

**Summer Training at
Narayana Health City, Bangalore
(April 3 to June 2, 2017)**

Study on the Process Flow of Catheterization Laboratory

**By
Monali Ghosh**

**Under the guidance of
Dr. P.R. Sodani**

**MBA Hospital & Health Management
2016-2018**

The logo for IIHMR University, featuring a stylized 'i' in a square followed by the text 'IIHMR UNIVERSITY' in a serif font.
**Institute of Health Management Research
The IIHMR University, Jaipur
2017**

CERTIFICATE

This is to certify that **Ms. Monali Ghosh** has undergone summer training in **Narayana Health City, Bangalore**, from 3rd April to 2nd June 2017.

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

I wish her success in all his future endeavors.



Col. (Dr.) Ashok Kaushik

Dean (Academic & Student Affair)

The IIHMR University, Jaipur



Mentor- Dr. P. R. Sodani

Dean (Training)

The IIHMR University, Jaipur

2nd June 2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Monali Ghosh, MBA - Hospital and Health Management, IIHMR, Rajasthan, has completed her Internship in Administration department (Operations) under the guidance of Mr. Lokesh Tharidal from 3rd April 2017 to 2nd June 2017 at NH Health City, Bangalore.

We wish her good luck in her future endeavours.

For **Narayana Hrudayalaya Ltd**



Nitin Barekere

Group Head – Human Resources

Date: 2nd June 2017

PROJECT COMPLETION LETTER

This is to certify that **Ms. Monali Ghosh – MBA - Hospital and Health Management, IIHMR, Rajasthan**, has successfully completed her internship project at NH Health City, Bangalore from 3rd April 2017 to 2nd June 2017.

During the course of Internship, the intern has worked on project titled “**A Study on Catherterization Laboratory Process Flow**”, at **Narayana Institute of Cardiac Sciences, Bangalore**, under the guidance of **Mr. Karan Dave – Facility Director, at NH Health City, Bangalore**.

We found her sincere, hardworking, and technically sound and result oriented. She worked well as part of a team during her tenure.

We take this opportunity to thank her and wish her all the best for her future.

For Narayana Hrudayalaya Limited.



Nitin Barekere,

Group Head – Human Resources.



Narayana Hrudayalaya Limited

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ACKNOWLEDGEMENT:

With immense pleasure I express my heart full gratitude to the director of IIHMR Jaipur, Dr. S.D. Gupta, (Chairman of IIHMR University), and my mentor Dr. P.R. Sodani (Training Dean of IIHMR University) for giving me this opportunity to undergo training.

I am extremely indebted to all the professionals at Narayana Institute of Cardiac Science for sharing generously their knowledge and precious time which inspired me to do the best during summer training. I owe a great debt to chief executive officer (NICS) for providing me an opportunity to work as a trainee in their organization. I would like to thanks Mr. Karan Dave (Facility Director), Mr. Lokesh Tharidal S (General Manager) as our mentor for the summer training in NICS, without their help it would not have been possible for me to understand the hospital to the extent as I have now. I am highly grateful to all the staff of Catheterization laboratory department for their cooperation which enabled me to complete my special assignment in the department.

I am also grateful to all the department heads and staffs for giving me time in spite of their hectic schedule. Without their active cooperation and participation, it would not have been possible to accomplish my task.

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Acronyms/Abbreviations

CCL System- Cardiac Catheterization Laboratory system

VSM – Value Stream Mapping

C & E diagram – Cause and Effect diagram

RN – Registered Nurses

H& P – History and Physical

CSSD-Central Sterile and Supply Department

CT-Computerized Tomography

ECG-Electro Cardiogram

MRI- Magnetic Resonance imaging

TMT-Treadmil Test

CCU-Critical Care Unit

PITU-Pediatric Therapy Unit

ITU-Intensive Therapy Unit

IPD- In-Patient Department

NICS-Narayana Institute of cardiac sciences

NH-Narayana Healthcity

About Summer Training:

The Master in hospital and health management (MBAHM) Program of Institute of Health Management Research (IIHMR) aims at preparing professionally trained managers of health care organization and hospitals to meet the increasing need for managerial skill. It involves a eight week summer placement for the first year students to provide them with a firsthand experience of the hospital system or environment. As a part of the program I had privilege to undergo my practical training at Narayana Health City, Bangalore to get a firsthand Knowledge and Experience about the functioning of the hospital. I worked all through under the Clinical administration there from 3rd April 2017 to 2nd June 2017. The main aim of the summer training was to get exposed to operation of all the hospital in general, and an in –depth insight of the Catheterization Laboratory department, Inpatient department, Critical Care Unit & in the hospital in particular.

Objective:

The summer training program had the following Objectives:

- To have a basic orientation of the hospital set up.
- To study the functioning of the hospital as a system and its departments as subsystems of the hospital.
- To observe all the department in terms of their location, work plan and Staffing pattern.
- To Study about staffing pattern and job responsibility of staff.
- Doing a project which is helpful to me in understanding hospital working in a better way and to the organization.

INTRODUUCTION:

Narayana Health headquartered in Bangalore is one of India's largest and world's most economical healthcare service provider. Since its inception in 2000 by leading cardiac surgeon DR. Devi Prasad Shetty, as a 225 beds cardiac hospital "Narayana Hrudayalaya" in Bangalore. The NH group of hospitals has grown to a healthcare conglomerate with a network of 32 multispecialty and super specialty hospitals with 6498 beds spread across 20 locations. The group was rebranded as Narayana Health in 2013 to convey organizational vision, values and objectives beyond just cardiac care.

The NH group offers services in all areas medicine with special thrust in the areas of Cardiology & Cardiac Surgery, Cancer Care, Neurology and Neurosurgery, orthopedics, Nephrology & Urology, Gastroenterology, General surgery, Solid organ transplant & Critical Care and is focused on Awareness, disease prevention, screening and early intervention.

Over the decade and the half, NH has set up cluster of south, East and west of the country, and plans to create similar cluster in Northern & Central India and Globally. They have set their global footprint with the establishment of health city, Cayman Island, North America that replicates the NH mode of Healthcare delivery. NH plans to reach out to people in Tier II and Tier III cities of India systematically, ensuring and providing them with quality healthcare. Recognized world over for its social enterprise model, NH is committed to the principle of Compassion, Quality and Affordability in healthcare and leverages technology to achieve this.

NH has also been striving to build a self-sustaining healthcare ecosystem through various initiatives like building health cities to bring down the overall cost, leveraging economics of scale, CSR initiatives/donations from corporates/Charitable trust offering academic programs, vendor management, thus addressing healthcare dynamics in a systematic manner. For its ability to reconcile quality, affordability, scale, transparency, credibility and profitability NH has emerged as a Global Industry Model.

Going forward, NH intends to stay predominantly asset-light, reinvest accruals and engage with the state government and like-minded private organizations for affordable healthcare while leveraging the economics of scale and technology to its advantage.

Vision- To provide high quality health care with compassion at an affordable cost on large scale.

Core values – (ICARE)

I-Innovation and efficiency

C- compassionate Care

A-Accountability

R- Respect for all

E- Excellence

MISSION

“A Dream of Making Quality Healthcare Available To The Masses Worldwide”

NARAYANA HEALTH- A PAN-INDIA MULTISPECIALITY HOSPITAL GROUP

- 2000 year founded by Dr Devi Prasad Shetty
- 56 Healthcare facilities
- 31 locations in India
- 1.97 Patients annually (in millions)
- 30+ Medical specialties
- 312 Daily average surgeries and procedures
- 11,650 Full-time employees and students
- 2,563 Full-time, consultant and students’ doctors

LOGO -THREE LEAVES OF BILEF



NARAYANA in Sanskrit means the preserver of the universe matches with NH ethos of being committed to the health of every life.

COLOUR: Blue is the colour of calm, peace and culture, leaf is the symbol of life.

NH: NH does not have any gaps in between as there is no space for discrimination while catering to the health needs of every individual.

3 Leaves: The core values of NH- Compassion, Quality, Affordability.

Sunrise: The sunrise behind the letters NH marks a new dawn in healthcare that NH is bringing.

What makes Narayana Health different?

