

A COMPREHENSIVE STUDY INTO CARDIAC CATHETERIZATION LAB

PARAS HOSPITALS, GURGAON

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Overview of hospital

- Paras Hospitals, Gurgaon is a NABH accredited 250 bedded super-specialty hospital. It was the first hospital in Gurgaon region to get NABH accreditation. Since its inception it has aimed to be a preferred healthcare provider for all
- Paras hospitals is equipped with one of the leading neurosciences centers in the region which boasts of all facilities needed for research and surgery in the field of neurosciences.
- Besides this, it has 55 specialty departments which include medicine, cardiology, minimal invasive surgery, gynecology, oncology, ophthalmology, dermatology, cosmetic surgery, plastic surgery etc.
- Paras hospitals is also renowned globally for its specialized international patient services. Customized treatment and surgery plans are designed to benefit international patients.

Project Overview

- Project Title: **A comprehensive study on optimizing cardiac catheterization laboratory utilization.**
- **OBJECTIVE OF THE STUDY**
- To study the workload and trends of Cath lab since inception.
- To study Cath lab time utilization, identify bottlenecks and recommend optimum utilization.

Research Methodology

- Type of study : Descriptive Study
- Location of study: Cath lab, Paras hospital, Gurgaon
- Duration of Study: 1 March 2014 to 31 March 2014
- Study Subjects: Patients in Cath lab, Records in Cath lab
- Sample: 90% of total patients operated in Cath lab during study period.
- Data collection tools: Observation, Review of records
- Data Analysis: MS Excel

Research Approach

A two phase descriptive - observational study was conducted

Secondary research- Phase I

- In the first phase, Cath lab records related to work load, process flow, and policies were methodically studied with following specific objectives.
 - ▣ To identify workload of Cath lab over the years since inception.
 - ▣ To assess patient profile in terms of elective/emergency, route of catheterization, mode of payment.
 - ▣ To study overall process flow of Cath lab patients and different phases involved in Cath Lab from “Patient In to Patient out”

Primary research – Phase II

- In the second phase, Time motion study was done in Cath lab for the study period (Cath lab Utilization Study) with following specific objectives.
 - ▣ To analyze patient turnaround time in Cath lab.
 - ▣ To assess the functional bottlenecks in optimum utilization of Cath lab.
 - ▣ To evaluate Cath lab in terms of quality assurance i.e. patient safety, employee safety, documentation.
 - ▣ To propose key metrics for Cath lab

INTENT OF THE STUDY

- Cardiac catheterization labs (Cath lab) represent a significant capital investment for many hospitals. Realizing a return on this investment is increasingly challenging, given the introduction of advanced technologies and limitations in reimbursement.
- To meet the challenges and maintain fiscal health, hospitals are pursuing strategies to improve throughput, maximize equipment utilization and increase efficiency. Inefficient use of this limited resource increases costs and can compromise patient care.
- Considering the remarkable strengths and identifying and improving on the bottlenecks of the department , a hospital can make Cathlab as a significant competitive advantage for themselves.

Claude Bernard (1813 – 1878)



- French Physiologist
- In 1844 passed a catheter into both right and left ventricles of a horse's heart via a retrograde approach from jugular vein and carotid artery.
- Set the stage for cardiac catheterization as we know it today

INTRODUCTION

- A catheterization laboratory or Cathlab is an examination room used to support the catheterization procedures which further evaluate cardiac diseases, when other less invasive types of diagnostic tests indicate the presence of any of these diseases.
- In cardiac catheterization a very small hollow tube, or catheter, is advanced via Trans-femoral or Trans-radial approach through the aorta into the heart. Once the catheter is in place, several procedures may be performed.

PROCEDURES DONE IN CATHLAB

DIAGNOSTIC

Coronary Angiography – Insertion of a catheter into heart to deliver contrast.

Electrophysiology Testing – Tests electrical conduction within the heart.

Cardiac Shunt Detections – Blood flow analysis to identify a shunt.

Structure Assessment and Confirmation – Verify structure of heart and veins.

INTERVENTIONAL

Cardiac Angioplasty – Balloon insertion to open an obstructed artery.

Cardiac Stent Placement – Placement of stent to keep artery open.

Ablations – Removal of faulty electrical pathways.

Closure of Congenital Heart Defects – Correct blood flow pattern.

Treatment of Stenotic Heart Valves – Correct blood flow amount.

Thrombectomy - Removal of blood clots

OTHER

Pacemaker Implantations – Implant device to regulate beating of the heart.

