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Hospital Administration

UTILISATION OF CATH LAB AT A TERTIARY CARE HOSPITAL OF NORTH INDIA.

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ABSTRACT **Introduction:** Cardiovascular ailments contribute to a huge burden disease in the world. These diseases are multi-factorial and preventable to a large extent. Interventional cardiology has progressed to sky- rocketed heights to cater to these patients. The main objective of this study was to determine the utilisation of cath lab in our hospital. **Methodology:** A prospective observational study was conducted for one year to study the patients undergoing cardiological procedures, time taken for these procedures and subsequently, utilisation co-efficient was calculated. **Results:** The ideal utilization is considered to be within range of 65% -80%. The utilization of New Cath Lab came out to be 66.42%, which is as suggested by standards for cath. labs considered GOOD. **Conclusion:** High –quality patient care is the goal of every hospital. Obstacles, including rising labour costs, labour shortages and increasing patient demand, force many healthcare organizations to deal with financial shortfalls in order to deliver the same level of quality of care.

KEYWORDS : Cath Lab, Costing, Utilisation

INTRODUCTION

Coronary artery disease is the leading cause of death all over the world. In the United States alone, over 1.2 million men and women every year suffer a coronary event, which is approximately 1 event every 26 seconds, causing 1 death every minute[1,2] According to WHO (World Health Organization) Indians are at a much higher risk of contracting heart disease than other nationalities due to eating habits, diabetes, stress and less exercise.

As the field of interventional radiology and interventional cardiology have leapfrogged in the last few years, it is obvious that the technology driving cath. labs have also advanced at a galloping pace, adding many attractive features. "Hospital Utilization" denotes the manner in which a certain community makes use of its hospital resources. Hospitals in developing countries like India are unable to utilize resources like money and man-power in an efficient manner. This leads to waste of large expenditures in hospitals. In order to improve efficiency in hospitals professionalism is the need of the moment as far as hospital management is concerned.[3]

This study was done for a period of one year from 1st March 2022 till 31st March 2023 with the aim of determining the utilization of cath. lab and determine the utilization coefficient in a tertiary care hospital of North India

OBJECTIVE:

1.To study the utilisation of cath lab in a tertiary care hospital of North India and determine its utilisation co-efficient

METHODOLOGY:

A prospective study was undertaken from1st March 2022 till 31st March 2023. An observational study was done in new cath lab to observe for how much time cath lab is used. Out of 770 patients taken in study 631 underwent invasive procedure in Cath Lab.Numbers of hours were noted from the time procedure started till the time procedure ended, also the time utilized by the staff for making cath lab ready for next procedure and number of procedures done in cath lab on that day. Utilization of cath lab was computed for each day from the data obtained.

Utilization Coefficient of cath lab means usage rate of cath lab as a machine/equipment.

Utilization coefficient = Number of hours cath lab was used + time utilized for making cath lab ready for next procedure × 100

Number of hours cath lab can actually be used
Average Utilization was then calculated.

Statistical Analysis

The continuous variables of the study have been shown in terms of descriptive statistics like mean, standard deviation, minimum and maximum. Also, the categorical variables in terms of frequency and percentage. Moreover, the appropriate statistical charts have been used to represent the data. Also ,the coefficient of utilization has been calculated to see the utilization of the cath. lab. The statistical software SPSS version 20 has been used to analyse the data.

OBSERVATION AND RESULTS:

Out of 770 patients taken in study 631 underwent invasive procedure in Cath Lab.CAG (Coronary Angiography) was done in 318 (50.40%), PCI (Stenting) was done in 209 (33.12%) followed by RAG (Renal Angiography) in 26 (4.12%) cases. (Table 1 and figure 1).

The most frequently performed procedure in cath. lab is CAG (50.4%) followed by PCI (33.12%). (Figure 2).

Average time taken for doing different procedures varied according to type of procedure and operator team in Cath. Lab.

CRTD>Device Closure>PTMC>PVBD>PCI>Stem Cell Therapy> Cath. Study> EPS>CAG>RAG

Minimum time was taken to perform CAG i.e. 10 minutes and maximum time was taken to perform CRTD i.e. 405 minutes (Table 17).

