



EQUIPMENT UTILIZATION ACROSS THE GROUP OF WOCKHARDT HOSPITALS.

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CONTENTS

- **INTRODUCTION**
- **OBJECTIVES**
- **METHODOLOGY**
- **LIMITATIONS OF STUDY**
- **FINDINGS & ANALYSIS**
- **OBSERVATIONS**
- **RECOMMENDATIONS**

INTRODUCTION

- Hospital medical equipment refer to various devices, medical equipments that are used in hospitals and healthcare establishments. Utilization essentially means the use of the equipment to its full potential. The equipment is an important and all pervasive factor in the present day hospital and has become a necessity in almost all its activities whether diagnostic, therapeutic and supportive in nature

OBJECTIVES

- To see the possibility of redistribution of equipments based on utilization.
- To study the usage of each equipment and identifying the optimum numbers.

METHODOLOGY

- **Study Design** – Retrospective analysis
- **Duration Of study** - One year (March₁₃ - Feb₁₄)
- **Sample size - Sample size: -1600 Equipments**
 - Goa - 300
 - Rajkot: 596
 - Surat: 220
 - Vashi - 143
 - Nasik- 342
- **Data collection tool** –
 - a. Interview and discussion with the bio-medical department and head of departments
 - b. Observation
 - c. check-list of the equipments

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- Determination of the current availability of the equipments in respective departments /service facilities across the various hospitals of wockhardt .
 - Equipments categorisation into two broad categories i.e. movable and non-movable
 - Observational study of the various service delivery sites/departments. Ten cases were observed for various diagnostic procedures viz. X-Ray, MRI, CT, USG , ECG,ECHO,PFT and average time for each procedure
 - Studying the Functional hours of working of each department to determine the time available for utilization of equipments.

- For all these equipments TAT for each procedure is being considered.
- Average no. of cases in a year are considered based on the equipment specific volumes for a year

Utilization rate = average no. of cases in a month* TAT taken for each procedure / total functional hours

Contd.

OPERATIONAL DEFINITIONS

- Functional hours – refers to the time when there is full deployment of the staff and maximum care can be catered to the maximum group of people.
- Emergency hours – Night hours between 8 pm-8am
- Working days – week days (Monday-Saturday) ,available per month -25days.
- For diagnostics, non-invasive cardiology, Endoscopy - 25 days and 12 hours considered.
- ICU Occupancy – Percentage of available beds which have been occupied for a given period.
- For IPD – 30days and 24hrs considered

LIMITATIONS OF STUDY

- For ventilators, data was not directly available as, intubation and extubation time is not being maintained only intubation and extubation dates are recorded so this data has been taken from the billing cycle where the patient is being charged either as 6hrs or 24hrs
- For Portable-Machines viz. portable ECG in ICU , wards or casualty – no separate register is being maintained for keeping a record

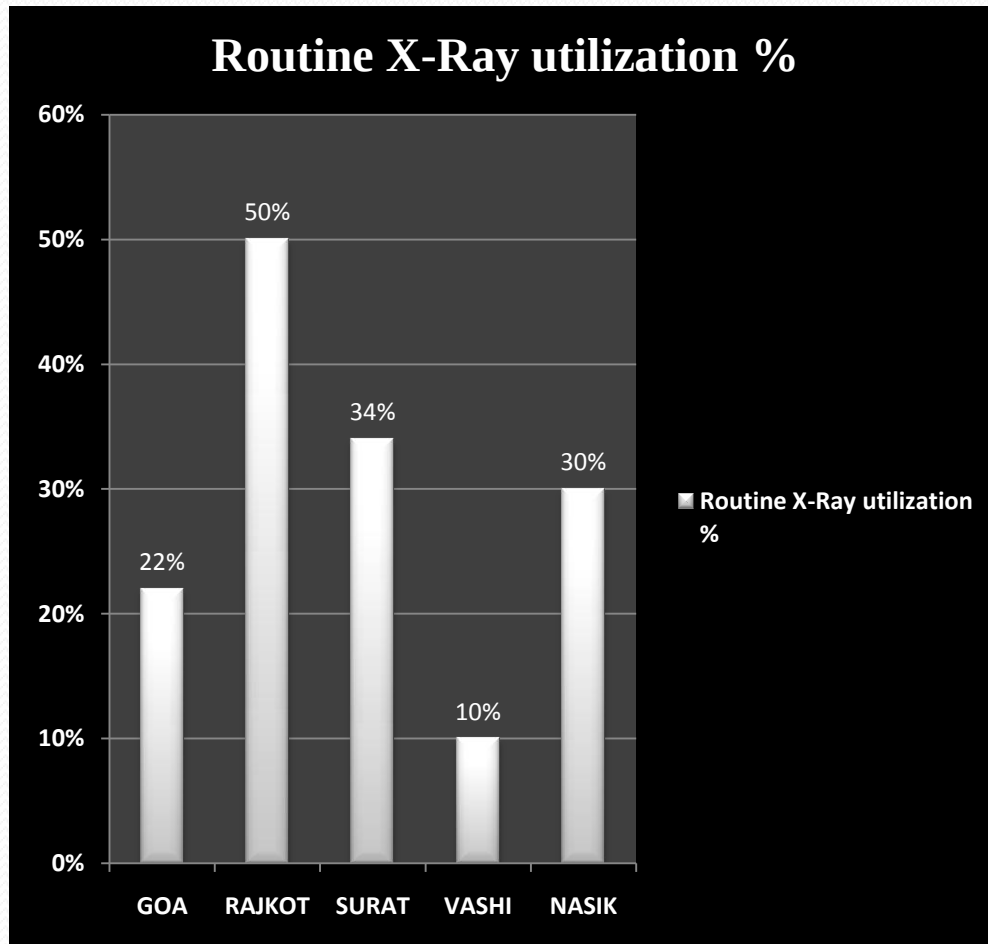


RADIOLOGY

TAT -Observed for Imaging Modalities

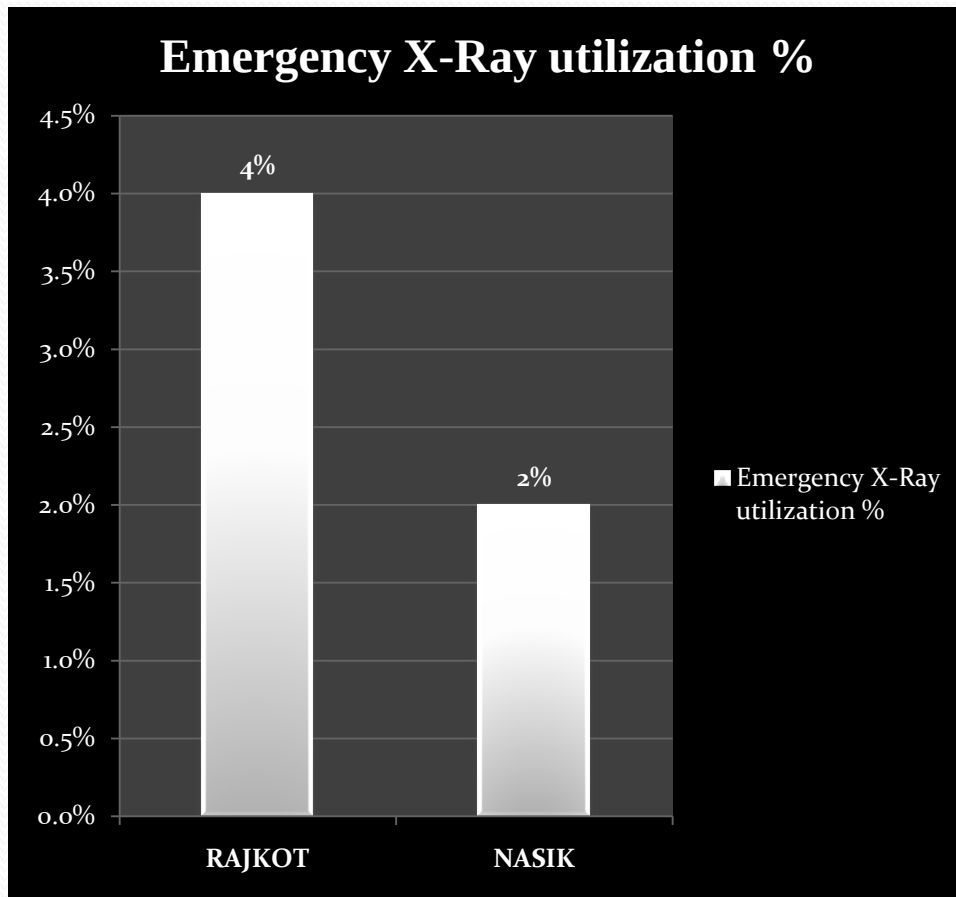
MODALITY	TYPE	DURATION
X-ray	plain	6mins
X-ray	contrast	56mins
CT	Plain	15mins
CT	contrast	30mins
USG	Abdomen and pelvis	15mins
USG	Carotid Doppler , arterial /venous (u/l)	25mins
USG	Bilateral -Arterial and Venous Doppler	60mins

X-Ray



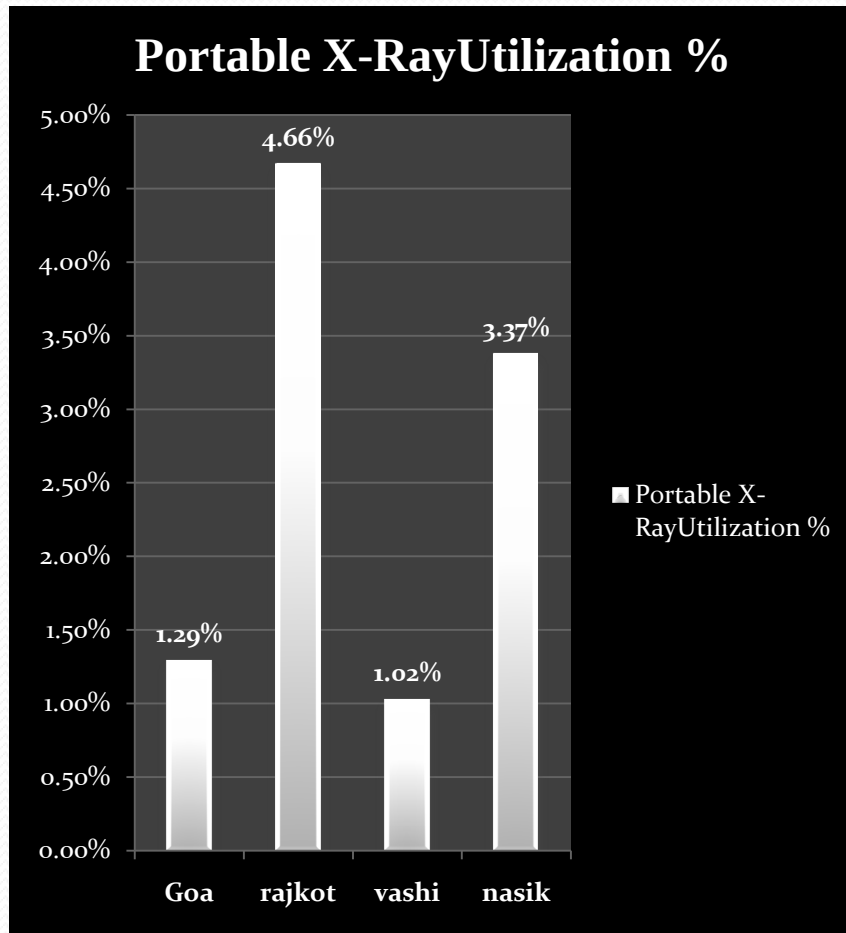
- Equipment specific volume of cases.
- Functional hours of department.
 - Goa-9 hrs
 - Rajkot -12 hrs
 - Nasik – 12 hrs