Cardiac Defibrillator Implants – Implant device to jolt heart in case of cardiac arrest

CATHLAB AT PARAS HOSPITALS, GURGAON

- Operational since March 2008.
- All elective lists are scheduled to run between 8AM and 8PM daily on weekdays (Monday to Saturday).
- Nights, weekends and holidays are reserved for emergencies.

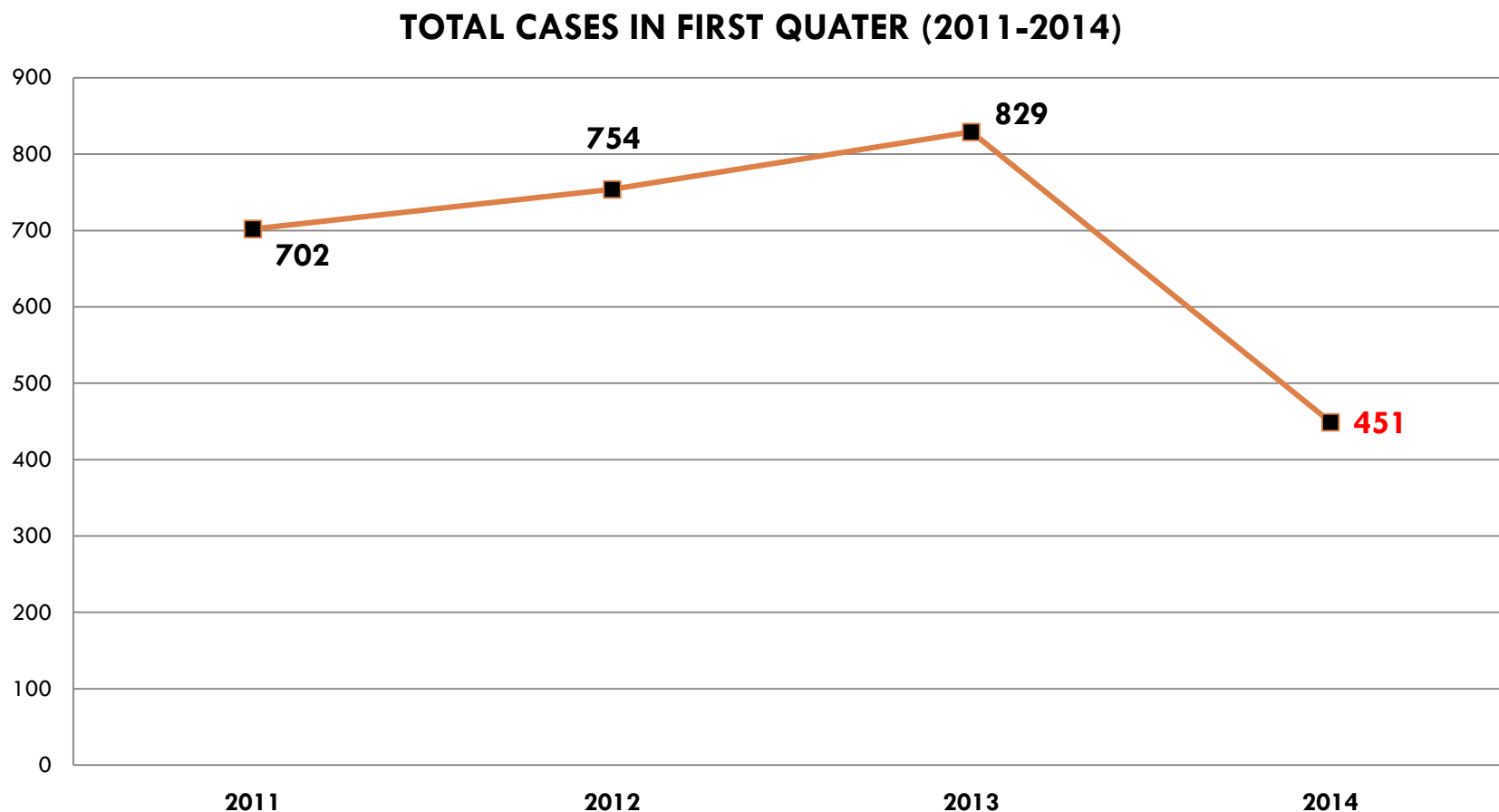
STAFFING

- 3 Technicians along with 4 Nurses support 4 proficient Cardiologists on a full time basis.
- A medical transcriptionist is dedicated to department for handling reports and discharge summaries.

