure.

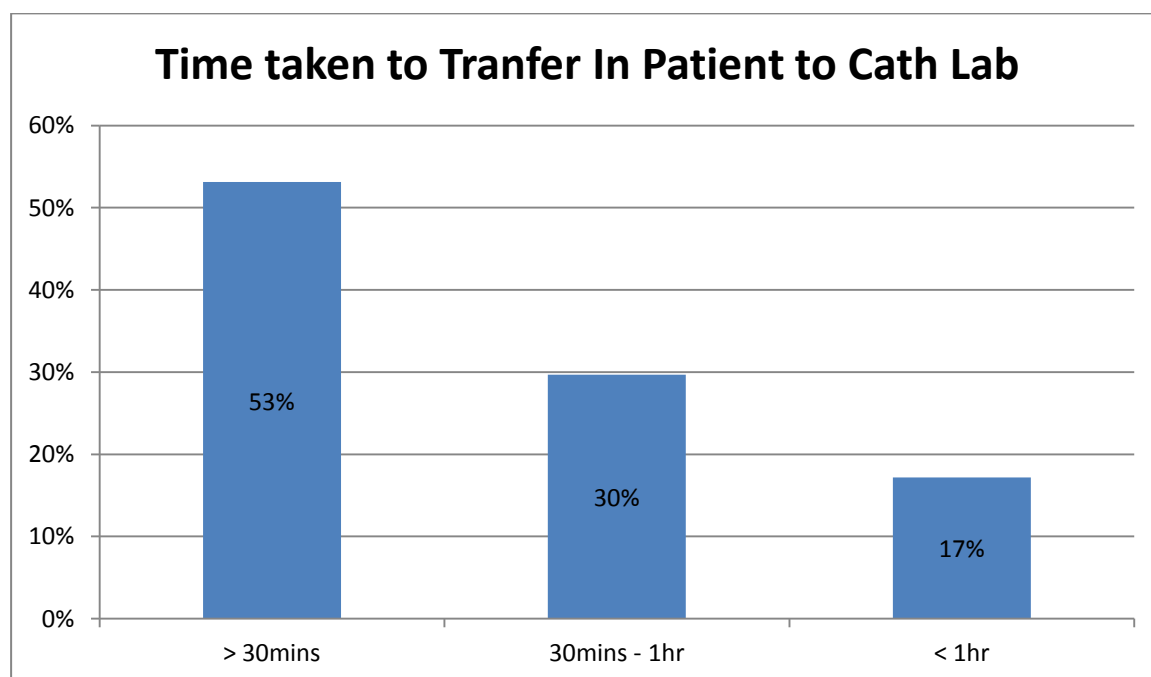
Reason for high waiting time –

- Lack of adherence to Schedule - Final schedule is made a day prior according to the appointments given before the schedule made but patients coming after the schedule made are also given appointment depending on the availability of slot.
- Patient is not communicated properly about the timing of the procedure, For example if the Procedure is at 4pm in evening the patient is just asked to report to admission counter at 8am in morning, in case patients reaches to admission counter at 8am then as per schedule patient has to wait till 4pm for the procedure in pre procedure area.
- Day care patient may not either reach on time or may not come for procedure without giving prior notice to the department. Leading to rescheduling of the schedule.
- Patient may arrive without any investigation with leads high waiting time in pre procedure area.

2) Time taken to transfer In Patient to Cath Lab.

Formula - Time (Patient arrives in Cath Lab) – Time (Patient called from ward).

Median Time – 20 mins



Taking 30mins as buffer time taken to shift a patient from respective ward or ICU to Pre Procedure Area only 53% Patient are shifted within 30 mins. 47% patient are received in Pre Procedure area after 30 mins Leading to Non Productive time of Cath lab.

Reasons identified for delay in shifting –

1. Overloaded Ward Nurse – One Ward nurse has to cater 6 Patient at a time leading to overload of work. Thus, all investigation for the required procedure is sent late.
2. Non Availability of Porter – Porter who helps the staff nurse in transferring the patient may not be available leading to delay in shifting of patient.

3. Consent not signed by patient – According to the protocols of KDAH patient is not shifted for the respective ward or ICU unless consent is not signed.
4. Financial clearance is due – According to the policy of KDAH patient is not shifted unless financial clearance is not received from Finance Department.