Emergency X-ray utilization



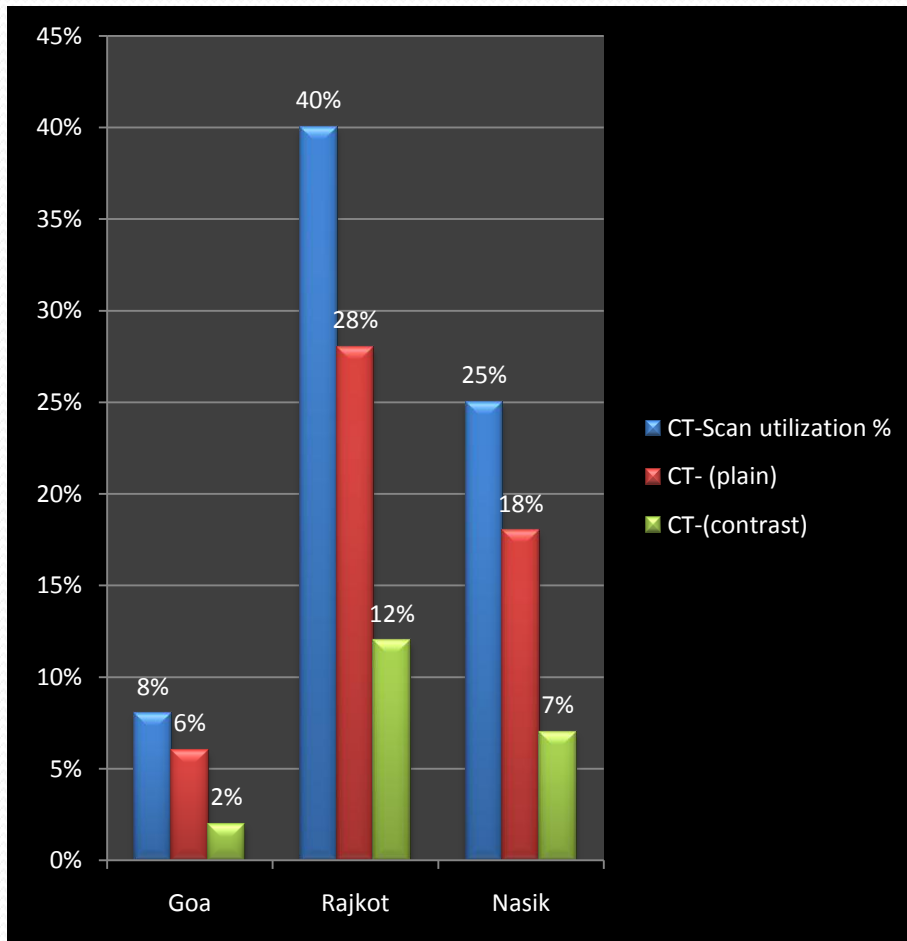
- Goa, Surat and Vashi negligible no. of x-rays were done during emergency hours .

Portable X-Ray Utilization



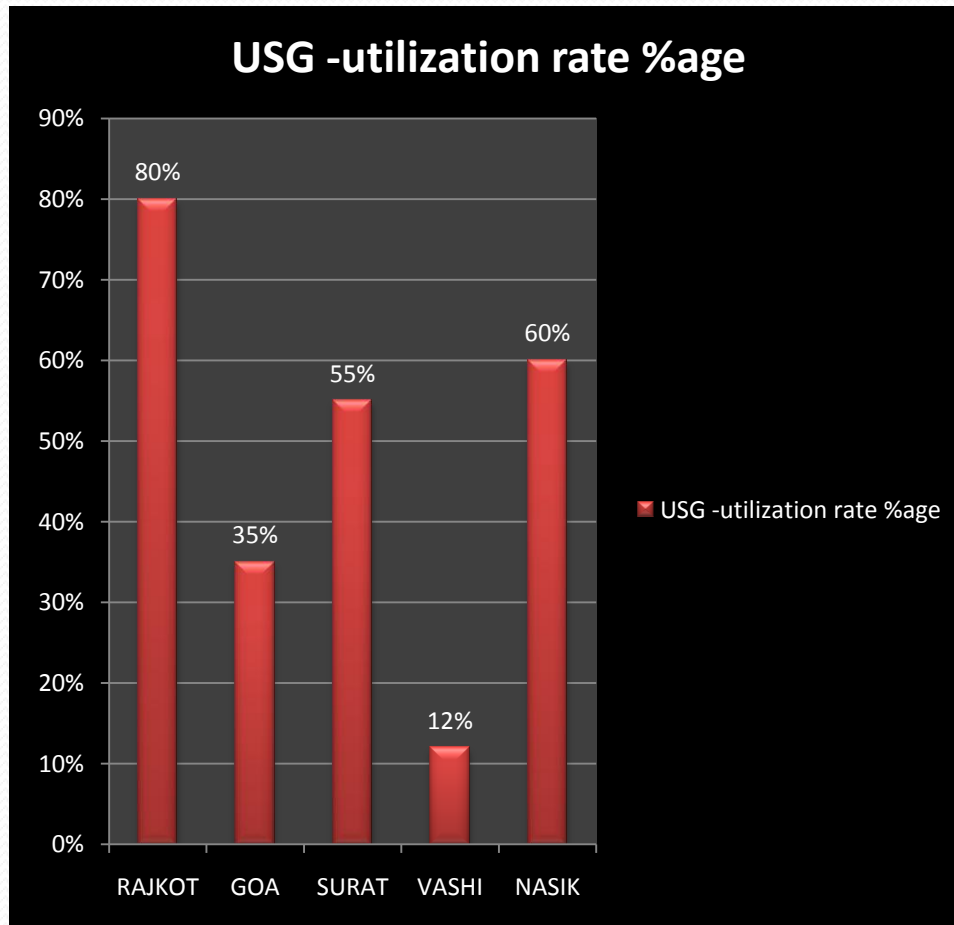
- Points of consideration –
- No. of portable x-ray machines – availability of these machines
 - Goa-2
 - Rajkot- 2
 - Vashi- 1
 - Nasik- 2
- Average no. of x-rays /day = 6 X-rays per day

CT-SCAN



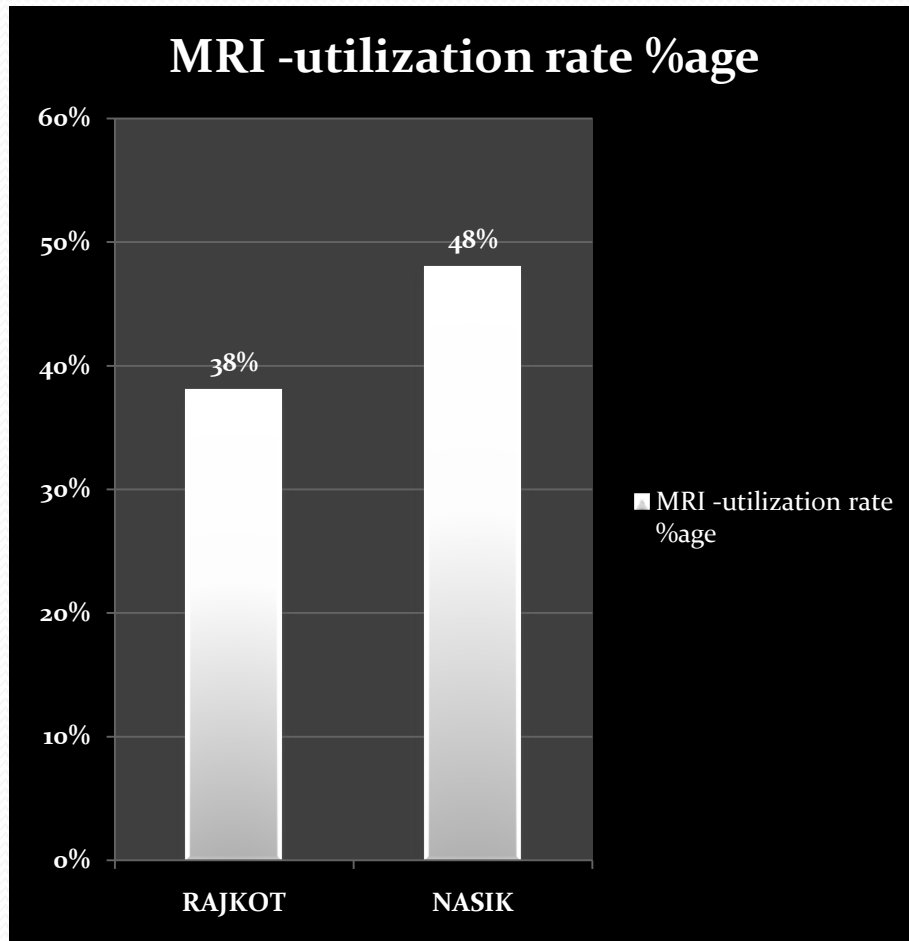
- Specific volume of cases for CT-plain and contrast.
- Operational hours-
 - Goa – 9hrs
 - Rajkot-12hrs
 - Nasik-12hrs
- Ct-utilization is highest in Rajkot as, the no. of neuro cases coming there is quite high .
- On average per day CT-across the group – 7 scans/day

USG MACHINE



- Functional hours of department-
 - Goa- 6hrs (9:30-3:30)
 - Rajkot -11hrs (9:00-8:00)
 - Surat – 7.5hrs (10:00-3:00 and 5:30-8:00)
 - Vashi -8hrs (9:30-4:30)
 - Nasik-11 hrs (9:30-8:30)

MRI



Points of consideration-

- Equipment specific Average volume of cases in a month of various MRI-studies –
 - MRI-Angio /Brain/ Venogram/ spine-plain
 - MRI –Contrast
- Standard time taken for each study
- Average no. of cases per month
 - Rajkot- 222cases
 - Nasik- 269 cases