Objective 1. To identify workload of Cath lab since inception.

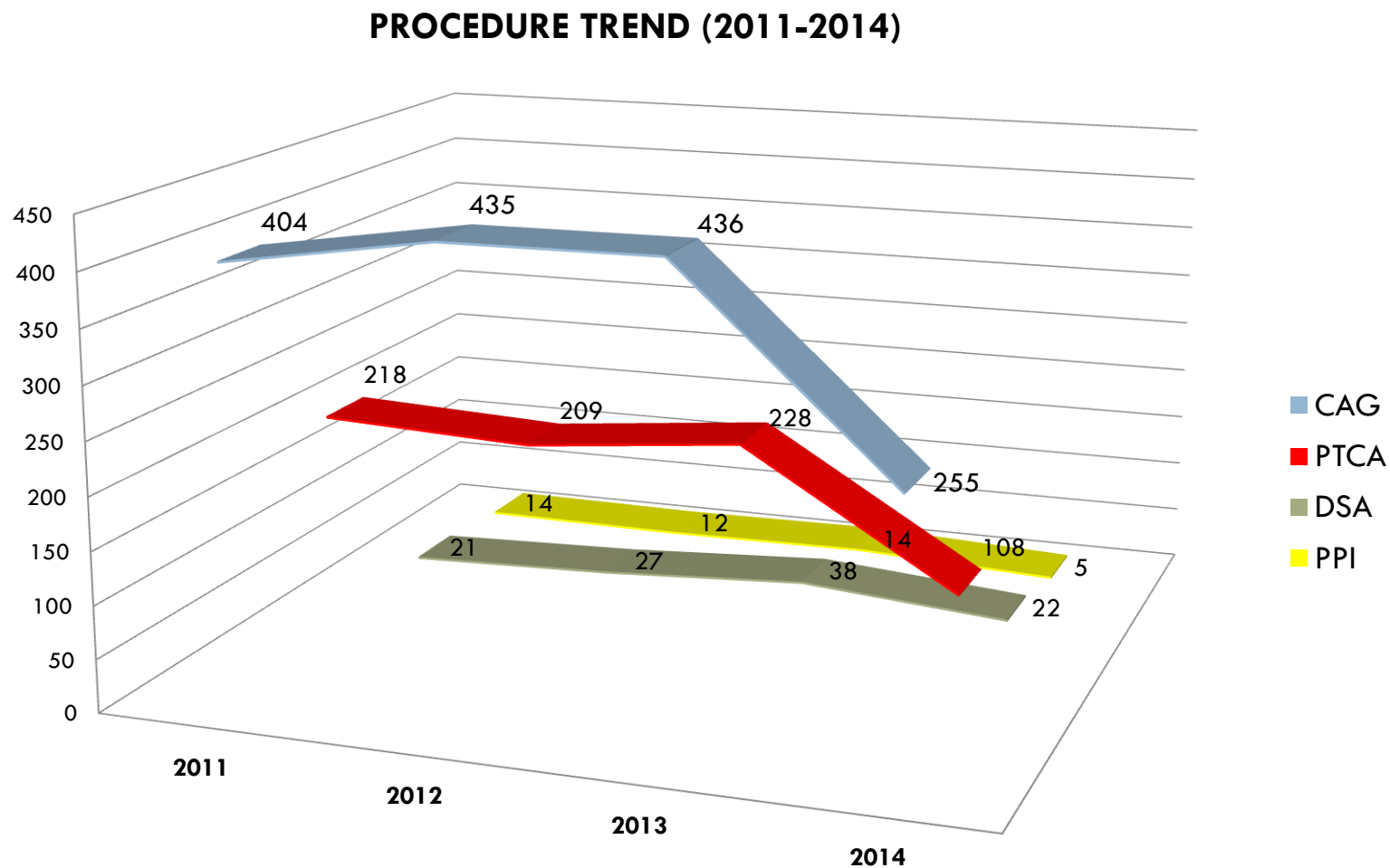
Year	Total cases	Average/ Month
2008 (9 months)	643	64
2009	1148	96
2010	1664	139
2011	3602	300
2012	2895	241
2013	2620	218
2014 (3 months)	451	150

First quarter trend of total cases (2011-2014)