3) Time taken to prepare patient for Procedure.

Formula - Time (Patient is prepared for Procedure in the Cath Lab) – Time (Patient taken into the Cath Lab).

Median Time – 14 mins

In Kokilaben Dhirubhai Ambani Hospital has well trained staff nurse in Catheterization Lab. 2 sister assist a doctor for a procedure, one is a scrubbed nurse and other is circulating nurse. Alternately they become circulating and scrubbed nurse.

Preparation time include the time when patient is shifted in the catheterization Lab shifted on the patient table, if required the patient is shaved on the table, the required area is draped and cleaned properly.

Still, this has a scope in reduction upto **10 mins**. This is used as standard in many Catheterization Lab

4) Time taken for a Procedure.

Formula - Time (Procedure finished in Cath Lab) – Time (Procedure started in Cath Lab).

Average time Taken for a Procedure

Cath Lab 1 – 45mins

Cath Lab 2 – 1hr 19 mins

In KDAH Cath Lab 1 is solely dedicated for adult Cardiac procedure whereas Cath Lab 2 is dedicated for paediatric cardiac procedure, Neuro Interventional procedures, Peripheral Interventional Procedure, Vascular and Endovascular Procedure etc. which comparatively take longer duration than adult cardiovascular procedures.

5) Turn Around Time

Formula -Time (Next patient shifted in the Cath Lab) –Time (Previous patient shifted out of Cath Lab).

Median time

Cath Lab 1 – 9 mins

Cath lab 2 – 12 mins

Ideal Turn Around time for any Cath Lab should be 5 mins if the sheath removal is not done in the procedure room as stated in a study An Evaluation in Cath Lab Turn Around Time by Rose Czarnecki..

In Cath Lab of KDAH Sheath removal is done in the Post Procedure Area.

Wastage of time in every case leads to underutilized Cath Lab.

Reason-

1. Over Loaded HCA – Health Care Assistant is the person who helps nurse to shift patient from Patient Table to the stretcher. As we have seen the Job Profile of the HCA too of work load leads to unavailability of HCA.
2. No one informs when the procedure is getting over -It is the duty of Circulating Nurse to inform that the Procedure presently going will finish soon to the Head Nurse who will keep

next patient ready for the procedure but in KDAH circulating nurse does not inform the head nurse about the same.

3. Delay in shifting of inpatient- when next patient for procedure is an inpatient if the patient is not shifted leading to Non productive time of Cath Lab, Doctors also have to wait leading to time wastage of Doctors.

6) Percentage of Additional cases. – 18.39%

Cases which are not scheduled in the scheduled are considered to be the additional cases.

Formula - Total number of Additional Cases divided by Total number of Cases x 100

Addition of cases leads to delay of cases which are scheduled thus disturbing the schedule.

It also leads to **Lack of adherence of timings** of staff leading to increase in work load on the staff of Cath Lab. Delay in cases leads increase working time of the staff. Occasionally, staffs have work overtime due to addition of cases.

7) Percentage of Case Cancellations. - 20.94%

Cases which are scheduled and are cancelled due to any reason are considered to be case cancellations,

Formula - Total number of Cancelled Cases divided by Total number of Cases x 100

Case Cancellations leads to increase in Unutilized time of the Cath Lab.

Reasons-

1. Patient medically unfit for the Procedure.- Schedule is made a day prior but sudden change in medical status of patients leads to case cancellations.
2. Patient or attendant not willing for Procedure – According to the guidelines unless and until consent is not signed by Patient and attendant procedure cannot be done. In KDAH Doctor take appointment for the procedure without taking consent from the patient. If the patient is Day care the consent is taken by the Registered Medical officer while taking history. If patient admitted the consent is taken by the nurse in charge. If day care Patient is not willing for procedure the patient doesn't appear leading to case cancellation.
3. No Financial Clearance done by Patient – Cases get scheduled a day prior but the financial clearance is usually done by patient on the day of procedure. Due to some reason if the patient or attendant has not done the financial clearance before the scheduled procedure time the case get delayed and sometimes Cancelled.

8) Case Delay.