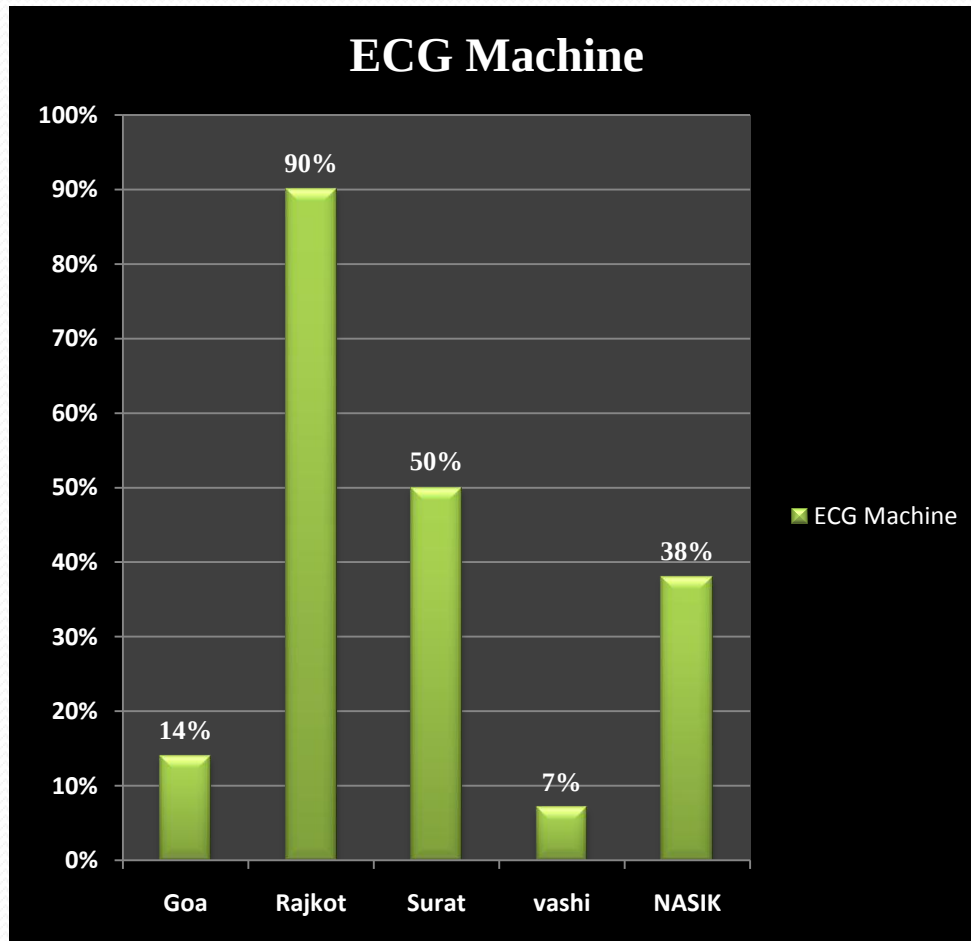


NON-INVASIVE DIAGNOSTICS

Non-Invasive Diagnostic tests

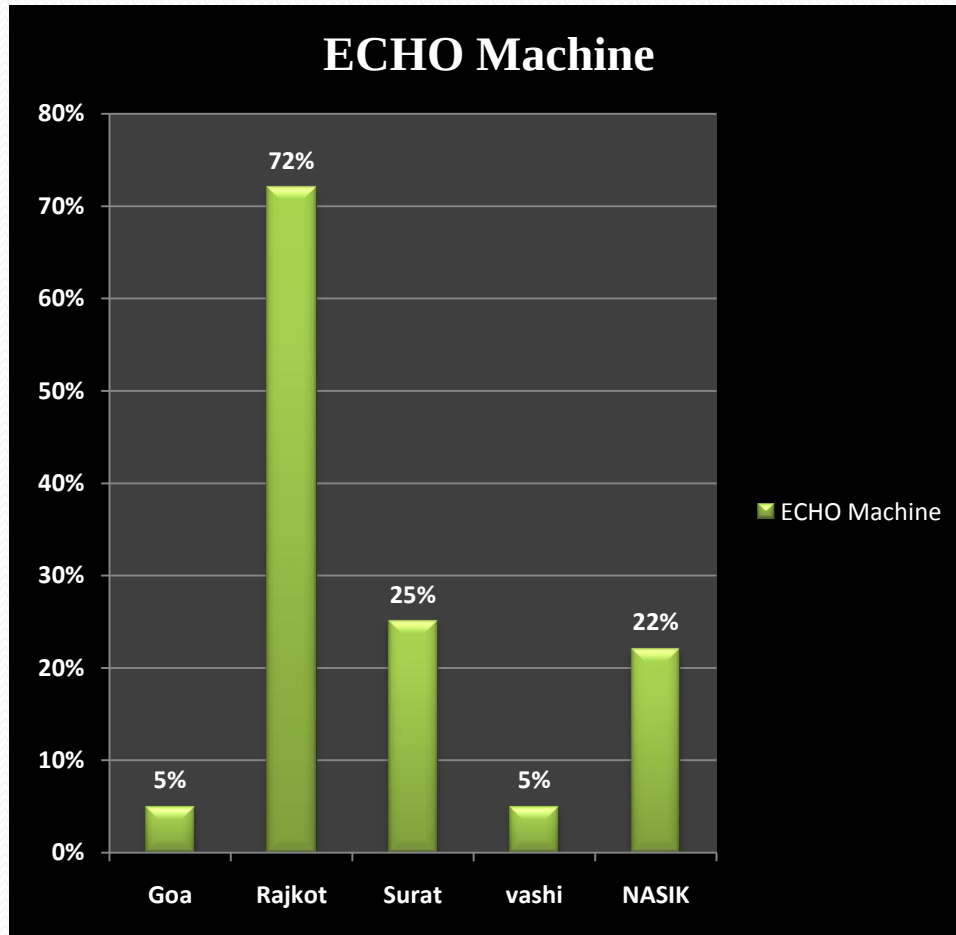
TEST	DURATION
ECG	10mins
ECHO	20mins
PFT	15mins
TMT	30mins
EEG/ EMG	40mins

ECG (OPD)



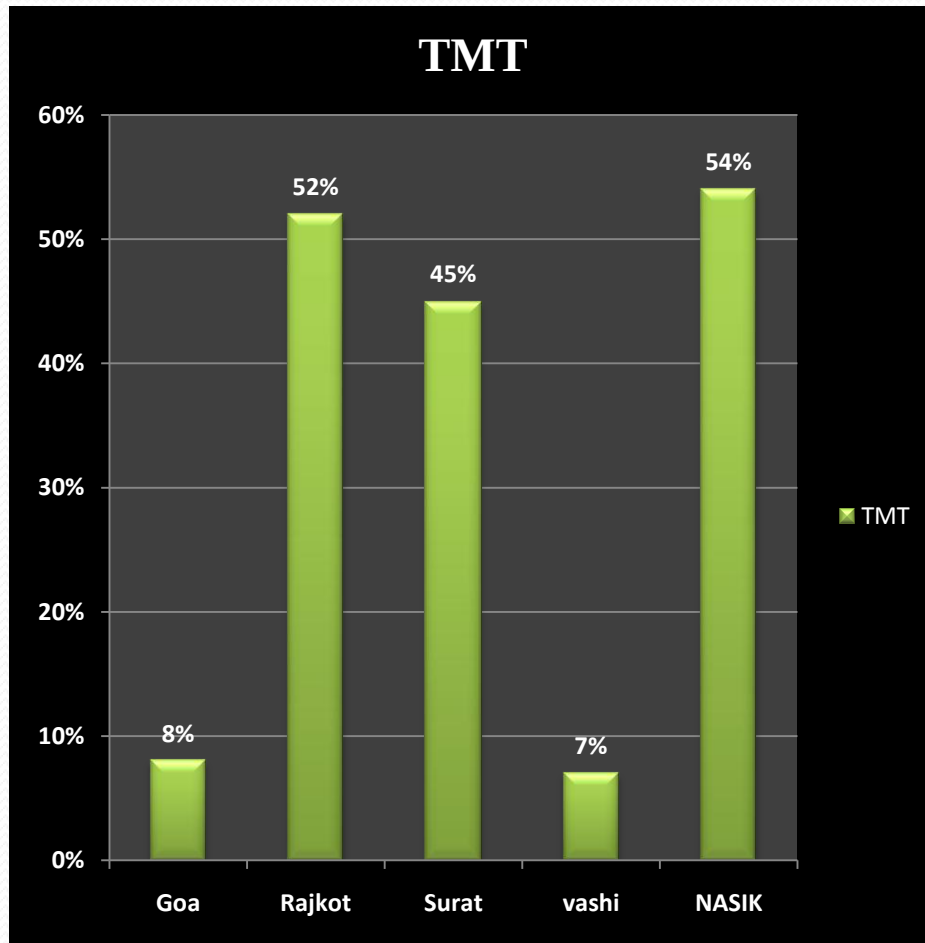
- Functional hours of department
 - Goa and Vashi has – 9hrs,
 - Rest, all functional for – 12hrs
- Vashi has least utilization rate because, of less no. of patients.
- Monthly volume of cases –
 - Goa- 202 cases
 - RajkOT -1442 cases
 - Surat – 819 cases
 - Vashi -74 cases
 - Nasik- 597 cases

ECHO (OPD)



- Average Monthly Volume of cases.
 - Goa – 110 cases
 - Rajkot-440 cases
 - Surat- 252 cases
 - Vashi- 32 cases
 - Nasik- 372 cases

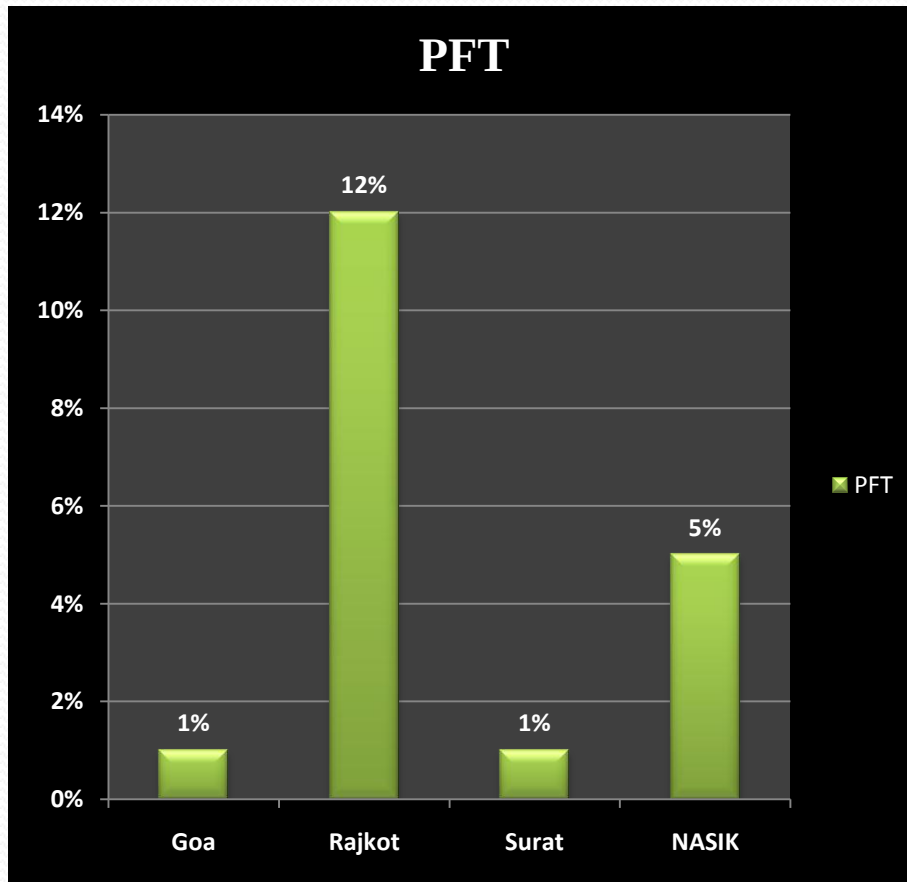
TMT



- Monthly Volume of cases

- Goa- 58
- Rajkot - 351
- Surat - 375
- Vashi -25
- Nasik -263

PFT



- Across the locations -PFT Machine utilization is quite low.