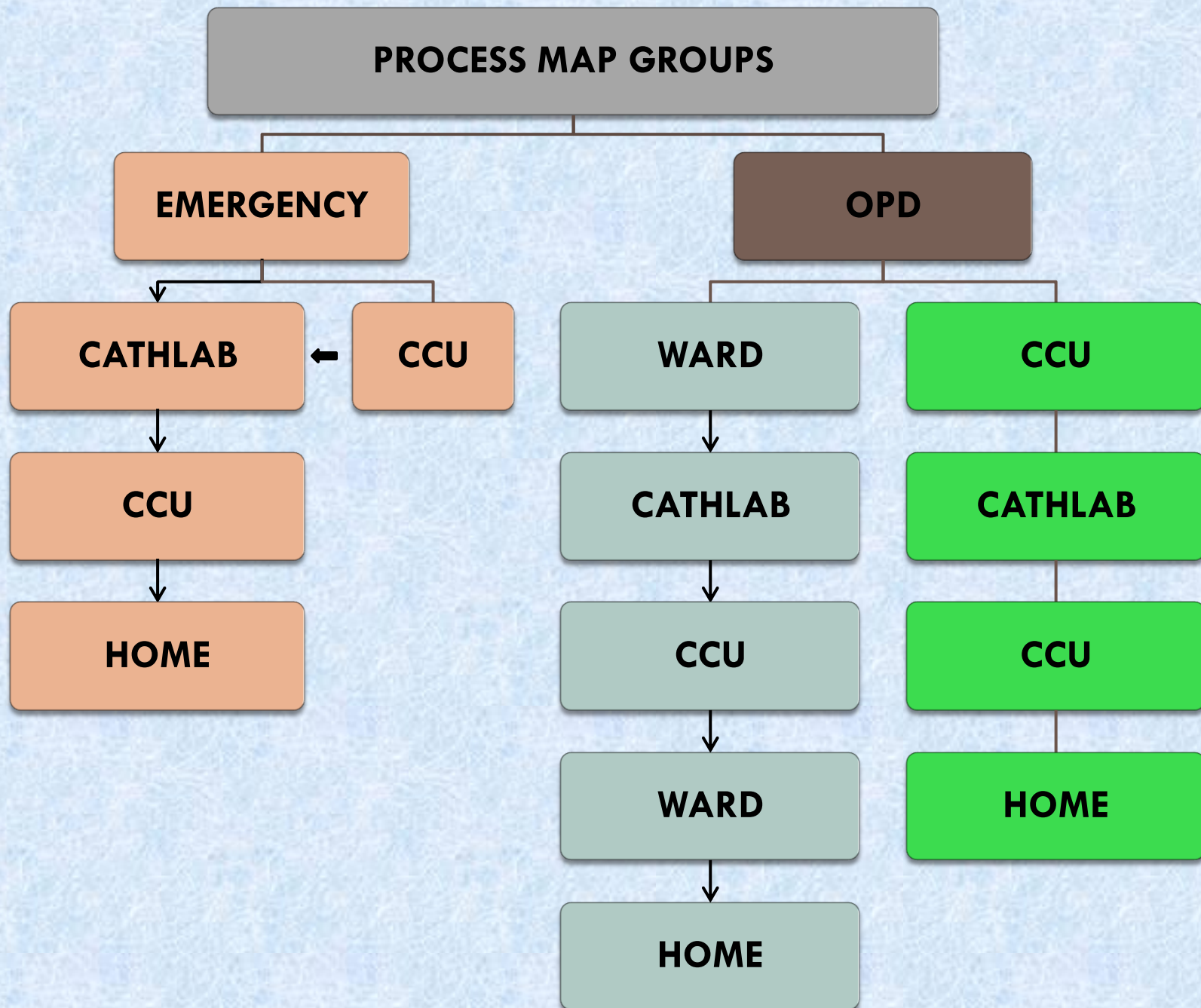
A significant fall of 45.59% in total number of cases for first quarter of 2014

Year wise first quarter procedure trend (2011-2014)



Objective 2: To assess patient profile in terms of elective/ emergency, route of catheterization, mode of payment.

- Emergency cases in Cathlab has increased to 15% as compared to last years 10%
- Trans-radial (76%) is the preferred procedure route for surgeons since January 2014
- Last two years trends in shift of patient profile from majority of cash payments to government insurance



**PATIENT REGISTRATION AND
ADMISSION**



**RECIPT OF PATIENT REQUEST FOR
CATH PROCEDURE**

- Informal communication to Cathlab



**RECORD ECHO
(OPTIONAL), ECG, PATIENT
PREARATION, PREMEDICATION**



**SHIFT PATIENT TO CATHLAB AREA 5
MINS BEFORE PROCEDURE**

- Consent not filled and signed appropriately by duty doctor.
- Pre Operative checklist not filled
- Procedure started without test results



PREPARATION FOR PROCEDURE

- Non availability of changing room for staff,
- Masks not worn properly, Cathlab attire and slippers used outside Cathlab.