Delay in Procedure -Formula – Time (Patient Taken in Cath Lab for Procedure) – Scheduled Time.

Cases which are delayed beyond 30mins are considered to be case delay. So Percentage is calculated.

Formula – Total No. Of Cases Occurring after 30mins of scheduled time / Total no. of cases Scheduled.

Indicator	Cath Lab 1	Cath Lab 2
30 mins to 1 hr	21.95 %	33.33 %
1 hr to 3 hr	58.53%	57.14%

3 hr and more	19.51%	9.52%
Total Case Delay Percentage	27.51%	40%

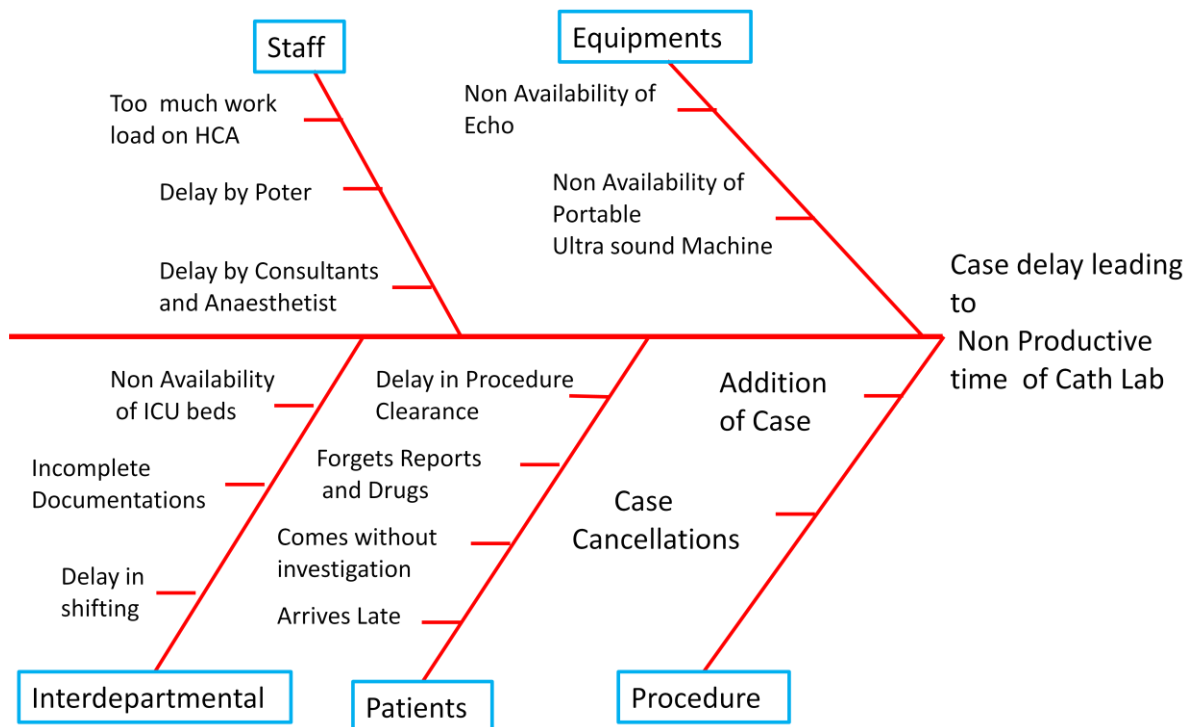
Above Table shows that almost 27.52% of cases in Cath Lab 1 and 40% cases in Cath Lab 2 are delayed.

Out of all delays most of cases are delayed 1 to 3 hrs.

Reasons

1. Delay in shifting of inpatient.
2. Day Care patient arrives late.
3. Patients get admitted without investigation.
4. Unavailability of Standby Anaesthetist or respective Consultant
5. Case Cancellation.
6. Non Availability of ICU beds – After various Catheterization Procedure in Cath Lab the Patient should be shifted to ICU. In KDAH due to unavailability of ICU bed the Procedure were delayed.
7. Delay due to staff.
8. Unavailability of Equipments – like Potable Echo machine and Ultra sound machine.
In KDAH 3 Portable ultrasound and echo machine are available. There is no responsible person to monitor it. Head nurse has to call departments with high probability of having them.