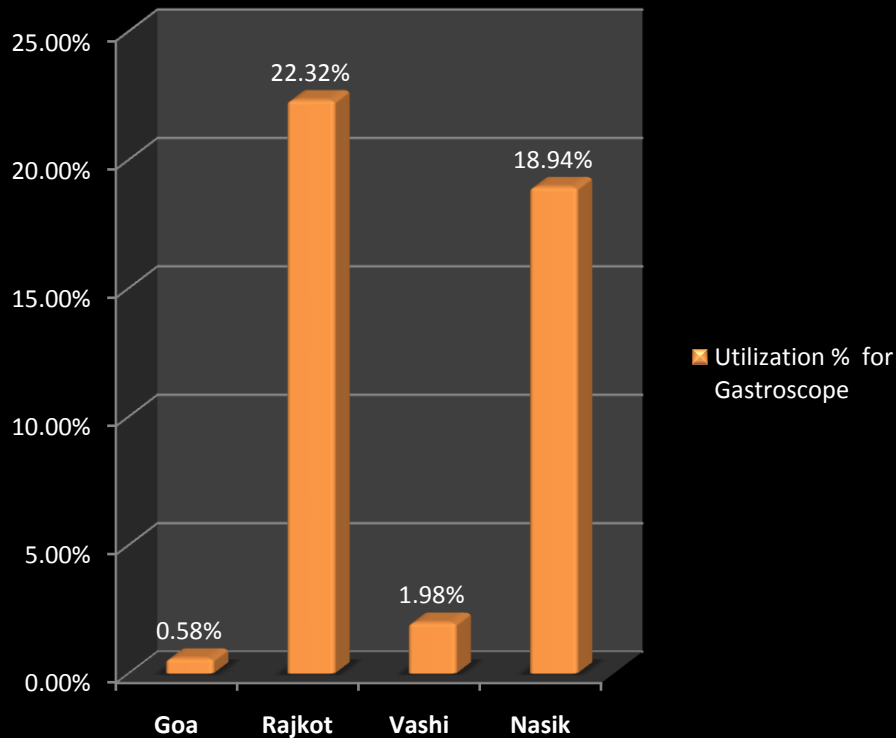
ENDOSCOPY



PROCEDURE	DURATION
GASTROSCOPY	15 mins
COLONOSCOPY	20mins
BRONCHOSCOPY	10mins

GASTROSCOPE

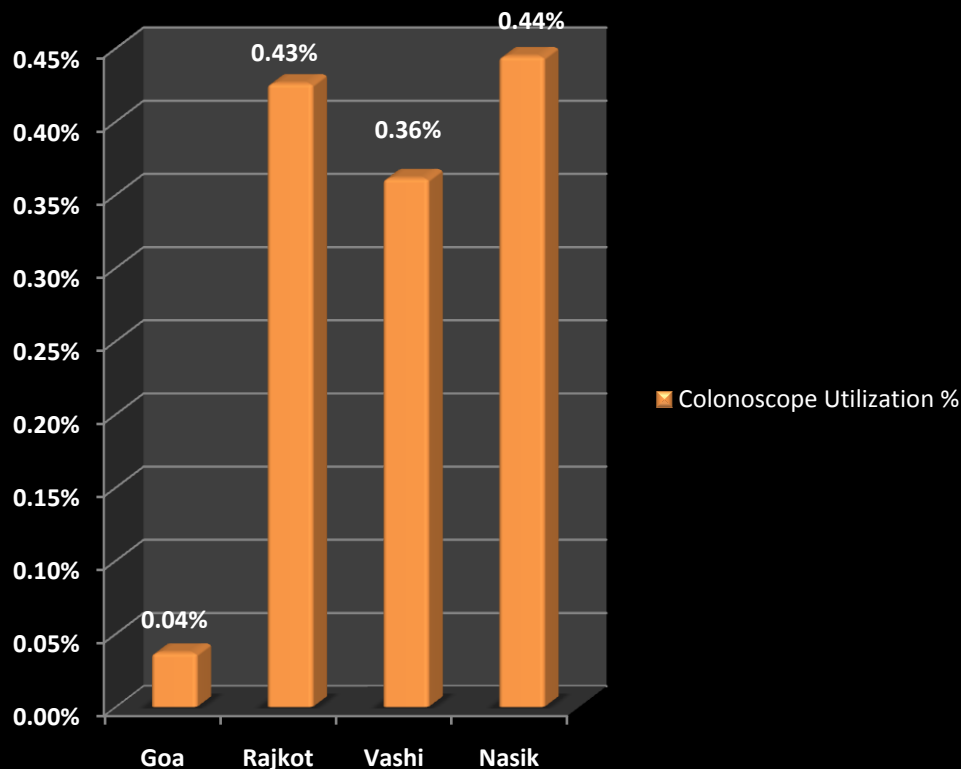
Utilization % for Gastroscope



- Average monthly volume of cases of Gastroscopy
 - Goa – 5 cases
 - Rajkot -188 cases
 - Vashi – 7cases
 - Nasik – 115 cases
- Functional hours of department –
 - Goa-9hrs (9:30-6:30)
 - Rajkot -9hrs (9:30-6:30)
 - Vashi- 4hrs (9-10:30 ,3-5:30)
 - Nasik- 6.5hrs (9-3:30)

COLONOSCOPE

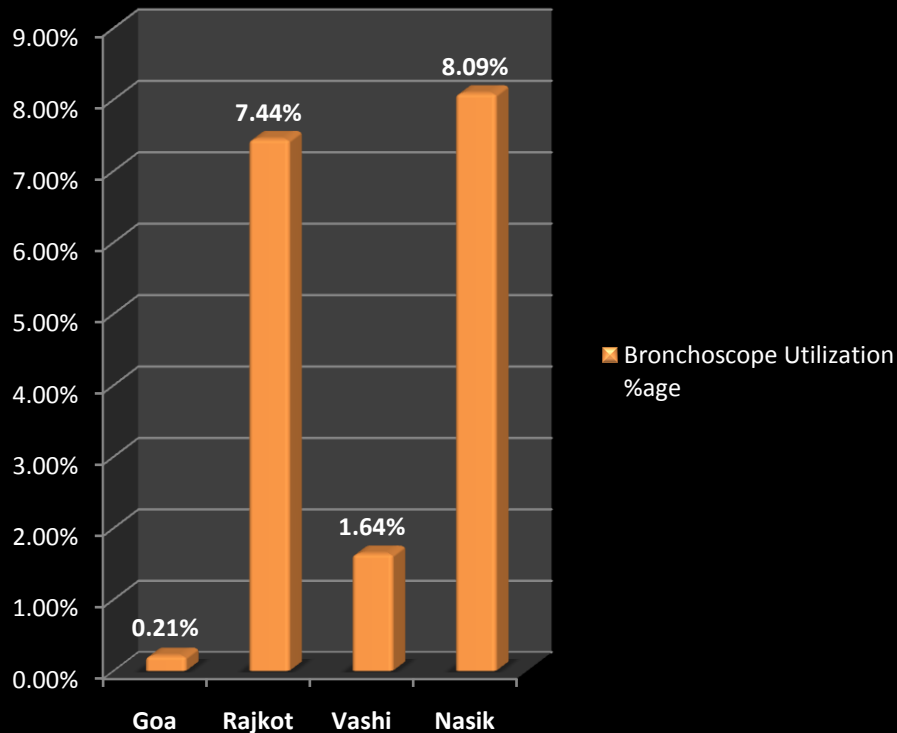
Colonoscope Utilization %



- Average monthly volume of cases of Colonoscopy and Flex sigmoidoscopy together are considered for Rajkot and Nasik
 - Goa- 1 case
 - Rajkot -50 cases
 - Vashi- 5cases
 - Nasik- 39 cases
- Vashi- utilization rate is almost comparable to what Rajkot and Nasik has because of only 4 hrs as functional hours of department

BRONCHOSCOPE

Bronchoscope Utilization %age



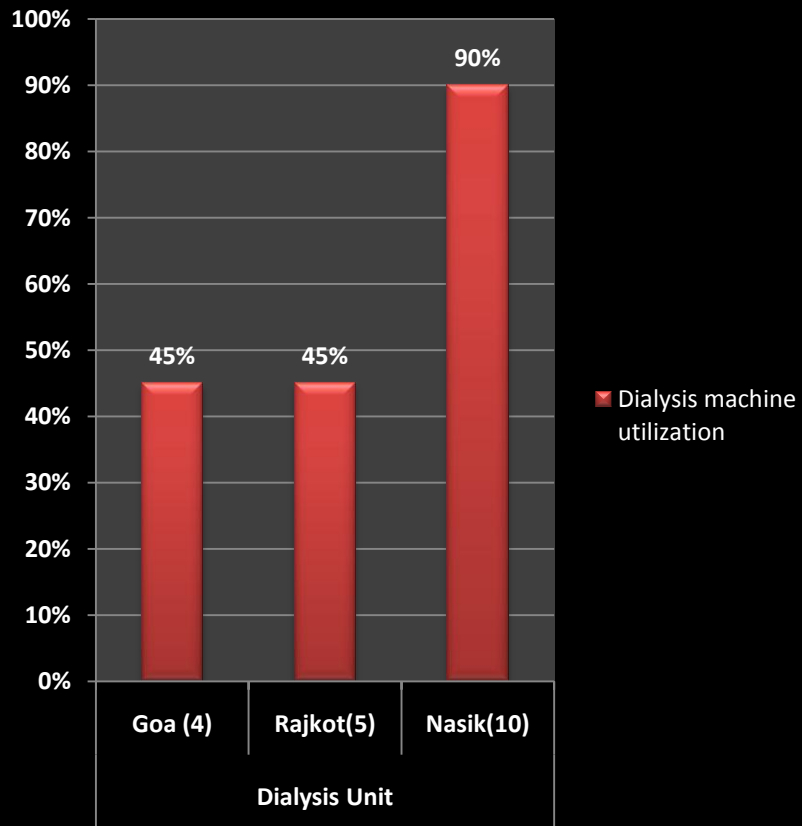
- From the graph it can be observed that almost 8% utilization of bronchoscope is there .
- Average monthly volume of cases
 - Goa- 1
 - Rajkot -6
 - Vashi – 2
 - Nasik- 4