PROCEDURE DONE

- TLD batches not worn by staff
- Repeated opening closing of door between console and procedure room during procedure



POST PROCEDURE



PATIENT DISCHARGED

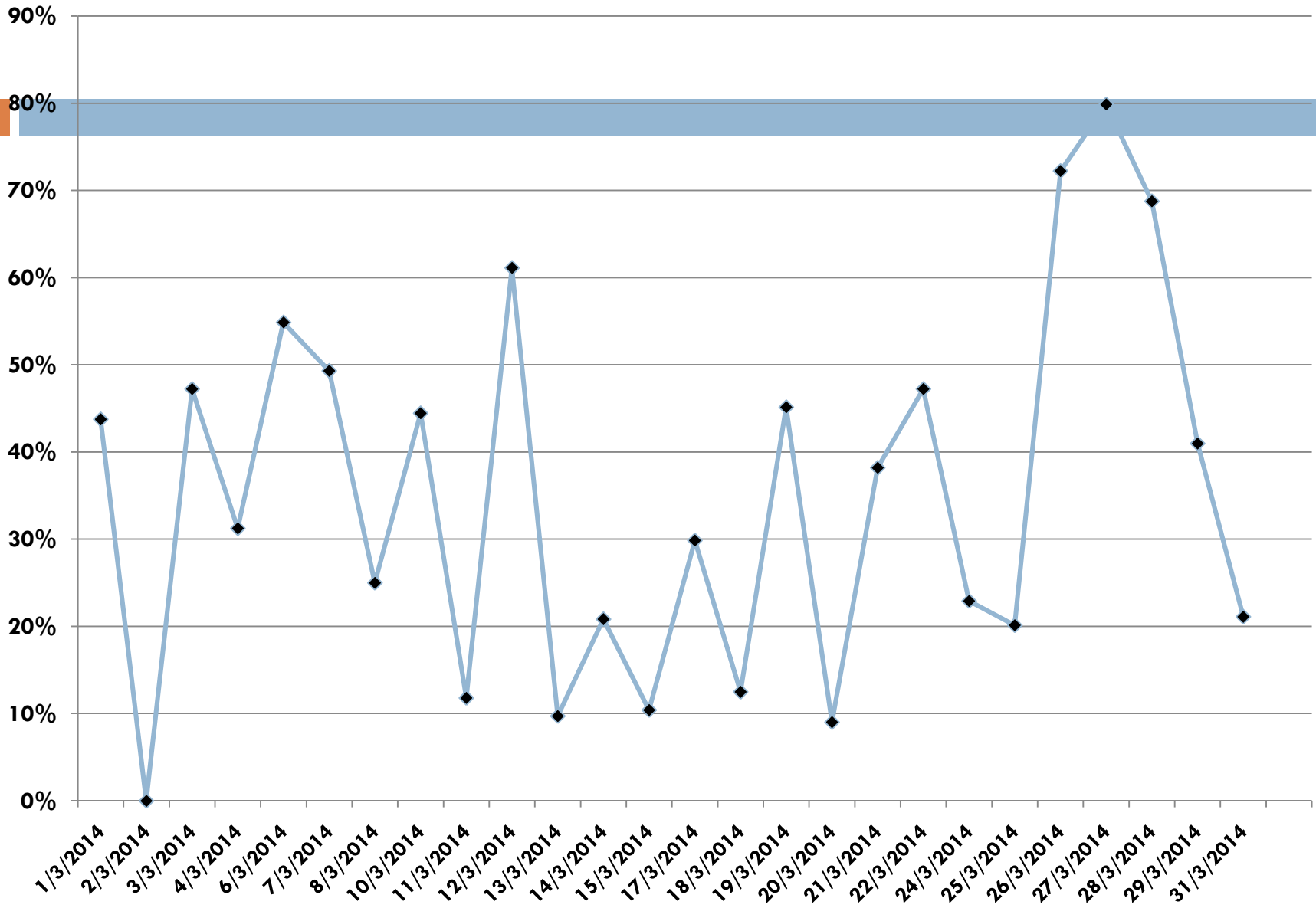
CATHLAB UTILIZATION- MARCH 2014

- Total no. of Cathlab: 1
- Total no. of procedures done in Cathlab: 133
- Total no. of elective procedures done in Cathlab: 114
- Total no. of emergency procedures done in Cathlab: 19
- Working Hours of Cathlab: 12 hours
- No. of Sundays in the study period: 5
- No. of working days: 26
- Total time available per day for elective cases: 12 hours = 720 minute
- Total productive hours available in march: 12 hours x 26 = 312 hours
=18720 minutes

To analyze Cath lab time utilization and patient turnaround time.