- Clinical Excellence with 2 JCI (Joint Commission International) accredited hospital.
- 4 NABH Accredited Hospitals.
- Service Excellence
- Affordability
- More than 90000 Cardiac Surgeries
- Amongst the Largest Telemedicine networks in the world
- Patients from 76 countries
- One of the largest Dialysis units in India with 217 dedicated beds and 1,30,000 procedures per year.
- 80 bed dedicated post-operative cardiac ICU, largest in the world
- Digital Radiology
- Academic excellence
- Financial stability

FLOOR WISE FACILITY DISTRIBUTION :

➤ BASEMENT

BLOCK- A

- IT DEPARTMENT
- LINEN DEPARTMENT
- SCHEME UNIT
- DATA PROCESSING
- STAFF CAFETERIA

BLOCK-B

- RADIOLOGY DEPARTMENT CT-SCAN, X-RAY, ULTRASOUND, MRI
- DEPARTMENT OF SOCIAL WORK
- CSSD
- ADMINISTRATIVE DEPARTMENT

➤ **GROUND FLOOR**

BLOCK-A

- HELP DESK
- REGISTRATION
- PACKAGE OFFICE
- ADMISSION COUNTER
- BILLING COUNTER- OPD and IPD
- CASH COUNTERS
- OUT PATIENT DEPARTMENT (17 consultants room)
- INVESTIGATION DEPARTMENT- ECG, TMT , ECHO, X-RAY, Hematology
- DIABETIC EDUCATION ROOM
- LAB REPORT DISPATCH COUNTER

BLOCK –B

- PEDIATRIC OPD (with 8 consultant room)
- CCU TRIAGE
- STEPDOWN CCU
- EXCECUTIVE CCU WARDS
- CATH LAB
- COUNSELLING ROOM

➤ **FIRST FLOOR:**

BLOCK-A

- EXCECUTIVE OPD
- CORPORATE CELL
- CAFETERIA
- WARD- SEMI PRIVATE ROOMS- 6BEDS
PRIVATIVE ROOMS- 3 BEDS

DELUX ROOMS- 12 BEDS

SUITE- 1ROOM

BLOCK –B

- Dr. DEVI SHETTY OFFICE
- 3 OT
- ITU – 22 BEDS

➤ **SECOND FLOOR**

BLOCK-A

- ITU- 36 BEDS
- 5 OT 's

BLOCK-B

- WARD- SEMI PRIVATE ROOMS- 32 BEDS
PRIVATIVE ROOMS- 4BEDS

➤ **THIRD FLOOR**

BLOCK-A

- PITU- 70 BEDED

BLOCK-B

- WARD- SEMI PRIVATE ROOMS- 30BEDS, PRIVATIVE ROOMS- 6 BEDS

➤ **FOURTH FLOOR**

BLOCK-A

- 2-CATH LAB
- HYBRID OT (VASCULAR, RADIO, NEURO SURGERIES)

- PITU- 14 BEDS
- ITU- 17 BEDS

BLOCK-B

- WARD- SEMI PRIVATE ROOMS- 16 BEDS
PRIVATIVE ROOMS – 1 BED
- PLATINUM WARD- 9 ROOMS
- SUITE- 1 ROOM

➤ **FIFTH FLOOR**

BLOCK-A

- PEDIATRIC WARDS- 52 BEDS
- PHARMACY

BLOCK-B

- WARD- SEMI PRIVATE ROOMS, PRIVATIVE ROOMS, DELUX ROOMS
- MARKETING SECTION

➤ **SIXTH FLOOR**

BLOCK-A

- WING-1 GENERAL WARDS- 32BEDS
- BILLING COUNTER

BLOCK-B

- WING -2 GENERAL WARDS- 34BEDS
- TELEMEDICINE DEPARTMET

➤ **SEVENTH FLOOR**

- TRAINING ROOMS
- DEVELOPMENT AND TRAINING OFFICE

**‘PROJECT REPORT’- “ STUDY ON THE
PROCESFLOW OF THE CATHETERIZATION
LABORATORY OF NARAYANA INSTITUTE OF
CARDIAC SCIENCE**

PROJECT REPORT

Introduction:

A Catheterization Laboratory or Cath lab is an examination room in a hospital or clinic with diagnostic imaging equipment used to visualize the arteries of the heart and the chambers of the heart and treat any stenosis or abnormality found.

Catheterization Laboratories (Cath Labs) are relative capital and labor-intensive departments within the hospital. Therefore, these departments are financially important for the hospital. Due to the increasing prevalence of cardiovascular diseases (CVD) as well as rapidly expanding absolute numbers and types of catheter procedures, the demand for catheterization procedures is increasing.

Cardiovascular disease is expected to rise to more than 23.6 million by 2030, With regard to this information, it may be expected that the demand for relatively scarce costly Cath Labs in the future will also increase. For this reason, Cath labs should be used optimally. This means that the utilization should be maximized, whereas idle times (i.e., under-utilized time or high turnover times) and work outside regular hours (i.e., over-utilized time) should be minimized.

The Cath Lab workforce comprises a specialist, skilled *multidisciplinary team* of Cardiologists, Cardiologists-in training, Registered Nurses, Medical Radiation Technologists, and support staff, Nursing in charge, medicine duty staff, shifting staffs and cleaning persons. The Cath Labs undertake a mix of elective (scheduled) and acute (un-planned) services during hours of operation and also provide an acute out-of-hours service.

Aim of the project-

- 1.Improve utilization of Cath Lab.
2. Reducing shift in & shift out timing of patients in Cath Lab.
3. Increasing the satisfaction level among staffs, patient and patient's relatives.

Objective-

- 1.To study the daily process flow of Cath lab
2. Addressing the value added and non-value added steps in a Cath lab day to day process flow.
- 3.To identify time gaps between patient shift in & shift out in Cath lab if any.
- 4.To provide suitable cost-effective recommendation to increase the utilization of the Cath lab if needed.

METHODOLOGY and STUDY DESIGN:

Study area: Narayana Institute of Cardiac Science

Study Design: A Descriptive, observational Prospective study was conducted in the Cath lab Department of Narayana institute of cardiac science hospital from April 3,2017 to June 2,2017. Informed consent was not necessary because of the observational nature of the study. Patient care was not affected by the study, and individual patient information was not used during the analysis of data.

Sampling Unit: Patient who was recommended for Cath lab procedure.

Sampling Size: - A sample size of 140 patients has taken.

Sample Technique: -The technique used to collect data was simple Random sampling.

Inclusion Criteria: – Inpatients who are recommended or cardiac procedures. .

Exclusion Criteria: - emergency patients referred for cardiac procedures.

Design Tool: The tool used for data collection was self-administered tabulated format for each day under the following domains to record:

- General information about the patient – 1. Name &MRN no.

2.Procedure name- For which the patient Is admitted for.

3.Respected consulted name

- **Patient Calling time:** The time when call Is made from the Cath lab to the 6th floor ward, asking for patient shifting.
- **Patient receiving time:** The time when the Patient is shifted to the Cath lab waiting room by the ward nurse.
- **Time taken for shifting:** The time Gap between Calling time and receiving time is referred by this.
- **Patient wheel in time:** The time when the patient is taken inside the procedure room.

- **Patient waiting time:** The time gap between the patient receiving time and wheel in time is referred by this.
- **Patient preparation time:** The time taken to prepare the patient inside the lab and simultaneously the preparation of the equipment needed.
- **Procedure time:** Time taken by the physician to perform the procedure
- **Wheel out time:** The time when the patient is shifted out of the procedure room on stretcher.
- **Shifting time:** The time when the patient is shifted to the SDCCU or ward from the Cath lab.

Data collection: After designing the tool for data collection, the data was collected and recorded by observing and tracking the patient flow of CCL system, records from the Cath lab registers. and Also by daily communicating with Sister in charge, nursing staffs, patients and consultants to determine the reason for delay in process flow and classify them as per discussion.

System description:

The CCL system under study, which is in the Narayana Institute of Cardiac Science, Bommasandra, Bangalore, operates from 7:00 AM until 8:30 PM on Monday- Saturday,

The CCL physicians are capable of performing procedures for three categories of patients: inpatients, Daycare patients, and emergency patients.