OTHERS

PROCEDURE	DURATION
DIALYSIS	4hrs
CATH LAB (DIAGNOSTIC)	30 mins
CATH LAB (THERAPEUTIC)	60 mins

DIALYSIS

Dialysis machine utilization

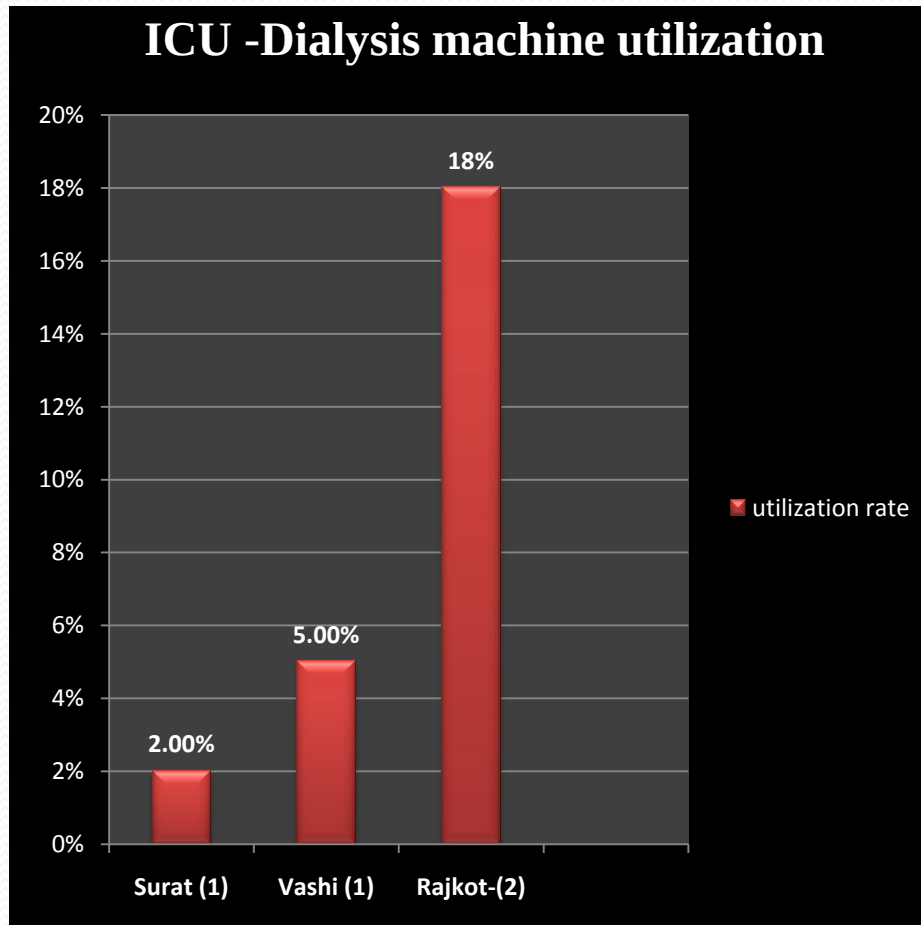


- No. of dialysis machines each unit has-
- No. of slots available –

location	No. of machines	SlOTs available
Goa	4	3
Rajkot	5	3
Nasik	10	7

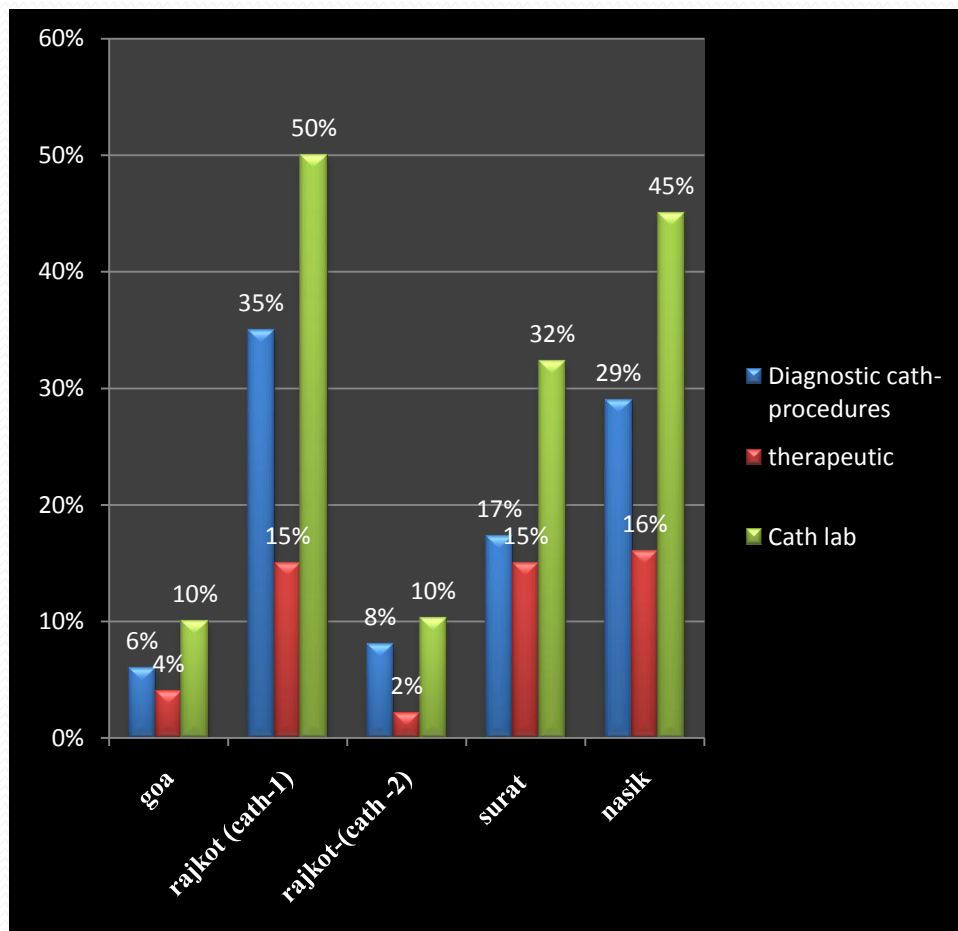
DIALYSIS MACHINES

at ICU



- Surat and Vashi don't have a dedicated dialysis unit.
- They have dialysis machine kept in the ICUs.
- Rajkot has a separate dialysis unit apart from that 2-machines are there in ICU.
- Functional hours considered- 24hrs.

CATH LAB



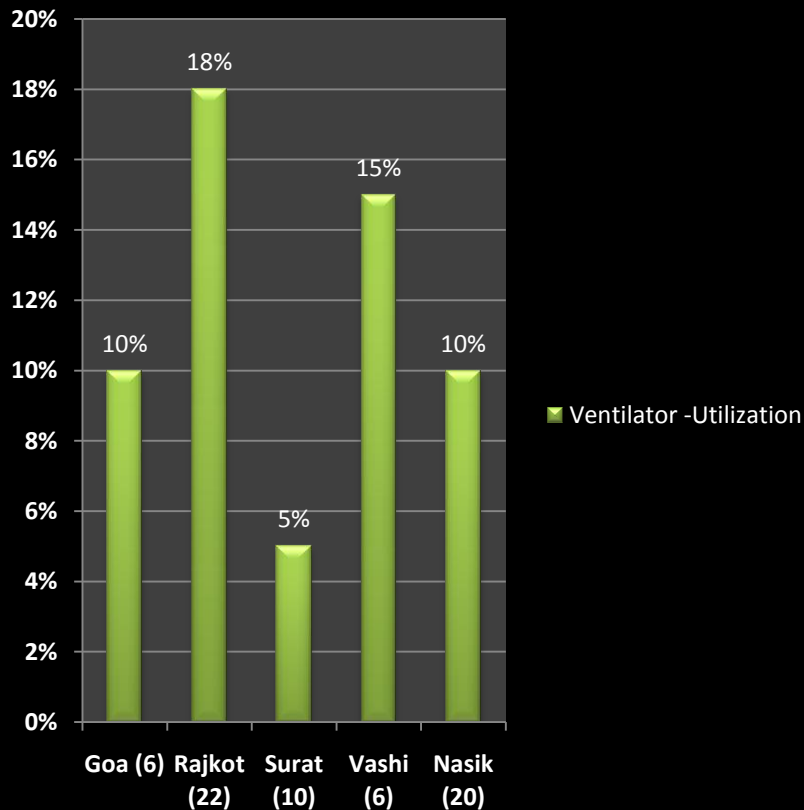
- Average monthly volume of diagnostic and therapeutic cases are taken into consideration.
- Across the locations daily – Diagnostic cases are little higher in percentage as compared to the Therapeutic cases -
- Except, Goa every where department is functional for 12hrs.
- Rajkot – has two cath lab-
 - cath-2 data functional since nov-13

INPATIENT EQUIPMENTS-

- Categorized as –
 - Critical
 - Non-critical equipments
- Critical includes –ventilators , defibrillators
- Non-critical equipments – patient monitors and syringe pumps.

ICU-VENTILATORS

Ventilator -Utilization

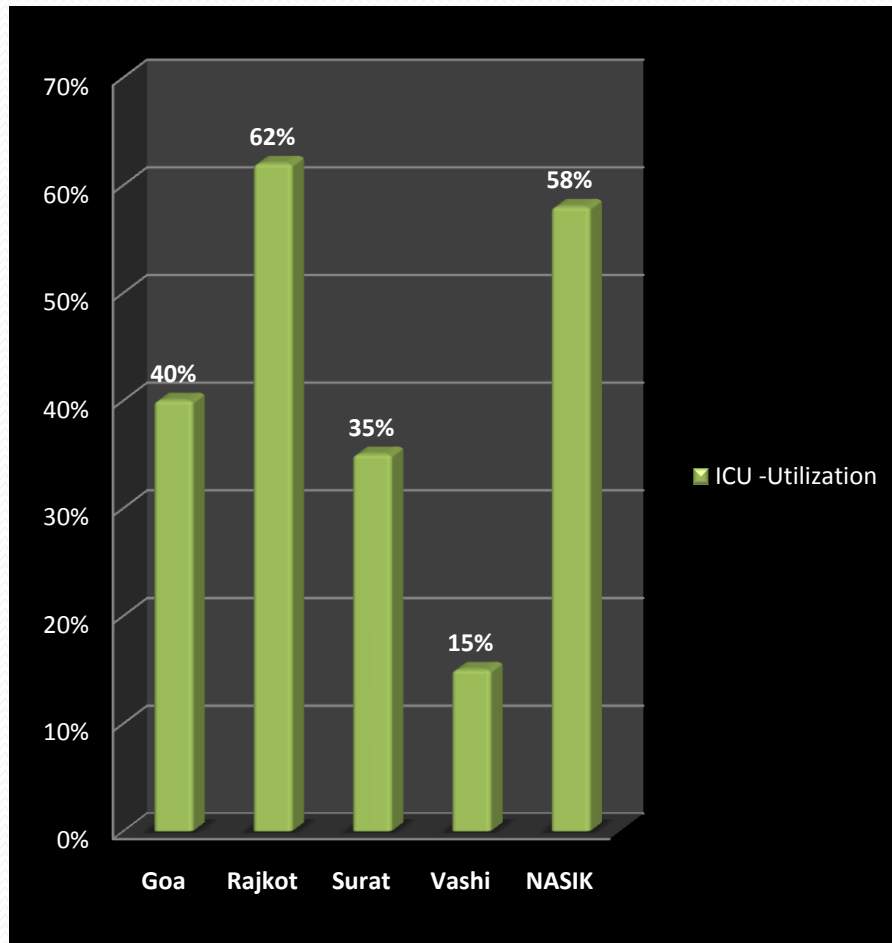


Both bipap and Cpap Ventilators considered together.

- No. of ventilators at each location-

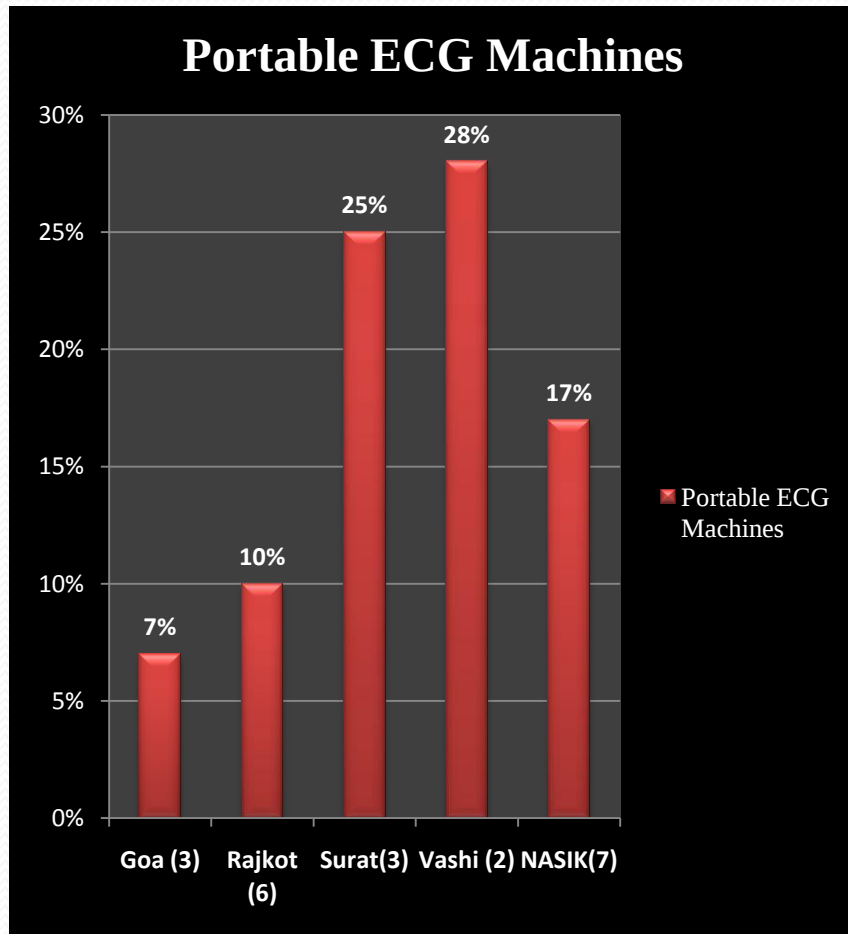
location	Ventilators hours per day
Goa	12
Rajkot	82
Surat	7
Vashi	16
Nasik	34

PATIENT MONITORS



- Bed strength of the ICU
- Average occupancy of the ICU.
- Patient monitors are the fixed equipments, which if patient is there are directly connected thereby, connecting all the fixed equipment with the ICU –Occupancy.
- Utilization rate – occupancy of ICU / Total no. of patient monitors.

PORTABLE-ECG-Machines



- On average in a month across the group ECG done by portable machine – 39 .