- UTILIZATION.docx
- THE OVERALL CATHLAB UTILIZATION FROM 8AM TO 8PM WAS **35.29%**
- OVERALL EMERGENCY CATHLAB UTILIZATION WAS ONLY **1.37%**
- **27.43%** OF UTILIZED TIME WAS LOST BETWEEN THE CASES

Percentage Utilization (8AM- 8PM) - March 2014



BOTTLENECKS IN OPTIMUM UTILIZATION OF CATHLAB

DECREASE IN TOTAL NUMBER OF CASES

LACK OF SCHEDULE PREDICTABILITY

- ❑ No scheduling of cases is done for next day .
- ❑ No protocol for case booking of ad on cases from OPD.
- ❑ No formal channel of communication for informing planned cases.
- ❑ Nursing staff of Cathlab calls CCU & wards in the morning to ask for planned cases.

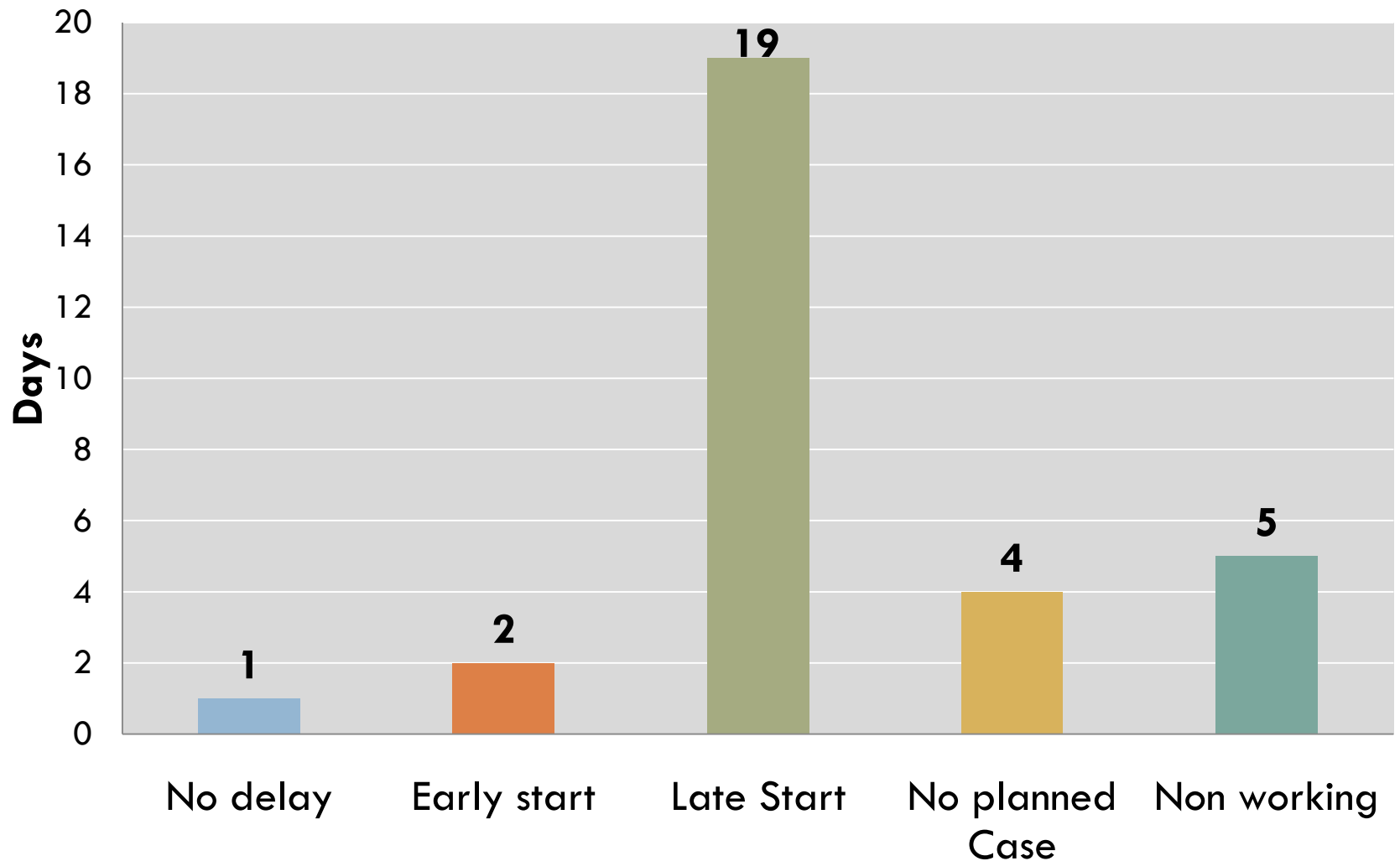
LATE START

- ❑ Delay due to shifting of patients in Cathlab from ICU/ward
- ❑ Delay due to surgeon. (No defined time slot for OPD consultation and Cathlab cases).

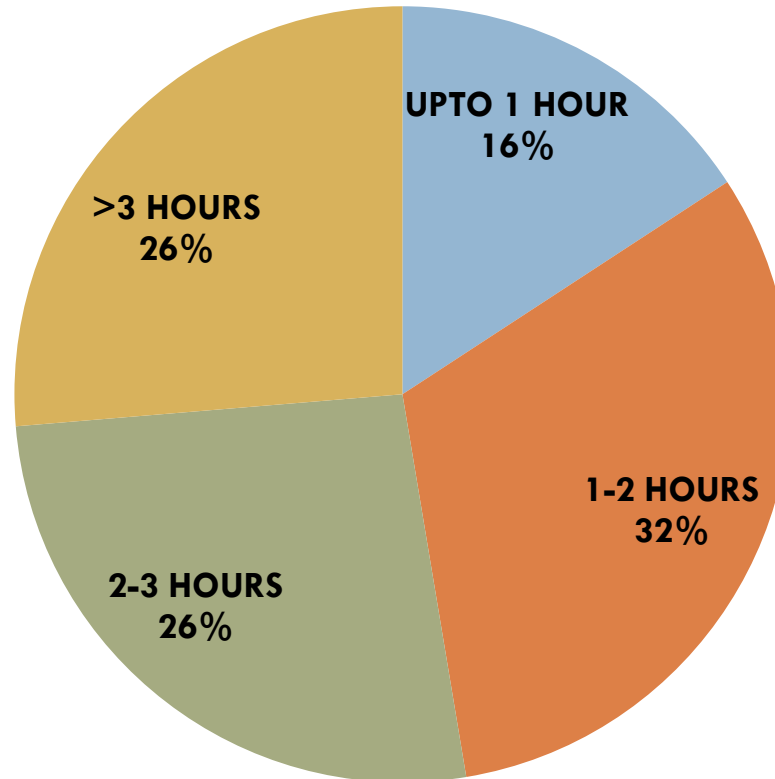
DELAY BETWEEN PROCEDURES

- ❑ Delay due to lack of consent from patient/attendant
- ❑ Delay in searching for right supplies.
- ❑ Delay due to ongoing case in Cathlab
- ❑ Delay due to late reporting of patient to the Cathlab

LATE START FOR CATHLAB