There are six Cath labs working in this hospital –

- Four of them are allocated for the cardiac procedures for adults patients.
Location- Ground floor
- One Cath lab is allocated to perform the cardiac procedures for pediatric patients
Location- 4th floor
- One is a Hybrid Cath lab combined with operation theater.
Location – 4th floor

System definition:

Diagnostic and interventional procedures are the two major procedures conducted in the CCL, whereas the six important procedures conducted in cardiac Cath labs are–

- Coronary Angiogram (CAG)
- Percutaneous Transluminal Coronary Angioplasty(PTCA),

- Percutaneous trans venous mitral commissurotomy (PTMC)
- Intracardiac Electrophysiology study (EPS) + Radio frequency Ablation (RFA)
- Permanent Pacemaker Implantation (PPI)
- Cardiac Resynchronization Therapy (CRT)
- Balloon pulmonary Valvotomy (BPV)

OVERALL SYSTEM DEFINATION:

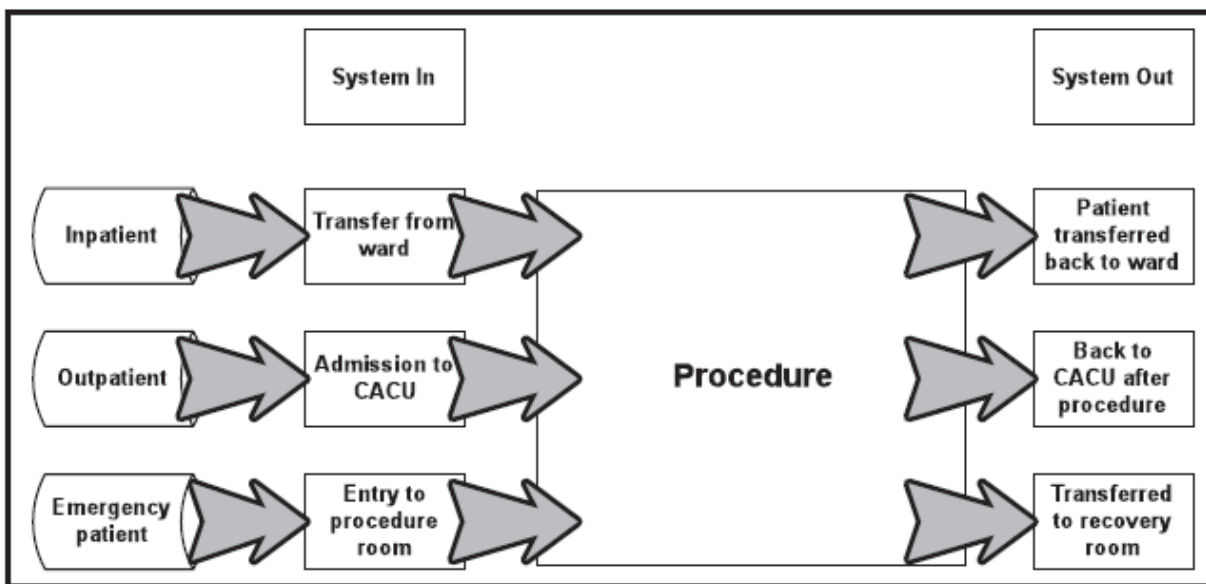


Table 1. Resource availability in the system.

Resource Name Quantity of Resource:

Consultant	15 Cardiologists
	2 vascular doctors
	2 radiologists

	1 neurologist
	3 cardiologist (for pediatric patient)
Nursing in charge	2 in morning shift + 2 in evening shift
Medicine duty in charge	1 in morning shift+ 1 in evening shift
Nursing staff per lab per day	3 in morning shift + 3 in evening shift
sheath removal staff	1 in morning + 1 in evening
shifting staffs	2
technician	14
cleaning staff	2

PROCESS MAPPING:

Inpatient and emergency patient process flow -

The pre-procedure documentation and medication for inpatients take place in the inpatient ward. The floor nurse is responsible for pre-procedure tests, medication, and preparation of the inpatient before they can be transferred to the CCL. It is important to note that the emergency patient has the highest priority among the three types of patients. Emergency patients can enter the system either from the emergency department of the study hospital or from the emergency departments of nearby hospitals. Information regarding the arrival of an emergency patient from a nearby hospital is communicated via telephone to the hospital and CCL authorities.

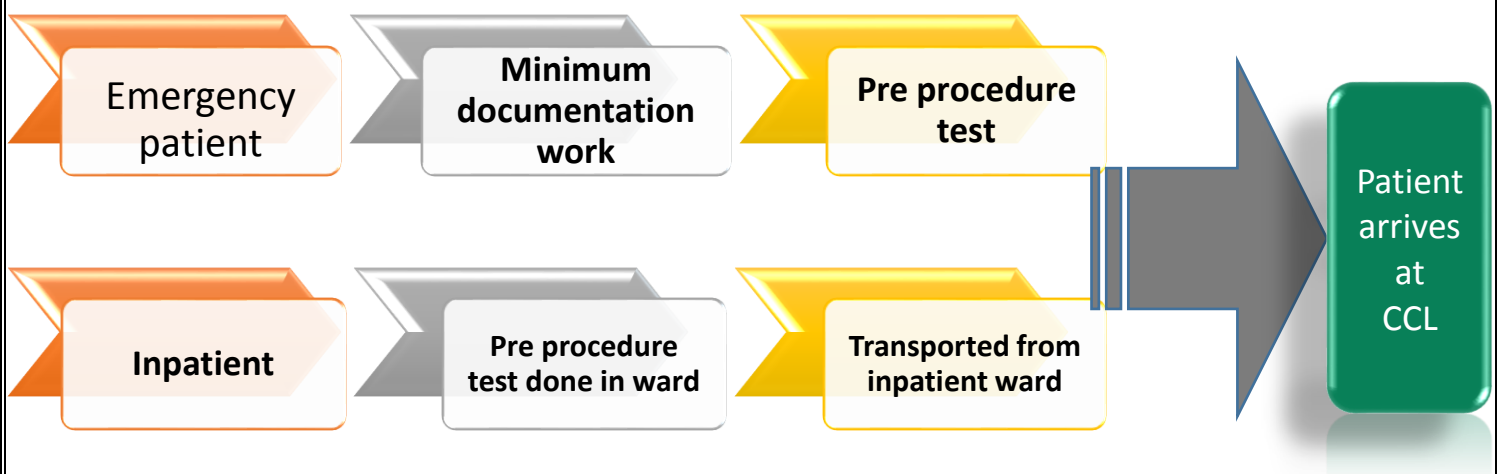


Fig: Process map for inpatient and emergency patient flow.

Procedure process flow:

This flowchart depicts the processes involved in the cardiac catheterization procedure from procedure room preparation to patient recovery.

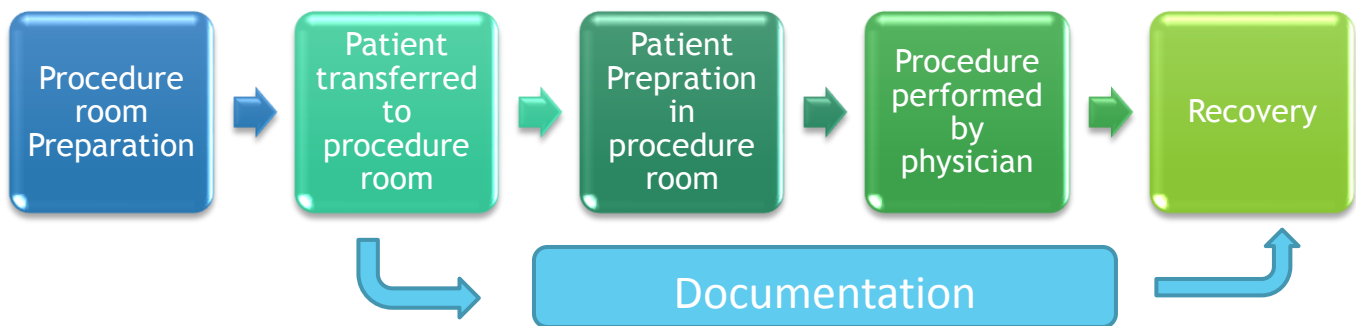


Fig: Process map for the cardiac catheterization procedure.

System resources:

The different process-wise resource requirement is listed below:

Outpatient transfer to and from CCU: One registered nurse and two nursing assistant are needed during this transfer process.

Inpatient transfer to and from floor/ward: This process requires one registered nurse and 2 shifting staff are needed during this transfer process

Procedure room: Each of the CCL procedure room is a resource in the system. Other resources involved in a procedure are one physician, one registered technologist and two registered nurses including one “circulator” and one “monitor”. The “circulator” is the registered nurse who assists the physician and the registered technologists during the procedure. The “monitor” is the registered nurse responsible for the

digital documentation during the procedure.