Cause and effect relation for reasons of Case delay ultimately leading to underutilized Cath Lab



9) Cath Lab Utilization Time.

Formula - Time (Patient moved out of Cath Lab) – Time (Patient moved in the Cath Lab).

It is the time when the cath lab is utilized that is the patient is inside the cath lab for the procedure. This time includes the preparation time consumed before the procedure and after the procedure. This also includes Anaesthesia induction time which is used only for paediatric cases and rarely for adults.

Median time

Cath Lab 1 – **45 mins**

Cath Lab 2 – **1 hr 19 mins**

Total utilization time in the duration of study

Cath Lab 1 – 167 hrs 32 mins = **167.53 hrs**

Cath Lab 2 – 179 hrs 46 mins = **179.76 hrs**

Per day utilization of Cath Lab is

Cath Lab 1 – $167.53/30 = 5.584$ hrs

Cath Lab 2 - $179.76/30 = 5.992$ hrs

As the workings hours of Cath Lab for a procedure is 8am to 6pm so available hours is 10hrs per day

So, Cath Lab is underutilized for –

Cath Lab 1 – $10 - 5.584 = 4.416$ hrs

Cath Lab 2 – $10 - 5.992 = 4.008$ hrs

As we know that procedure in

Cath Lab 1 takes approximately 45 mins that is 0.75 hrs, so we can say that still approximately **5** more cases can be done.

Cath Lab 2 takes approximately 1 hr 19 mins that is 1.32 hrs, so we can say that still approximately scope of **3** more procedure is still there.

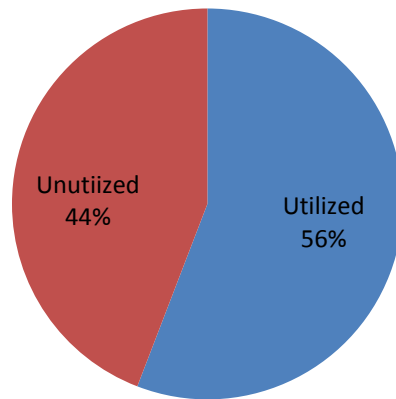
10) Cath Lab Utilization Percentage

Formula - Total Cath Lab Utilization time (in hours) divided by total working hours(30days) X100

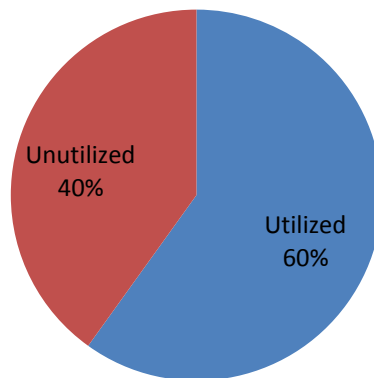
Cath Lab 1 - $167.53 \text{ hrs}/10 \times 30 = 55.84\%$

Cath Lab 2 - $179.76 \text{ hrs}/10 \times 30 = 59.92\%$

Cath lab 1



Cath lab 2



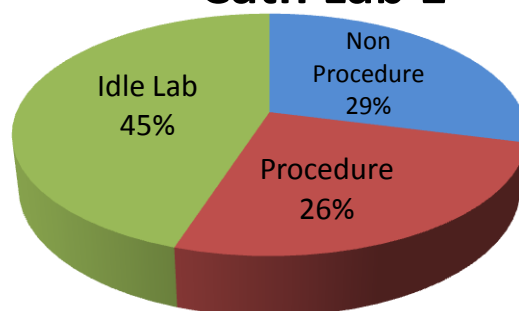
Pie Chart above shows the Utilization Percentage of two Cath Lab

Even when the patient is inside Cath Lab the time spent can be divided into Procedure time and Non Procedure time

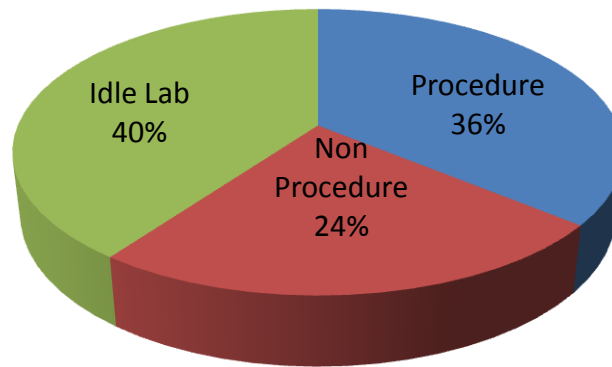
Procedure time is the time when the Procedure is undergoing

Non Procedure Time is the time when Preparation required before and after the procedure is done, it also includes the Anaesthesia Induction time.