FIRST CASE LATE START



Total productive time lost due to delay in first case start was 2612 min $\approx$ 43.5 hours

FINDINGS

- **Doctor In Out time**
 - CAG- 22 mins
 - CAG+PTCA/ PTCA – 68 min
- **Patient In- Out time**
 - CAG- 47 mins
 - PTCA- 82min
 - CAG + PTCA- 100 mins
- **Utilization Rate**
 - Normal (8 am to 8pm)– 35.29%
 - Emergency (8pm to 8am)- 1.37%
- **Time lost due to late start – 43.5 hours**
- **Time lost between cases-50 hours**
- **Clinical Outcome**
 - Mortality (Non risk Adjusted)– 2%
- **Consent – Non compliance / without signed consent – 17%**
- **Pre Operative checklist-** Not filled in 36% of cases

To assess gaps in Cath Lab in terms of quality i.e. patient safety, employee safety, documentation

PATIENT SAFETY

- ❑ Pre Operative checklist not filled before shifting patient from ICU/ward to Cath Lab
- ❑ Cases started without checking for consent.

INFECTION CONTROL

- ❑ Non availability of changing room and snacks room for staff.
- ❑ Masks not worn properly.
- ❑ Use of Cath Lab attire and slippers outside sterile area.
- ❑ Improper cleaning and maintenance of reusable items.