Problem Description:

Problem: Delay in Cath lab procedures –

Customer Impact :

- **Patient dissatisfaction:** Delaying in patients shifting from waiting room to procedure room makes a huge level of patient dissatisfaction. As there is no time scheduling is done for each patient, they were called from the wards and keep on sitting uncomfortably on the sofa of the waiting area for hours. Restlessness and hunger is the main issues causing among the patients due to this miss management leading to patient's dissatisfactions.
- Patients stay in hospital get increased.
- Next procedures get delayed automatically.

Business Impact:

- Number of patients may reduce due to high dissatisfaction level- Although having excellence and advanced technologies, high dissatisfaction level among the customer due to discomfort may have a harsh effect on the reputation of the organization.
- Date block due to delay may have negative impact on revenue generation.
- Staff's overtime increases.
- Nurse's turnover rate becomes high – Staffs satisfaction is also one of the key element of a successful organization. In Narayana there is a visible issue of delaying due to lack of manpower, which sometime forces the staffs doing double Shifts which leads to their ill health, and dissatisfaction, which may cause the high turnover rate among the staffs.

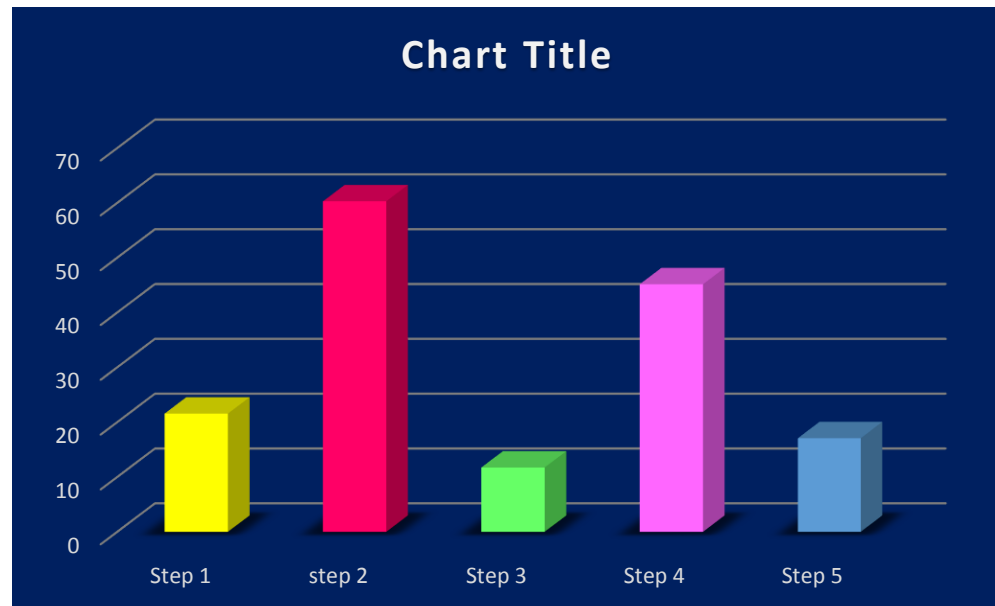
Findings:

During the study period, 140 patients were went through cardiac procedures and the mean time taken for overall process of their is 146 minutes i,e around **2 hours 26minutes.**

- Out of which average time taken between: -
 - 1.Transfer of patient from ward:- **21.58 minutes.**
 - 2.Patient waiting in waiting room: - **60.31 minutes.**
 - 3.Patient preparation in procedure room: - **11.75 minutes**

- 4.Procedure performed by physician:- **35.18 minutes**
- 5.Transfer of patient to SDCCU/ward: - **17.10 minutes**

Average time taken in each step:



Data analysis and interpretation: -

Value stream mapping-

VSMs were developed for the overall inpatient flow describing each step. VSMs were not developed for emergency patients because it was observed that the overall process in sending such a patient into the procedure room occurred in a very short period of time. This short duration from the time a patient arrives at the hospital to the time the angioplasty balloon is inflated in the blocked artery of the patient is known as the “door-to-balloon” time and should be under 90 minutes according to the guidelines. Observations and discussions with the subject-matter experts indicated that the door-to-balloon time was well within the 90-minute time frame. Moreover, there was practically no non-value-added activity involved in the treatment of emergency patients, leaving little room for improvement in this process.

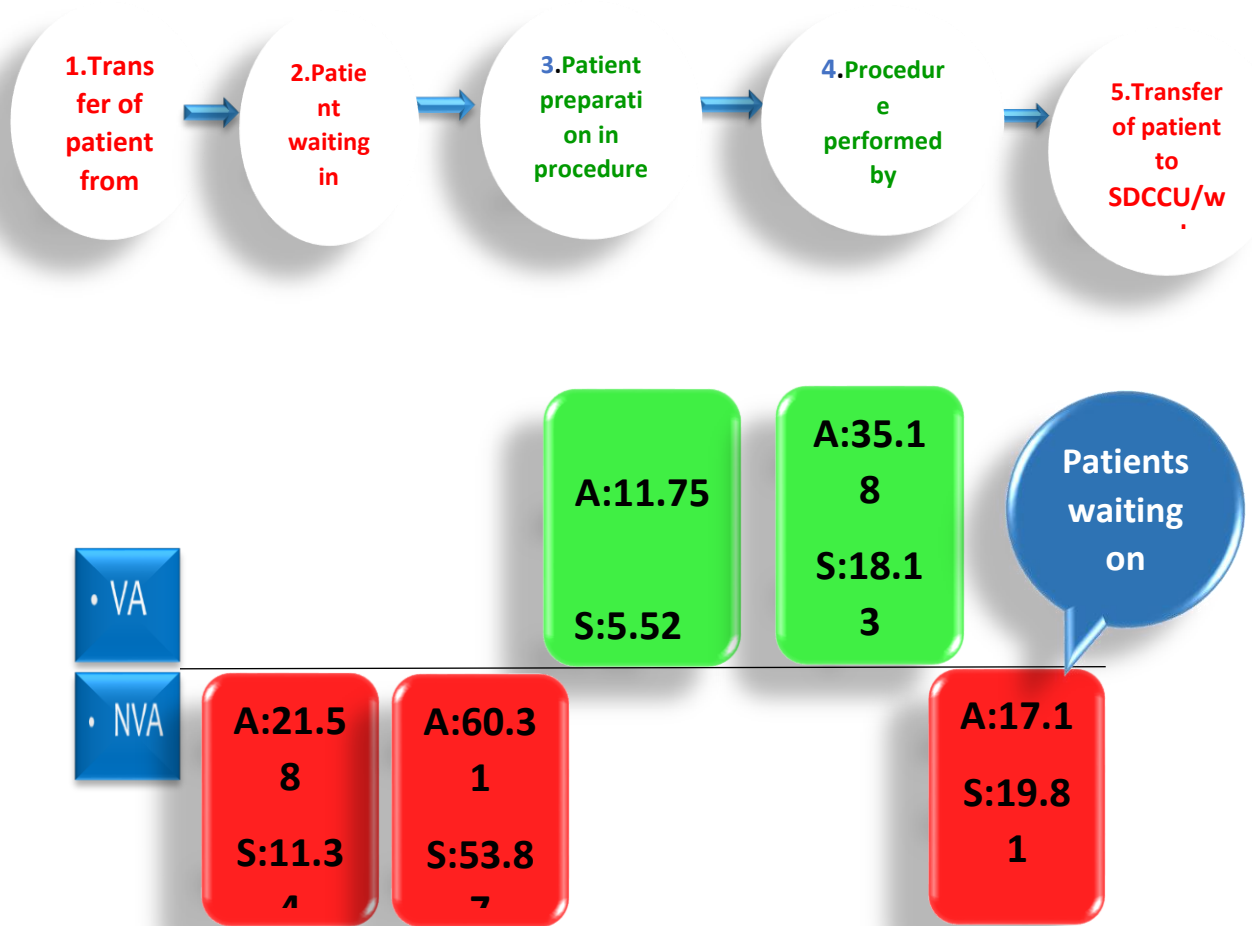
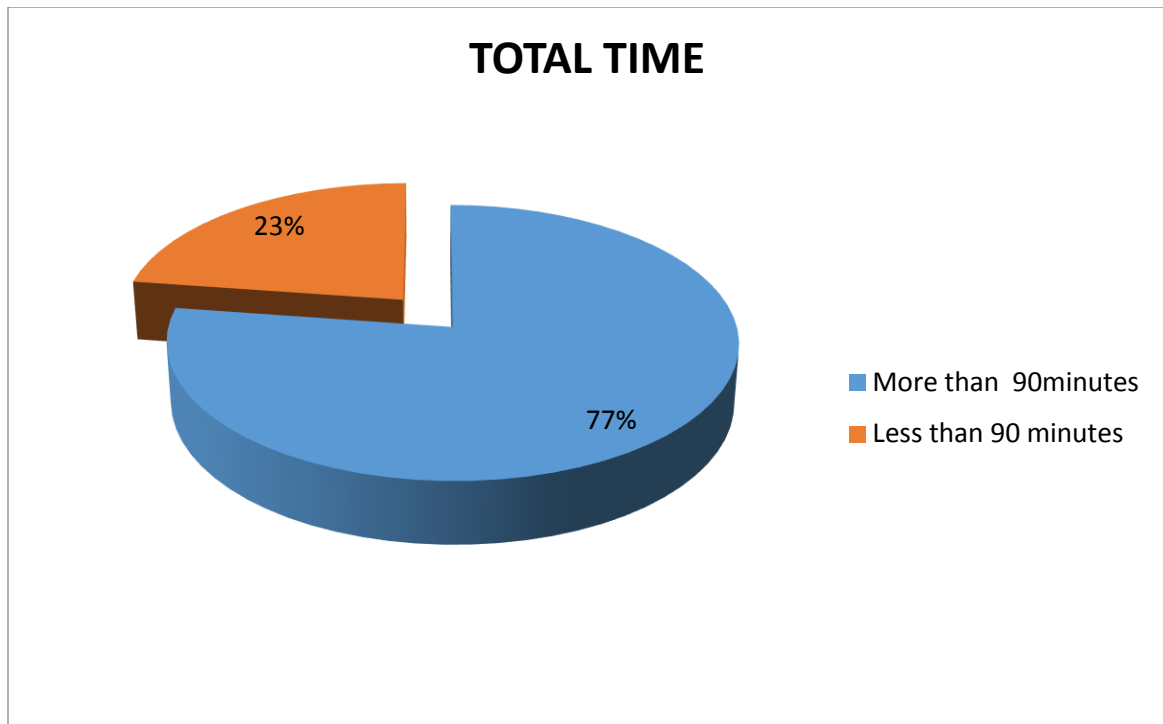