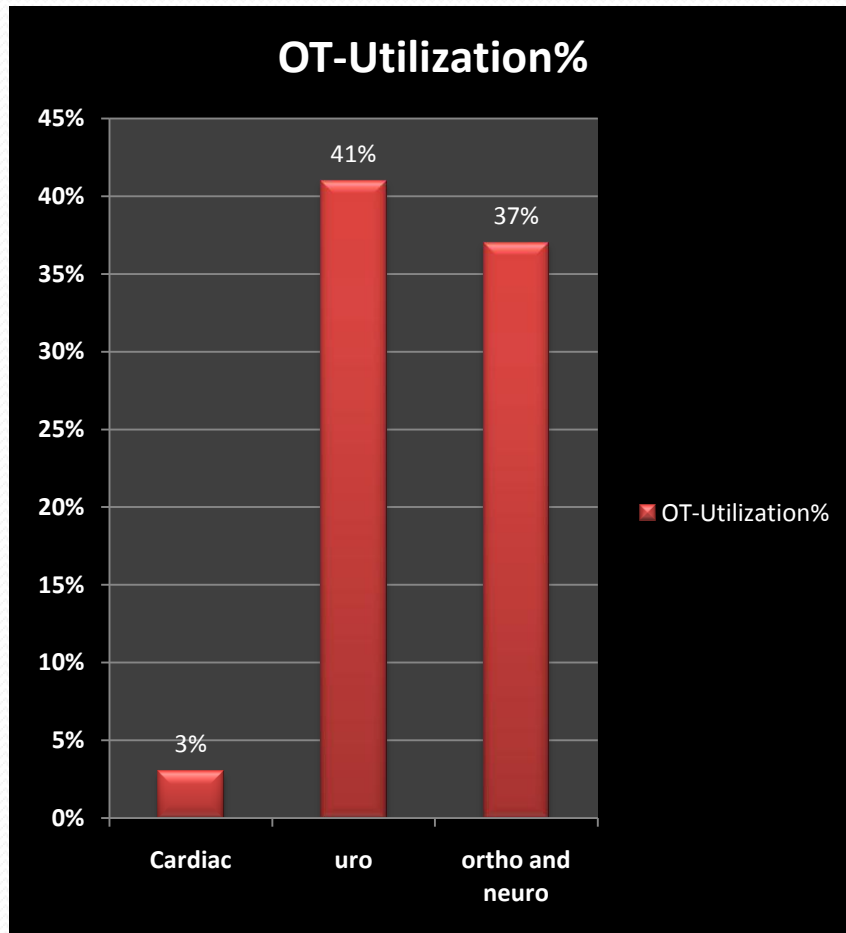


OT-UTILIZATION

List of equipments

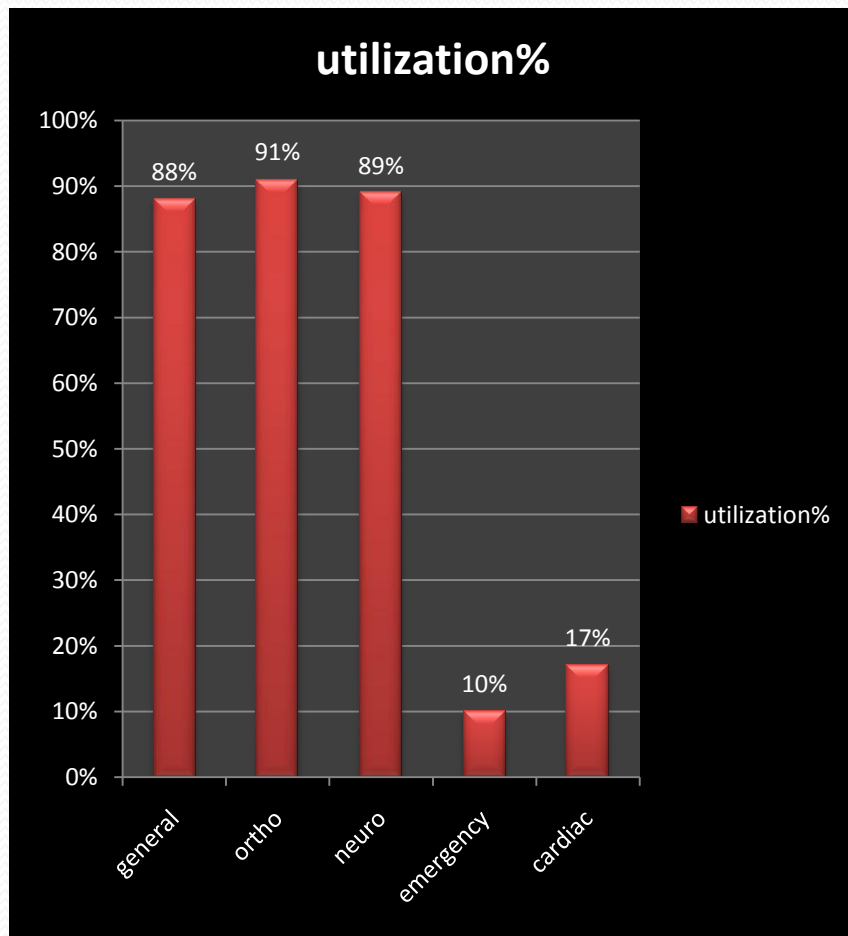
- Operation Theatre-utilization is considered because ,there are certain common equipments which are being used along with the use of OT.
- List of Equipments –
 - O.T. Table
 - O.T.Light
 - Pendent (anesthesia)
 - Pendent (surgeon)
 - Anesthesia machine
 - defibrillators

GOA



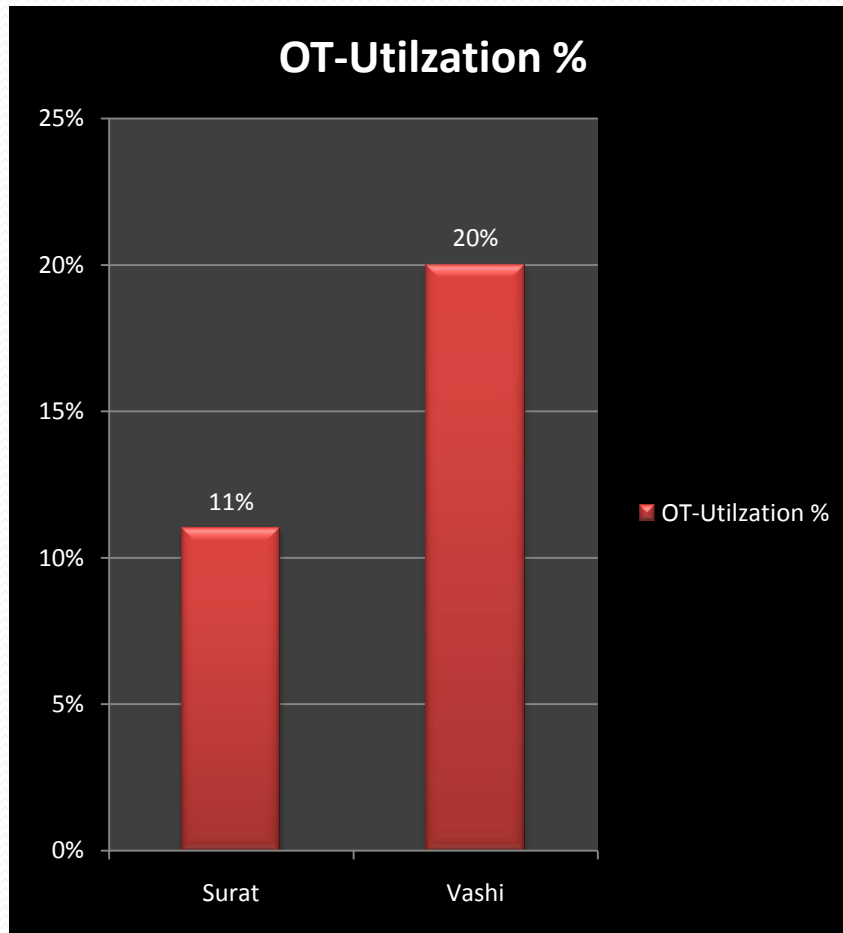
- Goa has 5 OTs but, three OTs are functional
 - OT-1 – cardiac
 - OT-2- urology
 - OT-3 –Ortho and neuro cases.
- Operational hours- 12hrs
- Including the cleaning time as well of 30 mins.

RAJKOT- OT



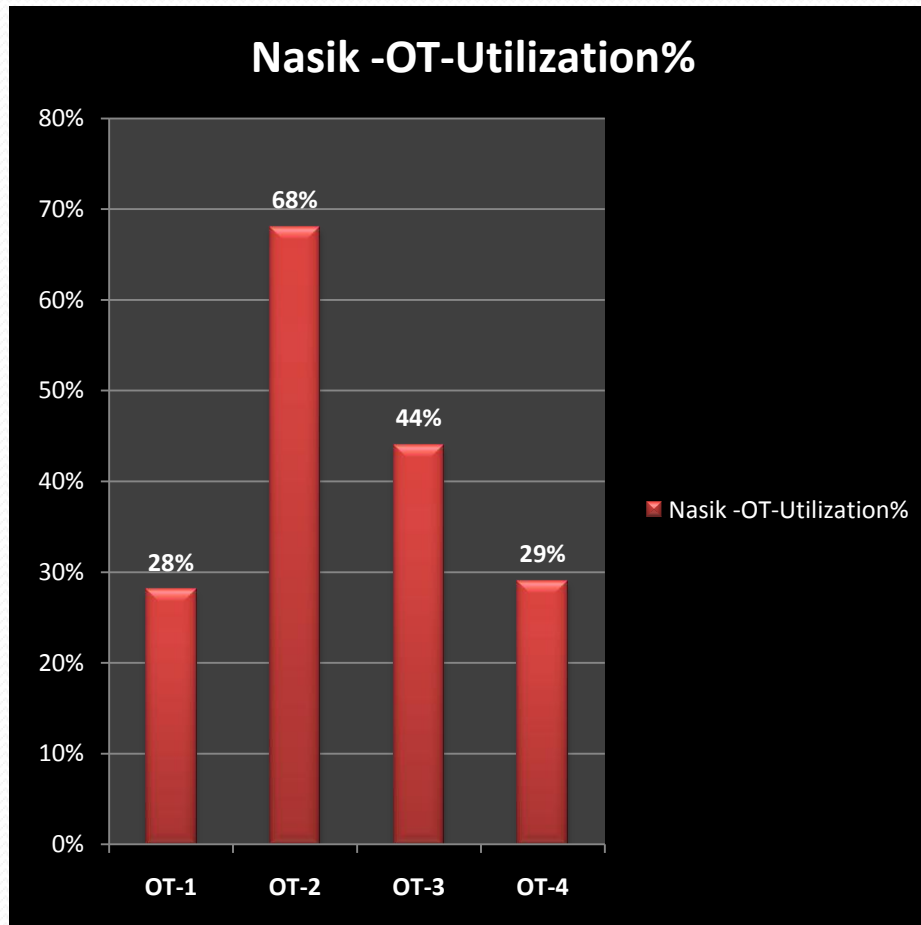
- All OTs functional for 12hours
 - OT-1 –general OT
 - OT-2-ortho OT
 - OT-3 Neuro –OT
 - OT-4 Emergency OT (i.e. operational for 24hrs and 30 days)
 - OT-5 Cardiac OT

SURAT and VASHI OT



- Surat and Vashi have single OT.
- Surat has got two OTs
 - OT-1 –Cardiac –OT
 - OT-2 which is non-functional since last 2yrs.
- Vashi - has one OT
- Types of cases done-
 - Ortho
 - Urology
 - Minimal access surgeries , general surgeries

NASIK

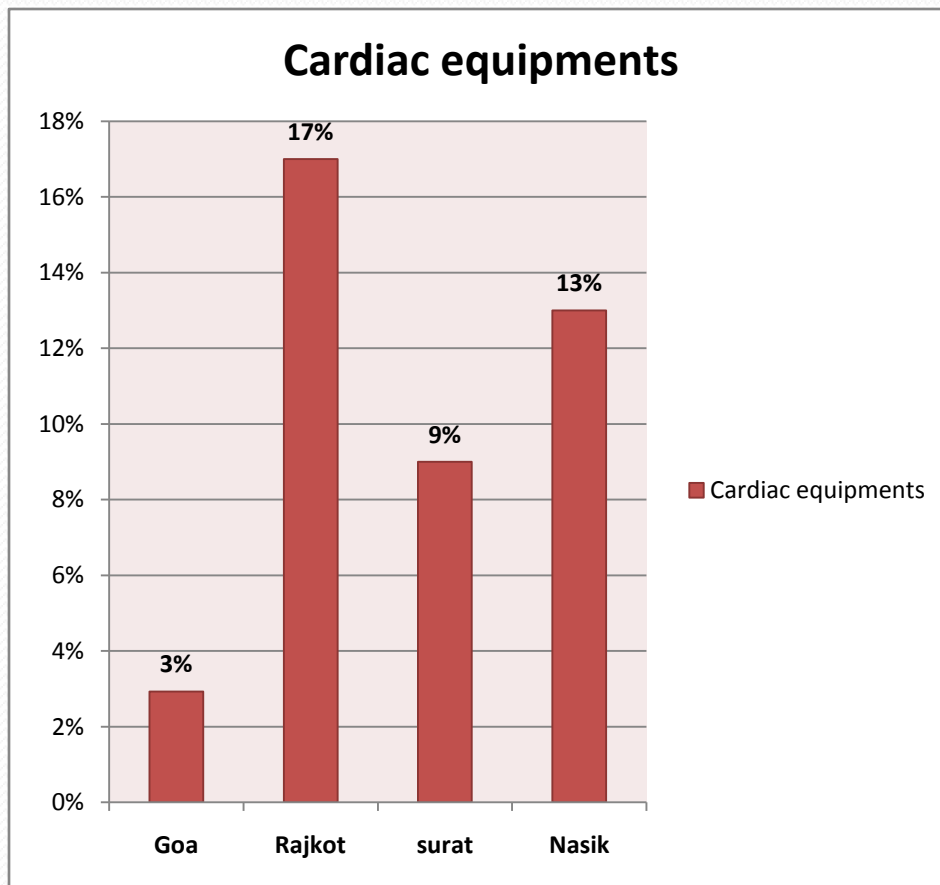


- No. of OTs – 4
- All OTs functional for 12hours
- OT-1 infected cases
- OT-2 general and other specialities
- OT-3 ortho cases
- OT-4 cardiac and spine