Utilization Coefficient =
Number of hour's cath. lab was used (total procedure time) + Total time utilized to get cath. lab ready for next procedure(total room turnaround time) x 100 Number of hours cath lab can actually be used
=30345 minutes + 6960 minutes /6 x 156 Working Days x 100
=66.42%

The ideal utilization is considered to be within range of 65% -80%. The utilization of New Cath Lab came out to be 66.42%, which is as suggested by standards for cath. labs considered GOOD.

Out of 770 patients taken in study 631 underwent invasive procedure in Cath Lab. CAG (Coronary Angiography) was done in 318 (50.40%), PCI (Stenting) was done in 209 (33.12%) followed by RAG (Renal Angiography) in 26 (4.12%) cases. (The distribution is depicted in Table 1and figure 1).

Procedure	Number of patients (n)	Percentage (%)
CAG	318	50.40
PCI	209	33.12
Cath study	22	3.49
EPS	21	3.33

Device closure	11	1.74
RAG	26	4.12
PTMC	14	2.22
PVBD	4	0.63
CRTD	4	0.63
Stem cell therapy	2	0.32
Total	631	100.00

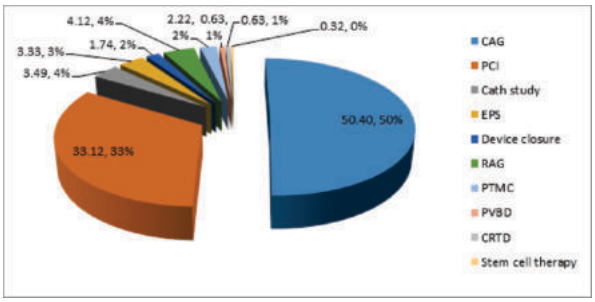

Figure 1: Percentage distribution of invasive procedures in cath. Lab

The most frequently performed procedure in cath. lab is CAG (50.4%) followed by PCI (33.12%). (The distribution is depicted in figure 1).

Table 2: Distribution of Average time taken for doing various invasive procedures in cath. Lab

Procedure	No of Patients(n)	Average Time Taken in minutes
CAG	318	24.95
PCI	209	73.64
Cath. study	22	55.68
EPS	21	41.43
Device closure	11	125.00
RAG	26	21.73
PTMC	14	108.21
PVBD	4	93.75
CRTD	4	243.75
Stem cell therapy	2	60.00
Total	631	

Average time taken for doing different procedures varied according to type of procedure and operator team in Cath. Lab.

CRTD>Device Closure>PTMC>PVBD>PCI>Stem Cell Therapy Cath. Study> EPS>CAG>RAG

Table 3: Minimum and maximum time taken (in minutes) to do various invasive procedures in cath. Lab

Procedure	Minimum time taken in minutes	Maximum time taken in minutes
CAG	10	130
PCI	40	200
Cath. Study	15	120
EPS	20	70
Device closure	30	200
RAG	15	50
PTMC	55	210
PVBD	60	170
CRTD	190	405
Stem cell therapy	60	60

Minimum time was taken to perform CAG i.e 10 minutes and maximum time was taken to perform CRTD i.e. 405 minutes (The distribution of minimum & maximum time taken is shown in table 3).

Utilization Coefficient = (Number of hour's cath. lab was used +total time utilized to get cath. lab ready for next procedure) X 100
Number of hour's cath lab can actually be used
=total procedure time +total room turnaround time
= (30345 minutes + 6960 minutes) /6 (No. of hrs) x 156 (No. of working Days)
= 37305 minutes / 936 hrs x 100
= 621.75 hrs /936 hrs x 100
=66.42%

The ideal utilization is considered to be within range of 65% -80%. The utilization of New Cath. Lab came out to be 66.42%, which is as suggested by standards for cath. labs considered GOOD.

Cath. lab does not usually work outside routine working hours (10:00 am to 04:00 pm); however, it is opened and utilised whenever any emergency arises.