Fig: Value stream map for inpatient process flow (VA: Value-added activities; NVA: Non-value-added activities; A: average; S: standard deviation; M: median. Data are in minutes).

Problem: Delay in Cath lab process flow

- **Symptoms:**
Patient dissatisfaction
Low utilization rate
- **Intervention Plan:** Decrease over all Cath lab procedure time for the diagnostic cases less than 90 minutes. (intervention cases is not considered because of their variable range of physician procedure time)



Among 140 randomly selected patients 90 patients were registered for diagnostic procedures. Considering 90 patients as sample size 70 % of the cases took more than 90

minutes and 30% cases took less than 30 % to complete the overall process.

Identification of sources of delay in the system:

Causes for delay in the system were identified using a Cause and Effect (C&E) diagram. *Cause and effect diagram*

Figure shows the C&E diagram with the “causes” **highlighted in red indicating potential areas for improvement in the process.** This diagram was developed taking into account all types of patients and including **all possible causes of delays** in different processes in the **system.**

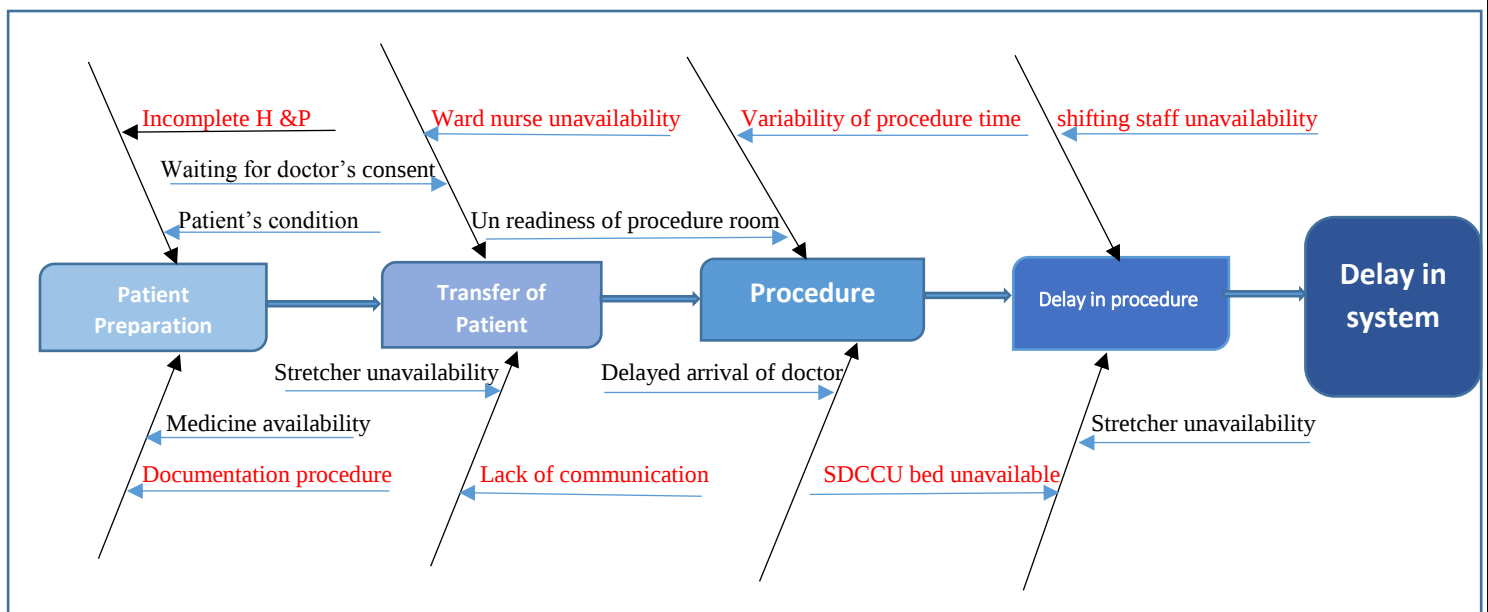


Fig: Cause and effect diagram for delays in the system

Detailed Discussion about the cause of the delays classifying them in four categories -

The contributing factors in the delay of the CCL system in Narayana Cardiac Science, Bangalore can be classified into four sub categories. Which are:

Man:

- Insufficient replacement of the registered nurses during leave or illness
- Lack of communication between ward nurse and Cath lab nurses
- Lower skill level of staffs
- Lack of registered nurse and shifting staffs than required

Equipment:

- Equipment failure
- Equipment servicing in working hours
- Lack of immediate replacement of the equipment
- Unavailability of eco machines