RADIATION SAFETY

- ❑ TLD badges not worn by staff
- ❑ Repeated opening closing of door between console and procedure room during procedure

DOCUMENTATION

- ❑ “All cases” record register not available from 2008-2010
- ❑ No documentation of daily checking of machines.
- ❑ Consent forms not filled/ incompletely filled by duty doctor.

To propose key metrics for Cath Lab.

- The cath lab tries to monitor specific key metrics in a variety of different groups and then use benchmarking and historical data to find out how they are performing. These measures can give the department a competitive advantage in how they deliver services and provide for increased profits with decreasing reimbursement.
- However no key metrics were present for monitoring and analysis of Cath lab at studied hospital. Thus following key metrics described below were proposed for future assessment of Cath lab performance.

PROPOSED KEY METRICS FOR CATHLAB

PROCEDURAL

- **Door to Balloon time**- The benchmark for this should be 90 minutes or less.
- **Average Procedure Time** - The average time a procedure should take.
- **Patient In- Out Time**
- **Fluoroscopy time**

PATIENT FLOW

- **Utilization Rate** (include allotted time and cleanup)
- **Accurate Scheduling** - Consistent and correct scheduling of the staff to meet the needs of the daily patient schedule as well as the add-on patients(scheduling of cases as per the OPD schedule of doctor)

INVENTORY

- **Supply Amount Control** – ROL, Inventory Days, reusability

PROPOSED KEY METRICS FOR CATHLAB

QUALITY ASSURANCE

- **Clinical Outcome-** Mortality ($< 0.1-0.2\%$), Complication, Readmission rates, procedure related length of stay
- **Conversion Rate-** % caths referred for medical therapy, % caths referred for PCI, % caths referred for surgery
- **Accurate Documentation-** Consents, Referral (Inter/intra dept.), Appropriate reporting with in defined TAT.
- **Patient safety Protocols-** Patient education, Pre-operative checklist, Amount of contrast used.
- **Personnel Safety Protocols-** Radiation safety measure

RECOMMENDATIONS

DAY CARE CATH PROCEDURE

Since Trans radial technique is being used by most of cardiologists in hospital, day care procedures can be started in Cathlab reducing the length of stay of patients by 75%.

SCHEDULING OF CASES

Each morning nursing staff of Cathlab calls CCU and wards for planned cases. This causes late start and also unpredictability of schedule for next day. Communication for planned cases should be from CCU & wards to Cathlab on preceding evening at the end of last shift (8 PM) and OPD cases admitted should be scheduled later for the day

SINGLE CHANNEL FOR FLOW OF INFORMATION

Information of new patient is communicated to anyone in Cathlab from either cardiac coordinator, doctor, or nursing staff. All information should pass through Cardiac coordinator to Head Cathlab so that proper information is received in time and scheduling can be done.

RECOMMENDATIONS

COUNSELLING OF PATIENT AND ATTENDANT

Financial counseling of patient and attendant should be done together by the cardiologist, so that there is not much of delay in decision making by attendant during the procedure thus decreasing the delay between cases and reducing patient discomfort.

BEST PRACTICES

- Complying with the Benchmark times- call from doctor/Cathlab to patient shifting in room, procedure time, Room preparation time.
- Encouraging documentation accuracy and compliance

INVENTORY MANAGEMENT

Proper stock area need to be present so that labeled compartmentalization can be done which help in quick retrieval of supplies during the case. Stock Cards will help in tracking the usage and assist in maintaining Reorder level.

RECOMMENDATIONS

STAFFING & DUTY PATTERN

Each case engages one scrub nurse, one technician and one circulating nurse. Staff shift timings can be rearranged to decrease the overtime of nursing and technician during emergency cases but only when sufficient number of cases are there in Cathlab.

INFECTION CONTROL

- Scrub area should be nearer to Cathlab.
- Absence of changing room and refreshment room for Cathlab staff hamper infection control in console area. There is an acute need for the same.
- Two way communication device should be installed between console room and procedure room to stop repeated opening and closing of door.
- Regular audit by quality and infection control department should be there.

CONCLUSION

- Decreased number of cases, under scheduling, late starts and delays between cases are the main factors that account for inefficient utilization of Cathlab.
- Also accurate records, weekly analysis of recorded data, better pre financial counseling before procedure, and strict adherence to and enforcement of approved policies and procedures are essential ingredients for an efficient operation of Cathlab. The correction of above mentioned factors would increase the efficiency and throughput of Cathlab.

Thank you





Q & A