Cath Lab 1



Cath Lab 2



Above two pie Chart show the Percentage division of the time Available in Cath Lab in Procedure, Non procedure and Idle lab (when Nothing Is done in Cath Lab).

Reasons –

1. Case Cancellation- Cases get cancelled either due to medical reason or patient unwilling for procedure or due financial clearance.
2. Comparatively less no. of patient for catheterization Procedure.
3. Case delay – either due to delay in shifting of patient or Patient arrives late for admission. Cases are also delayed due to incomplete investigation.

CONCLUSION

Catheterization Laboratory, which is generally a high volume, challenging and complex environment within any health care facility, can operate efficiently only if it has a highly integrated system that brings together all the different aspects of managing the facility.

From the study we can infer that:

- The protocol for patient Scheduling is very well made but practically not followed as such which results in lack of organization of catheterization Laboratory and this is mainly because there are no follow up once the appointment is given, neither from the doctor nor from the patient.
- Improper scheduling and addition of cases results in overwork.
- Delay in shifting of Patient, Daycare Patient arriving late or not appearing leads to wastage of laboratory time, Doctor's and staff time and also wastage of resources.
- As a result there is only 56 percent and 60 percent of utilization of Cath Lab 1 and Cath Lab 2 resulting loss of revenue of approximately 5 cases in Cath Lab 1 and 3 cases in Cath Lab 2 per day.

All the above parameters studied show that **there is respective growth in no. of cases that shows that Laboratory can be utilized much more efficiently provided some important and minor changes are made.**

Proposed Suggestions

1) Patient Related-

- Patient Related problems can be solved by giving proper communication to patient. A checklist can be given to patient before coming for procedure.

- This checklist can be floated in our websites.
 - A day prior a reminder call can be given to the scheduled Patients.
- 2) **Case Cancellation/ Rescheduling –**
- Proper Planning and work up of Cases before scheduling of Cases.
 - Proper conveying of rescheduling and cancellations to the Cath Lab team.
- 3) **Over Loaded HCA –**
- Divide some work to Housekeeping Staff.
- 4) **Equipment—**
- 3 Machines Can be divided into 3 floors
 - In A&E
 - In 3rd floor
 - In 5th floor
 - A person should monitor the whereabouts of the same.
- 5) **Delay in shifting of Patient due Non Availability of Patient –**
- Fixed timings of Doctor's Rounds.
 - Proper Scheduling of Discharge.
 - Allotting atleast two beds Daily to Cath Lab.
 - A person to monitor the allocation of beds.

LESSONS FROM SUMMER TRAINING

The main objective of summer training was to get acquainted with the hospital as an organization. The departmental orientation gave me a good insight into the structure and processes of various departments. I came to know about the various requirements of a department and common issues in that department. I came across some procedures which were of world class quality like pneumatic shoot system. An exposure to such practices would be very helpful in future.

Moreover, an exposure to the real work environment has helped me to develop skills to work with people and tackle them. When I interacted with people of various levels I came to learn about their perceptions, attitudes and behaviors like nursing staff, doctors, technicians, patients and managers. This will help me in future whenever I will be dealing with them.

The project assigned to me gave an opportunity to develop better understandings of the standard practices which are available in the industry. It gave me a sense of responsibility and commitment towards the fulfillment of the task assigned. It helped me to critically analyze the situation and to come up with plausible solutions for improvements.

The hospital environment gave me the flavor of the work environment in which I will be working in future. I got a better understanding of the hospital as a system which is a combination of lot of people and departments. Inter departmental coordination is very necessary. This has enhanced my interest further in the industry and would be profession.

The two months journey not only helped me to better understand the hospital as an integrated system of people and processes but gave me certain attributes which I would carry with me for future.