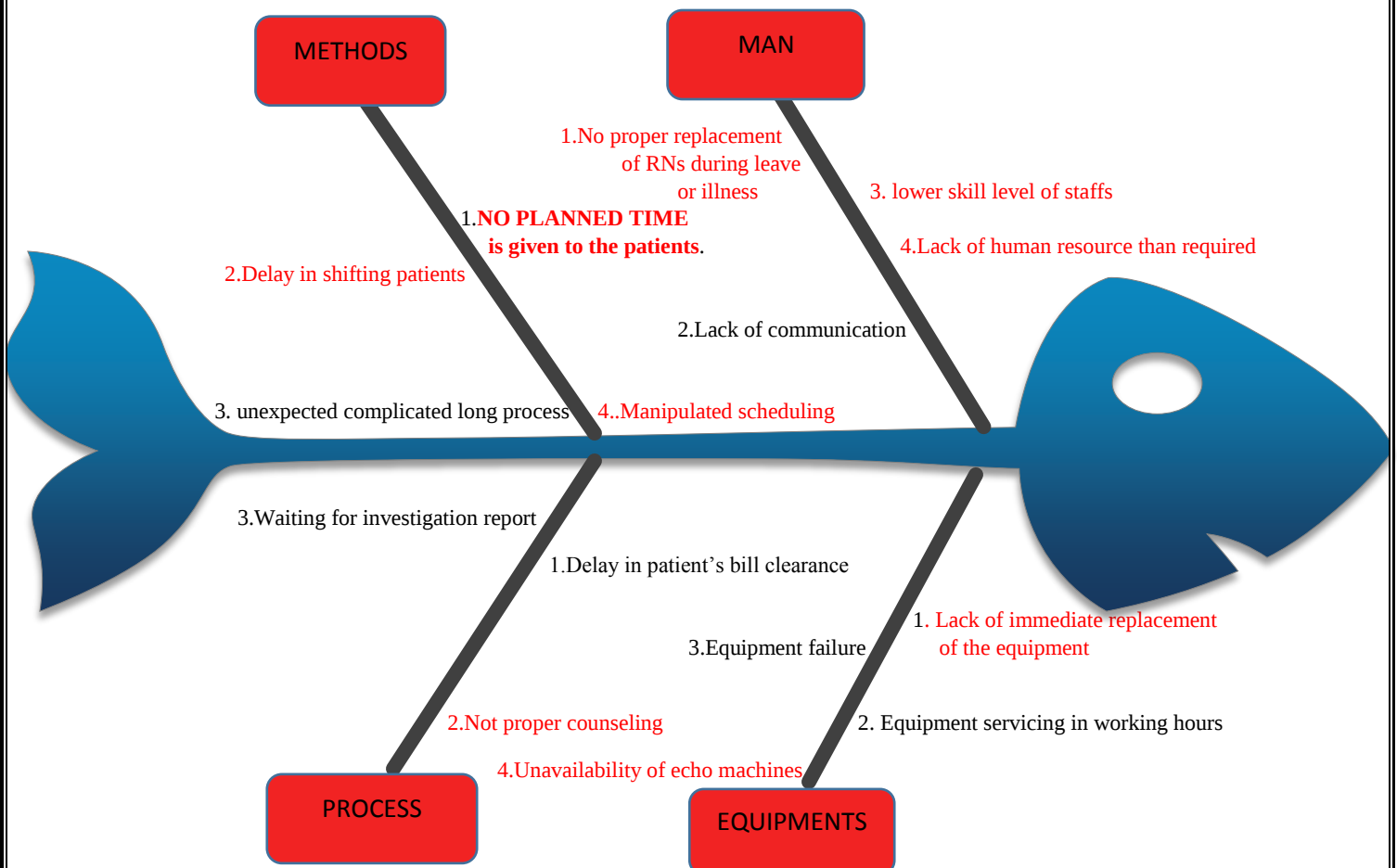
Method:

- NO PLANNED TIME is given to the patients
- Unexpected complicated long cases
- Manipulated scheduling
- Delay in shifting patient.

Process:

- Waiting for patient's bill clearance
- Waiting for investigations report

Fishbone diagram:



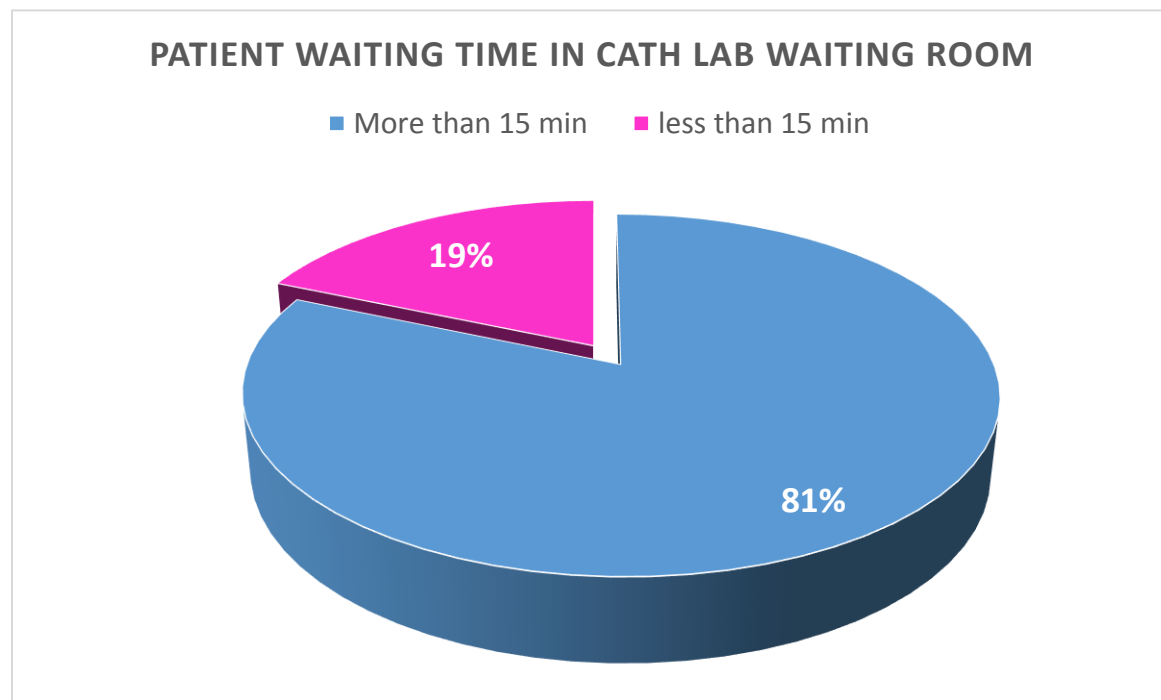
Step wise Discussion:

1. No planned timing is given to the patient in advance: The patients recommended for Cath lab procedure are not allotted any planned timing. They are called from the wards and keep on sitting with discomfort in the waiting room for hours. According to study the average of waiting time of the patient came as 61.31min which is more than 1 hr. This mismanagement creates a huge dissatisfaction among the patients.

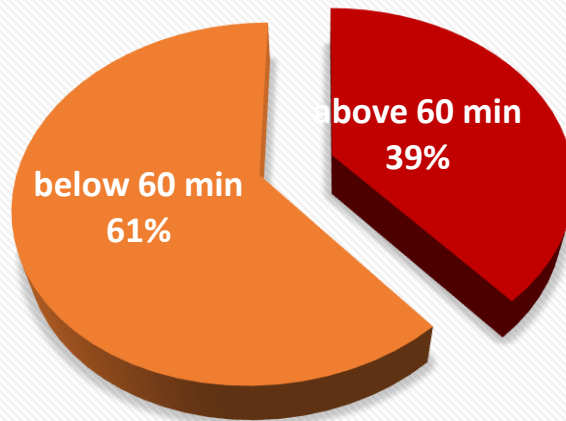
1.1 prolonged waiting time for patients in the waiting room o Cath lab:

Considering 15 min as maximum waiting time for the patient in the Cath lab waiting room as per the hospital protocol,

Current status – According to the collected data 64% of the patients wait more than 15 min and 36% of the patients wait less than 15 min in the waiting room of Cath lab for the procedure.