DISCUSSION:

The Utilization Coefficient of our Cath. Lab was found to be 66.42%. "In Case study: using data to determine utilization" by John Carroll (2014) Room Utilization is made up of two parts:1) Room time 2) Room Turnaround Time. Room time can be defined as "wheels in (patient arrival time) to wheels out (patient leaves the cath. lab), where the procedure room is dedicated to single patient.

Room Turnaround Time can be defined as time from wheels out of one patient, until wheels in of the next patient or time one patient leaves the procedure room until the room is ready for next case i.e. time spent on making cath. Lab ready plus some idle time. The same definition has been used to calculate Utilization Coefficient of our Cath. Lab.[4]

David Fuller of Corazon in the article, "Running out of space, Evaluating the Cath. Lab Capacity & Utilization (2014) also gave same formula to calculate Cath. Lab Utilization[5] Tyler, et al studied OR Utilization and used data to create standards for cath.lab utilization. Optimum utilization is not full utilization. An outpatient cath. Lab performing only diagnostic cardiac cath cases may be able to achieve ideal 85% figure but the ideal utilization has been kept within a range of 65%-80% [6]. Thus, our utilization of 66.42% is considered significantly good.

A cath lab procedure should take exactly as long as necessary to produce excellent results in the safest possible manner. That is the starting point without addressing the setup and room turnover time. Once vascular access has been obtained, manipulation of catheters for coronary angiography and ventriculography should take less than 20 minutes, barring complicating features of vascular disease, aortic tortuosity or hemodynamic instability. Start to finish, a routine left heart catheterization should probably take no more than 30 minutes. Add 15-20 minutes for a right heart catheterization. The time for cath lab room turnover should be no longer than the case time.[7]

The issue about how long an angioplasty may take is more difficult and dependent on many factors. The operator selects angioplasty cases based on the severity and number of the lesions, potential for complications (risk level), and his skill and judgement. The time allotted for 'routine' angioplasty/ stenting thus varies widely. All of these factors vary from operator to operator, but a routine time allotment for an uncomplicated angioplasty should be no more than two hours (120minutes), barring unforeseen difficulties.[7]

In this study, CAG was the most frequent procedure done in cath lab(50.4%), PCI(stenting) in 33.12% and RAG in 4.12% (David J et al 1993[8]; Angioplasty (76%), Stenting (15 %), Atherectomy (9 %)}.The average time taken for catheterization was (25±10 minutes) and for PCI (stenting) was (75 ±50 minutes), Device closure (125± 25 minutes), Cath/ EPS (56 ± 60 minutes), PVBD (94± 60 minutes) comparable with { Cohen DJ, et al 1993[9]; 63 minutes LHC, 108 minutes PTCA ; Becker ER et al 1999[10]; 25 minutes LHC, 32 minutes RHC; 102 minutes PTCA, 117 minutes coronary Stent, 135 minutes Atherectomy; 83 ±35 minutes PTCA, 66±22 minutes Stenting } which is almost going with standard time taken worldwide by operators for doing such procedures.

CONCLUSION:

Cardiac catheterization labs are typically highly stressful places because of the hectic work schedule and the acuity of patients. Team approach is the only way to effectively manage the controllable expenses. Indeed, even amid many downturns, cath labs have continued to function as profit centers for hospitals. Effective utilisation of these labs definitely, will improve the patient care delivery system in the country and help in attaining better health standards.

Abbreviations

CVD	Cardiovascular Disease
CHD	Coronary Heart Disease

PCI	Percutaneous Coronary Intervention
ACC	American College of Cardiology
AHA	American Heart Association
CABG	Coronary Artery Bypass Grafting
AMI	Acute Myocardial Infarction
CCL	Cardiac Catheterization Laboratory
CTO	Chronic Total Occlusion
LHC	Left Heart Catheterization
PTCA	Percutaneous Transluminal Coronary Balloon
CAG	Coronary Angiography
PCI	Percutaneous Coronary Intervention
EPS	Electrophysiology Study
RAG	Renal Angiography
PTMC	Percutaneous Transvenous Mitral Commissurotomy
PVBD	Pulmonary Valve Balloon Dilatation
CRTD	Cardiac Resynchronization Therapy Device

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