SPECIALITY –WISE –EQUIPMENT UTILIZATION

CARDIAC EQUIPMENTS



- Average monthly volume of cardiac surgeries
 - Goa-2 cases
 - Rajkot-16 cases
 - Surat-5 cases
 - Nasik-11 cases

Cardiac Equipments list-

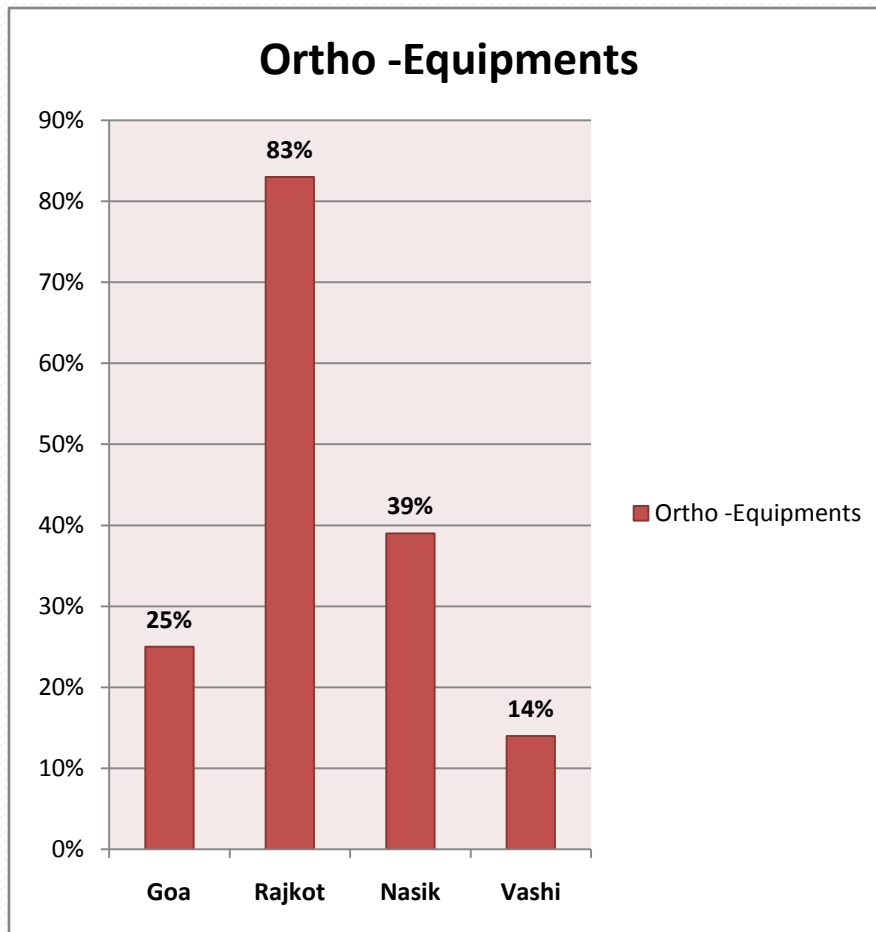
a. Sternum saw motor

B .IABP

c. ACT MACHINE

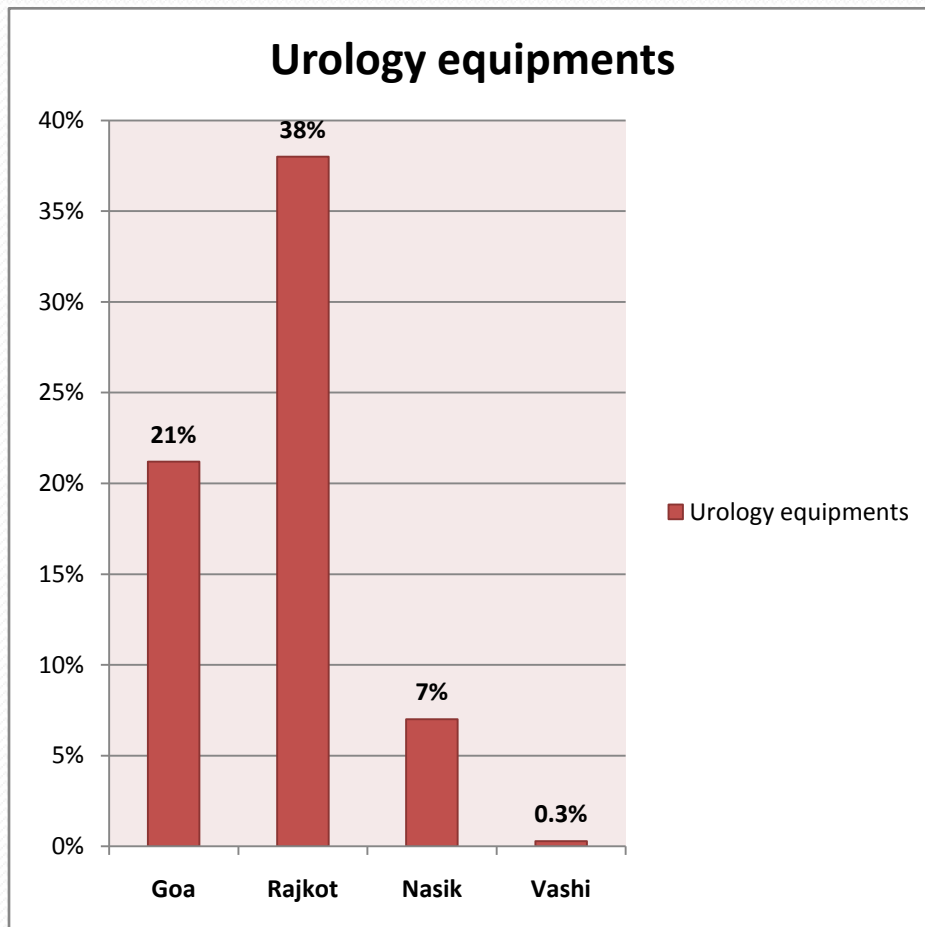
d. HEART LUNG MACHINE

ORTHO-EQUIPMENTS



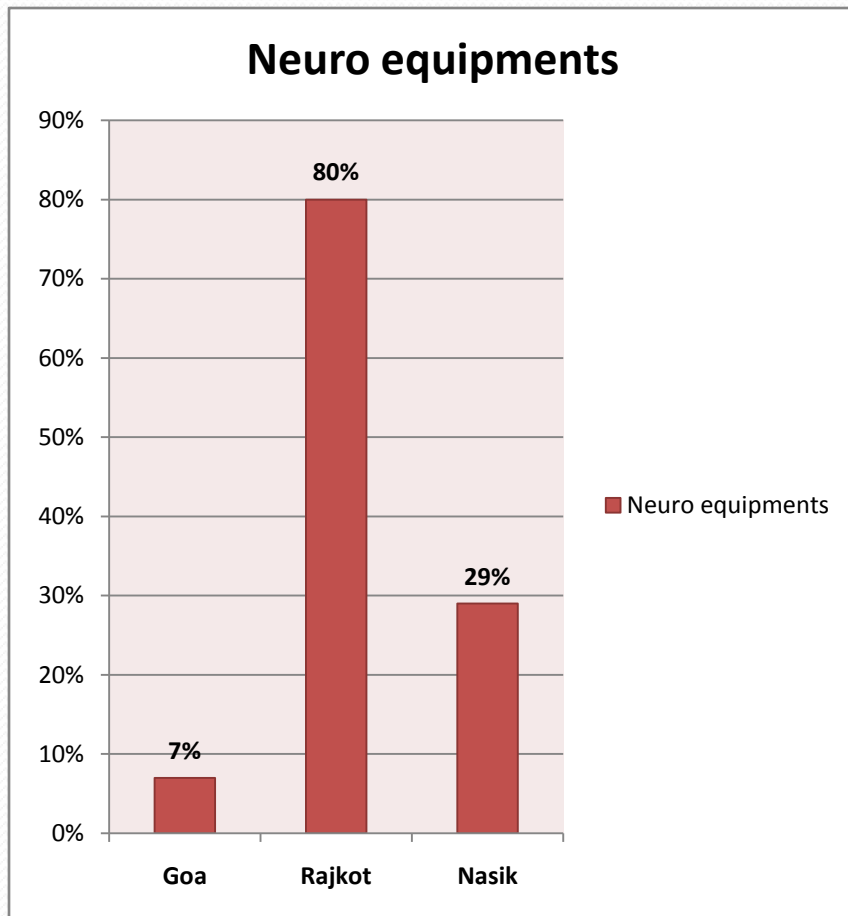
- Average volume of Ortho and replacement cases are taken.
- operational hours except, at Goa- 12hrs.
- Ortho equipments –
 - Ortho drill
 - Cautery machine
 - Tourniquet
 - C-arm
- Monthly volume-
 - Goa- 20 cases
 - Rajkot-75 cases
 - Vashi – 16cases
 - Nasik- 44 cases

UROLOGY –EQUIPMENTS



- Points of consideration –
- Average monthly volume of uro cases-
 - Goa – 88 cases
 - Rajkot- 38cases
 - Vashi- 2cases
 - Nasik- 13 cases
- Surgery time taken for single procedure in Goa is less compared to the same surgery being performed at other locations.
- TURP at Goa –done in average 40mins
- At Rajkot – average in 3:00 hrs

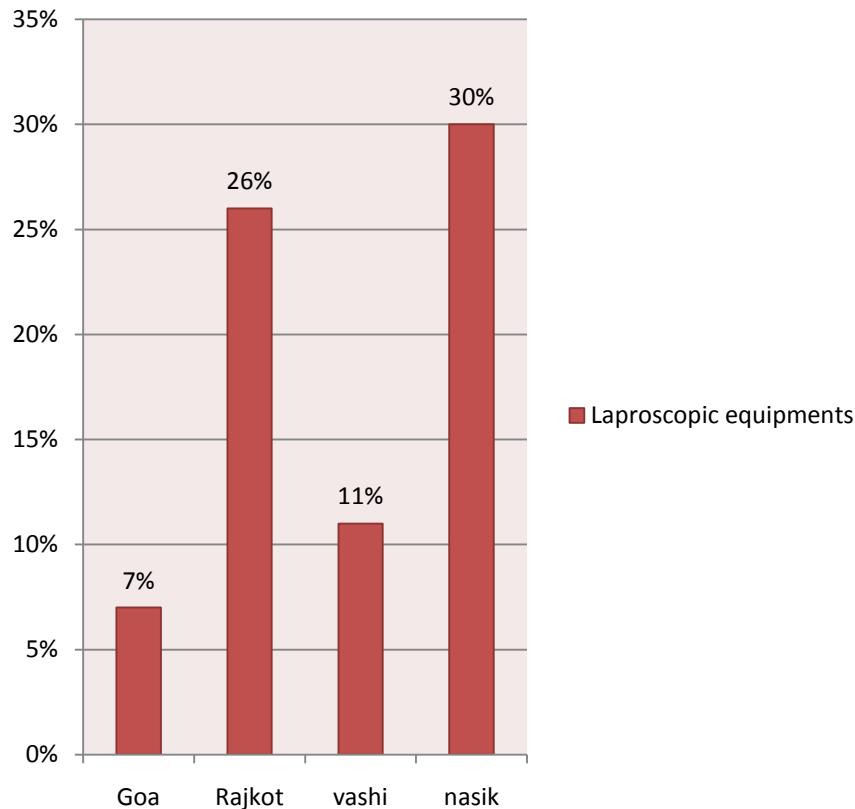
NEURO EQUIPMENTS



- Average volume of neuro and spine cases
- Neuro equipments –
 - Neuro Drill system
 - Leyla Retractor
 - C-arm Microscope
 - CUSA Machine
- Average monthly cases at different locations-
 - Goa-3 cases
 - Rajkot-106 cases
 - Nasik- 25 cases