Patient waiting more than 60 min in the Cath Lab waiting room



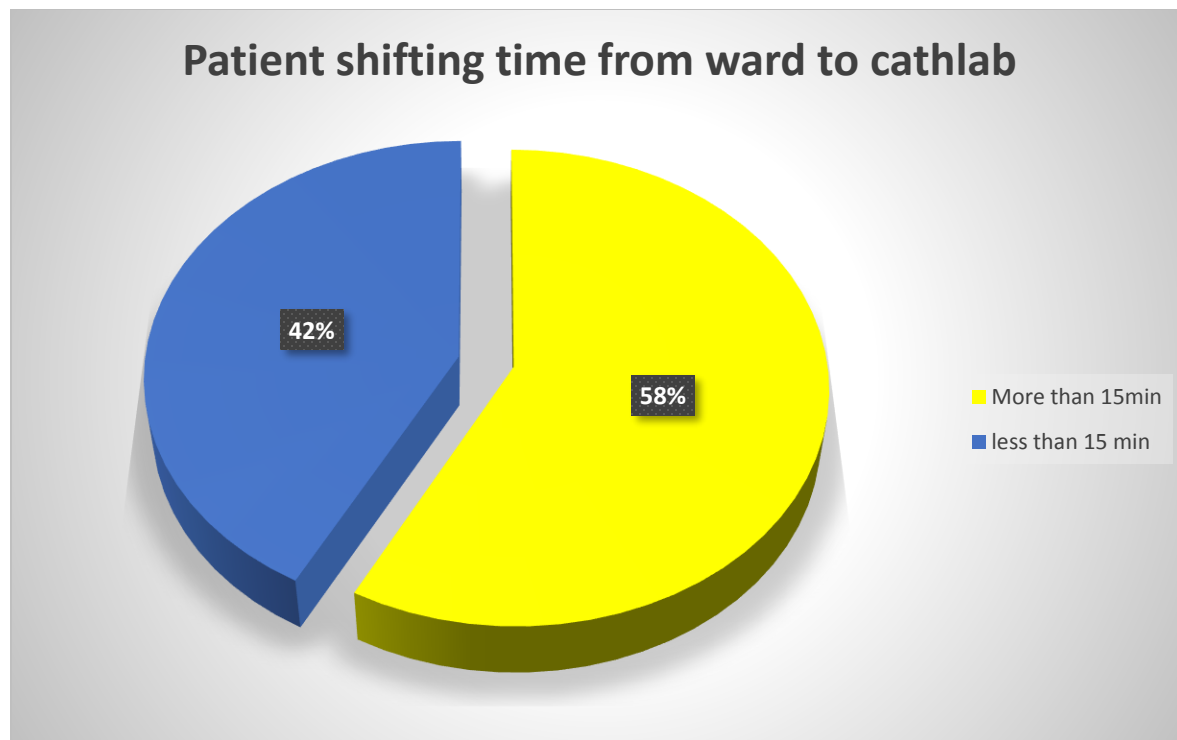
■ above 60 min ■ below 60 min

2.1. Delay in shifting patients : Shifting of the patients from the wards to Cath lab gets delays due to unavailability of ward nurse and their poor skill of documentation .

Communication gap between the ward nurse and Cath lab nurses also leads to delay in shifting.

Considering 15 mins as the standard time, to be taken in shifting patient from the ward to Cath lab-

Current status: According to the collected data 58% cases take more than 15 mins, and 42% cases take less than 15 mins to shift patient from ward to Cath lab.



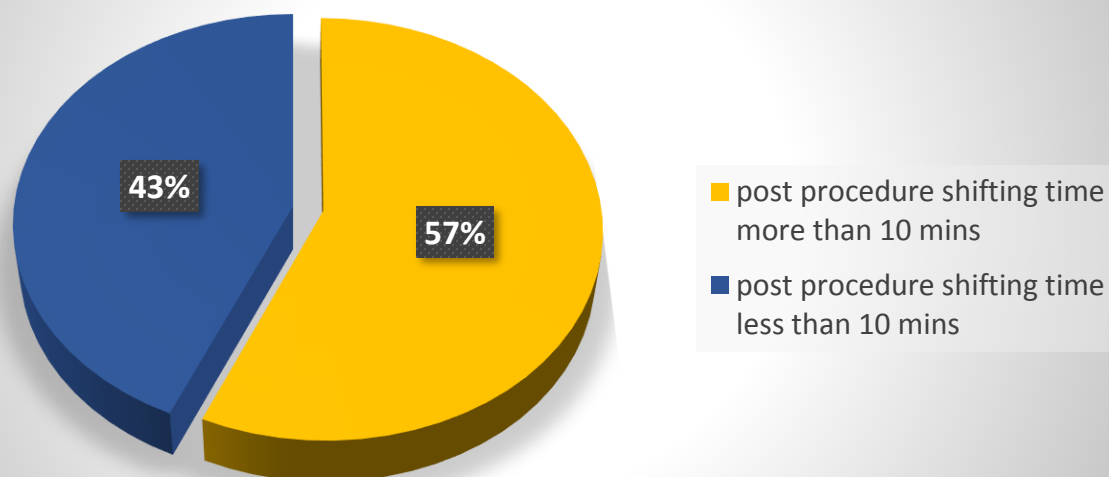
2.2 Shifting to the wards of SDCCU gets delayed due to unavailability of enough shifting staffs. Moreover, shifting the stable patients to the wards takes long time in process as there is no recovery area down stairs.

2.2.1. Delayed visiting of round doctors leads to unavailability of vacant CCU beds creates delay in shifting.

Considering 10 mins as the maximum standard time to be taken to shift the patient, post procedure as per the hospital protocol.

Current status: 43% of the cases took less than 10mins and 57% of the cases took more than 10mins to shift the patient from Cath lab to SDCCU or ward.

Post procedure shifting time



3.Lack of trained manpower leads to delay in the procedure. As Cath lab is a radiation area staffs must not work more than 6 hrs a day and there are 4 pregnant nurses currently who are prohibited to go inside which creates a shortage of manpower.

4.Equipment's replacement is not prompt. Within the study period, 2 days Cath lab remained vacant because of temperature problem during the working hours due to lack of timely maintenance.

5.There is no Eco machine in the Ground floor Cath lab, which leads to delaying the procedure while collecting it from CCU depending upon its availability.

6.Doctor's delay in morning slots sometimes leads to delay in starting the procedures.

7. Delay in receiving Serology report sometime causes delay in starting the procedure.

Recommendations for reducing the delays and increasing the utilization of the Cath lab –

Cardiac Catheterization labs represent a significant capital investment for many hospitals. Realizing a return on this investment the hospital need to improve the management techniques to improve throughput, maximize equipment utilization and increase efficiency.

1.Giving a planned timing In advance to each of the patients (inpatients) for performing the procedure can be included in the CCL system of NH.

For this scheduling system -

Patient can be Prioritize according to the need, considering their respected consultant slot :

As patients waiting to be treated in the Cath Lab vary according to the degree of urgency for intervention, it is important that the patients that are most sick are treated first. An objective risk assessment scoring system can be applied to prioritize. (identified according to a research-based criterion of the patients' risk of a cardiac event within the next 72 hours). The application of this objective measurement not only removes bottlenecks of patient movement in cardiology, but it reduces after-hours call backs for staff as sick patients are no longer deteriorating as in-patients (and reduced the overall length of stay for cardiology patients).

According to this need assessment result, each patient can be given a planned timing according to the doctor's scheduling.

- This can make the workflow smooth according to the timings.
- It will be easy for the supervisor to follow up the situation comparing the planned timing and actual timings.

Limitation:

In between the emergency cases are coming which can lead to manipulation of the patient's scheduling.

Recommendation over coming this issue:

- ❖ Ground floor Cardiac Cath Lab 1, which currently performs the EP and PPI procedures can be allocated as the Pediatric Cardiac Lab.
- ❖ 4th floor Cath lab 5 which currently performs the Pediatric cases can allocated for the EP & PPI procedure for the adult patients.
- ❖ Emergency cases can be taken to the pediatric Lab (recommended Lab 1)

Prospects of this recommendation:

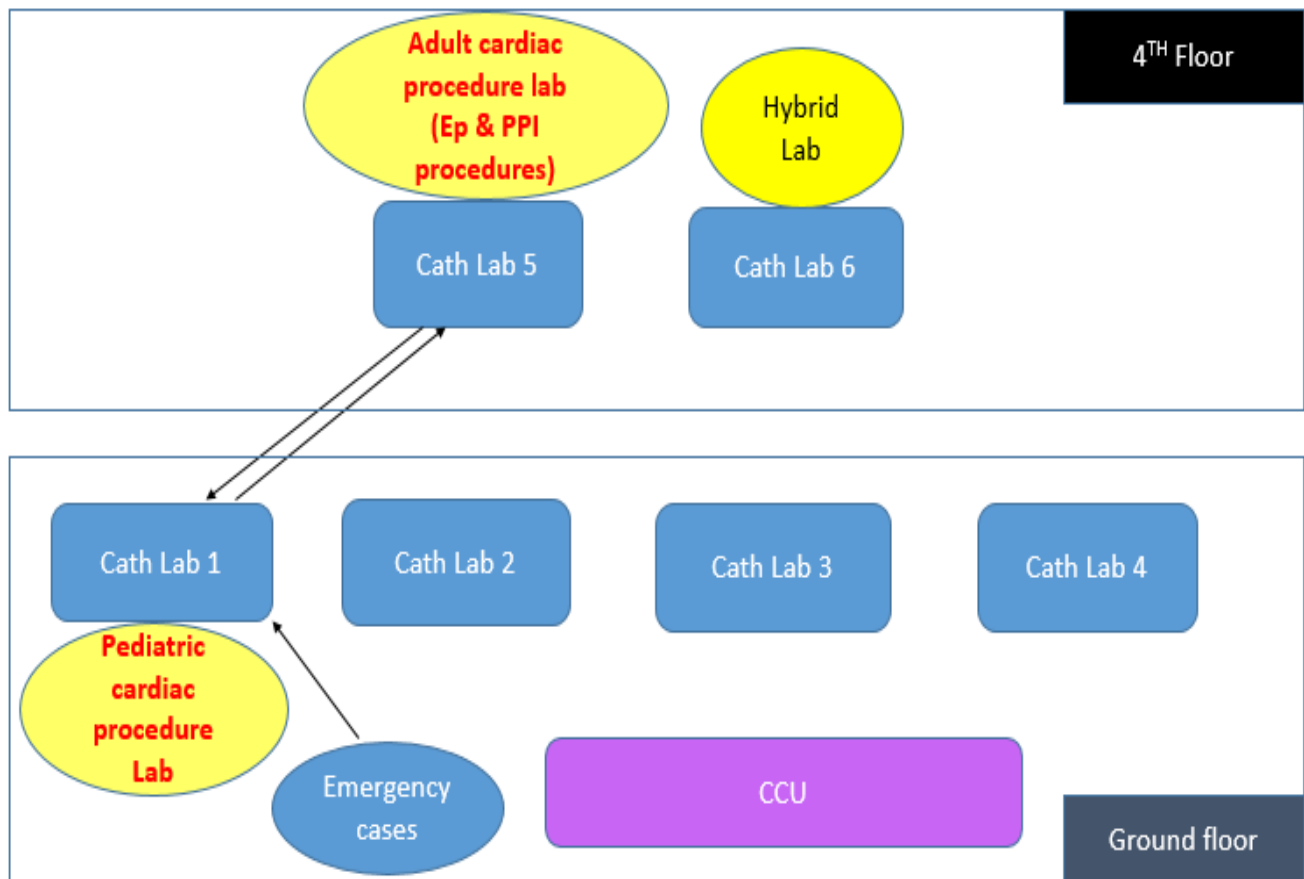
- Currently the pediatric lab is performing 6-7 cases a day and the procedure starts around 9 a.m.
Thus, the lab remains unutilized 7-9 a.m.

If Cath lab 1 is allocated as pediatric lab, adult cardiac procedures can be performed there in the morning slot until the pediatric cases started.

Thus, the issue of underutilization of the lab can be overcome.

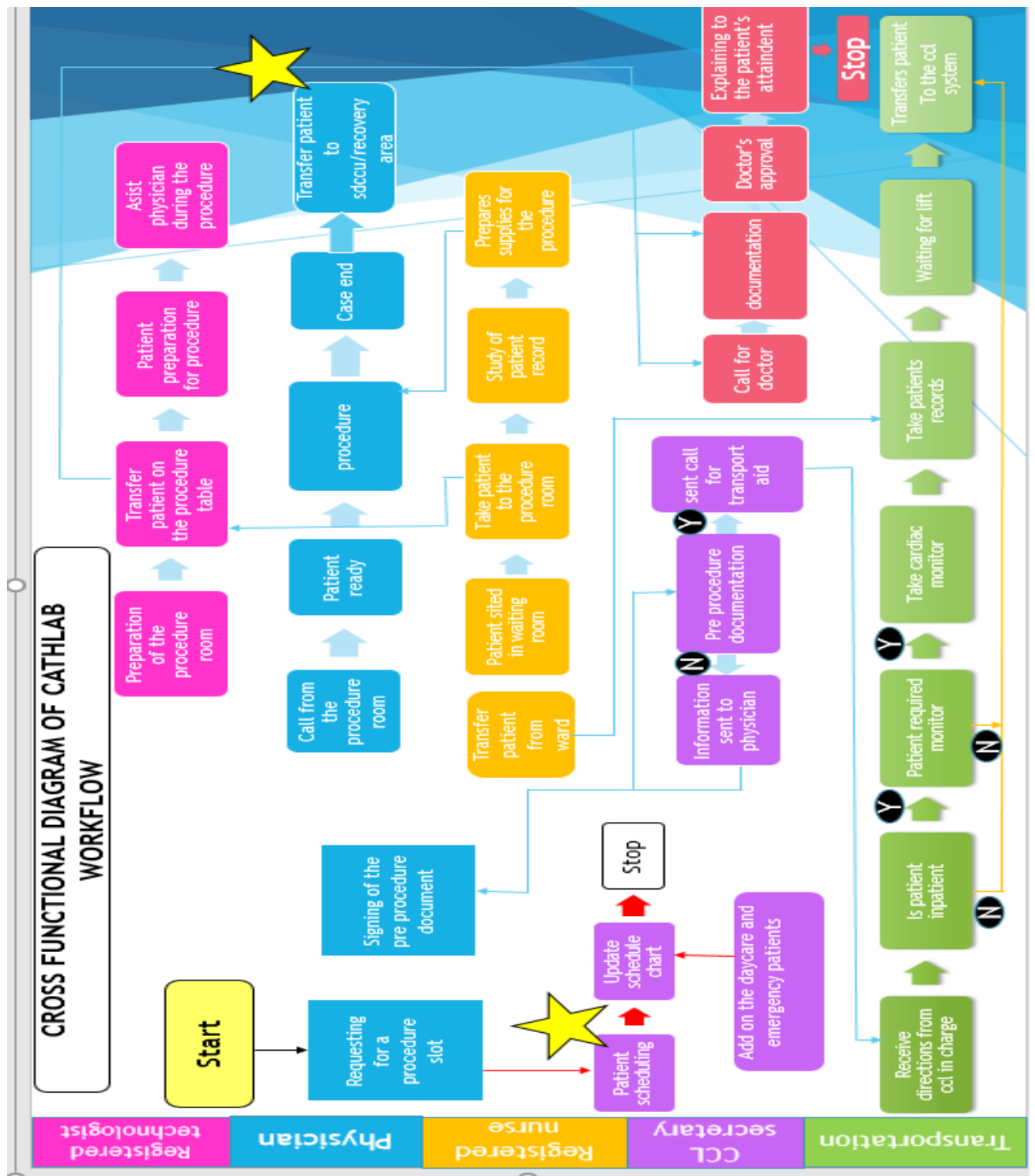
- It will be easy to manipulate the scheduling of the pediatric lab when the emergency cases come as the pediatric patient load is less.
- In case of any unpleasant critical condition for the emergency patients they can be shifting to the ground floor CCU smoothly from the Cath lab.
- Chance of occurrence of any unpleasant critical condition of the EP & PPI procedure patients is less, which probably will not cause serious issues to allocate the 4th floor Cath Lab 5 for this purpose.

Diagram of the recommendation -



2. A recovery area can be constructed in the ground floor for the stable patients who are currently shifted to the ward directly after the procedure which is causing long shifting time and shortage of shifting staffs leading to delay in the procedure.

3. There must be a eco machine available for the ground floor Cath lab exclusively.
4. Required number of the nurses should be appointed to make the process flow smooth.(staffing pattern should include 1 scrub nurse and 2 floor nurse along with the consultant for each of the procedure being performed)
- 5.Replacement of the resigned staffs must be done promptly (within 30days notice period)
- 6.Maintance of the equipment and AC machines must be done every week to avoid any kind of disruption during the working hours.
- 7.Traniee doctor's scheduling can be avoided on the day with heavy patient load.
8. Patient for discharge should be prioritized to be seen first during morning round of consultant thus availability of CCU beds will not cause the delay in shifting patients after the procedure done.
- 9.staffs need continuous training to avoid the miscommunication between the ward and Cath lab and maintain the documentation efficiently.



Cross functional diagram of modified process flow of CCL system

★ Denotes the recommended areas of the process flow.

Conclusion:

The incorporation of the recommendations may bring in a new approach to CCL function and a new dimension to CCL staff's view of the system. The modified workflow diagram helped in setting the roles and responsibilities within the existing flexible framework.

A plan is proposed to the process owner of the CCL to ensure successful implementation of the recommendations.

This work demonstrated that systematic use of industrial and systems engineering techniques, such as C&E diagrams, Fishbone diagrams and VSMs, can help identify and eliminate nonvalue added activities in the system. Furthermore, a Cross Functional Diagram can help identify not only the flow within the system, but also the designated functions of every category of personnel. This can further be an effective tool helping the management make decision on training, retraining, and (re)allocating staff.

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Reengineering the Cardiac Catheterization

Lab Processes: A Lean Approach

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Thank you...

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