GENERAL & LAPROSCOPIC SURGERY

Laprosopic equipments



Average monthly volume of laproscopic surgeries-

- Goa – 7
- Rajkot - 32
- Vashi -16
- Nasik- 45

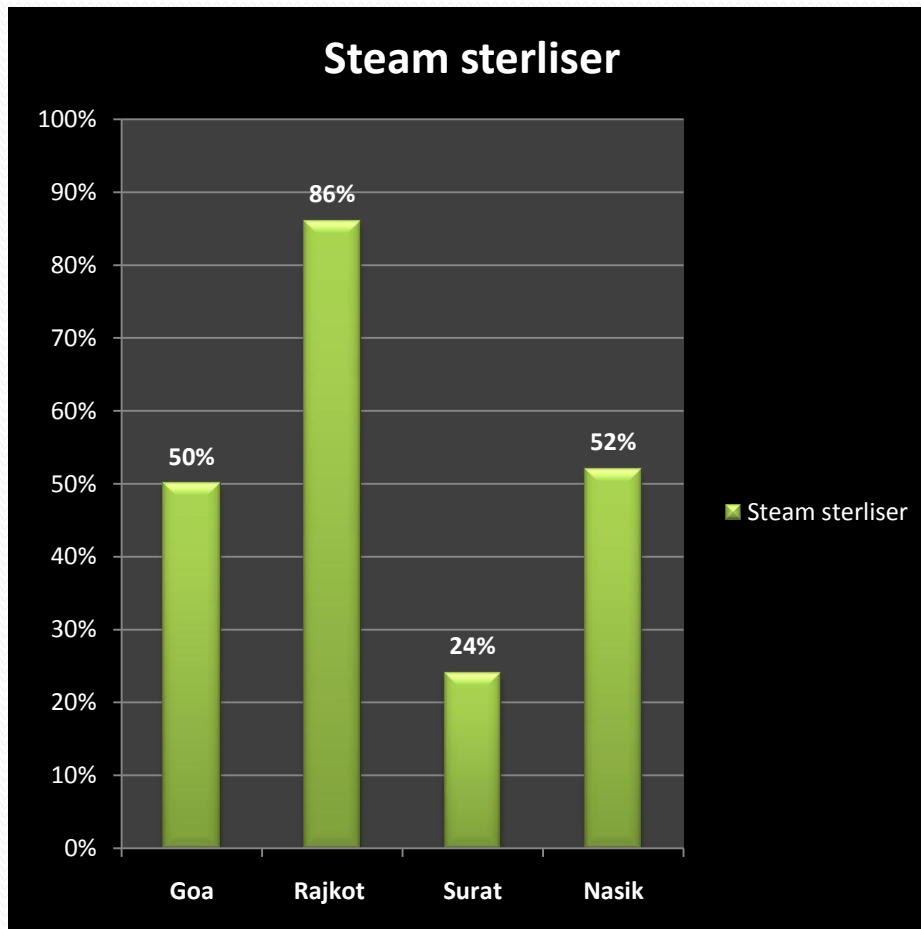
Laprosopic Equipments

- Laproscopy system Monitor
- Image Hub Xenon
- Endoflator Machine
- Monitor Endocamera
- Telecam DXPL
- Telecam DXPL Monitor
- Light source, Halogen 250 Halogen 250 Twin
- Endocamera Cautery Machine



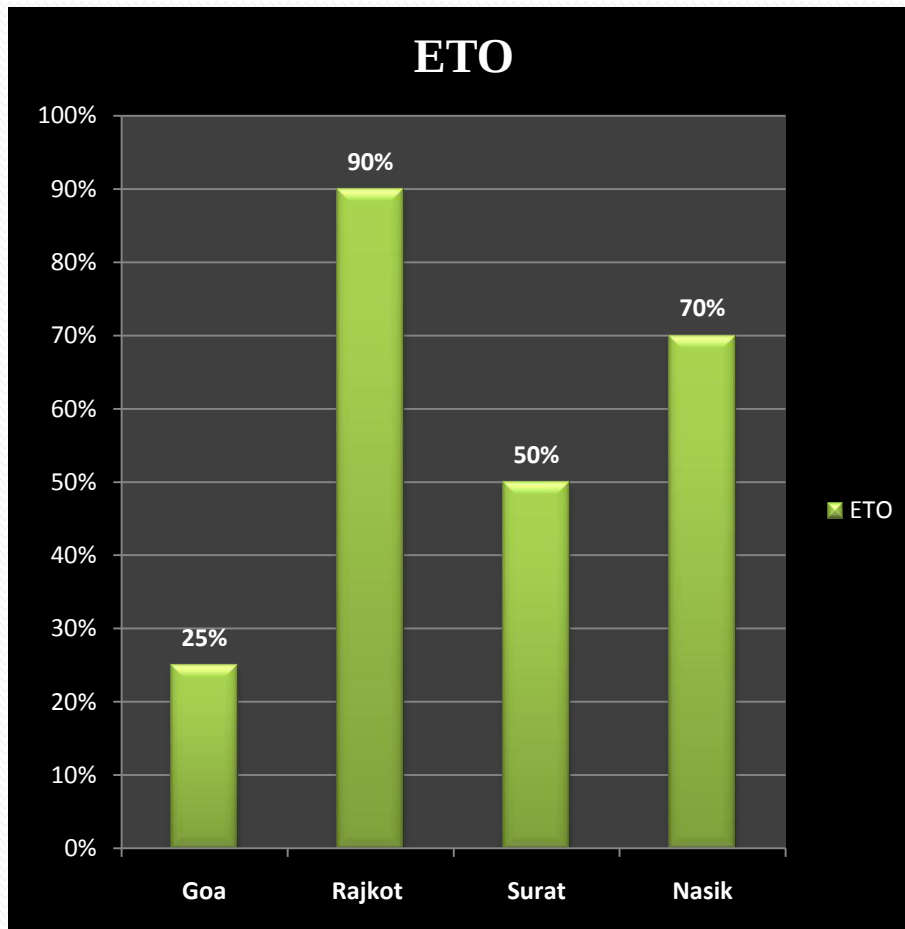
SUPPORT SERVICES

CSSD



- Points of consideration
- No. of steam steriliser that each unit has-
 - Goa -2
 - Rajkot -2
 - Surat-1
 - Vashi-1
 - Nasik-2
- Average no. of cycles
- Across the group average no. of cycles per month - 169.

ETO



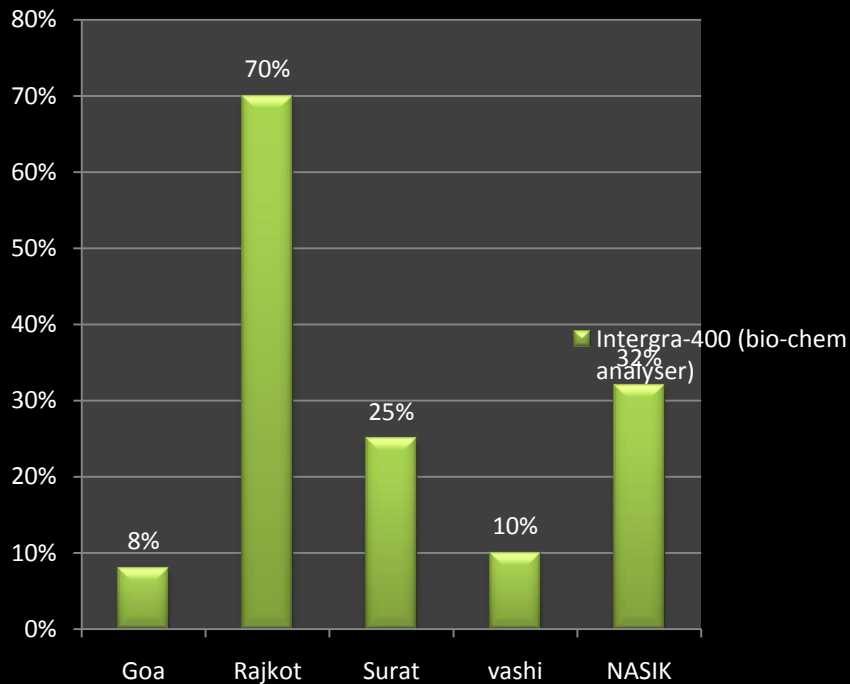
- Points of consideration-
- ETO-Sterliser has two cycles
- Cycle used at different locations-
 - Goa - 14hrs cycle
 - Rajkot - 14hrs
 - Surat -12hrs
 - Nasik -14hrs
 - Vashi had no documentation maintained for last year.
- Across the group average no. of cycles per month - 25



LABORATORY EQUIPMENTS

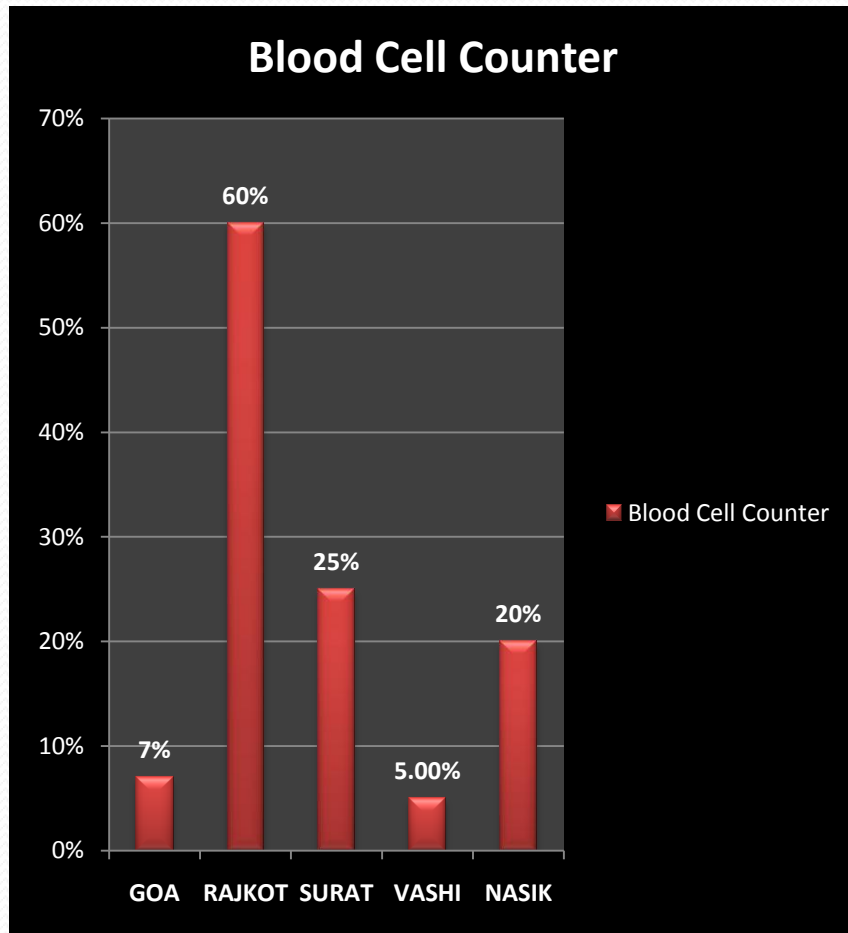
BIO-CHEMISTRY ANALYSER

Intergra-400 (bio-chem analyser)



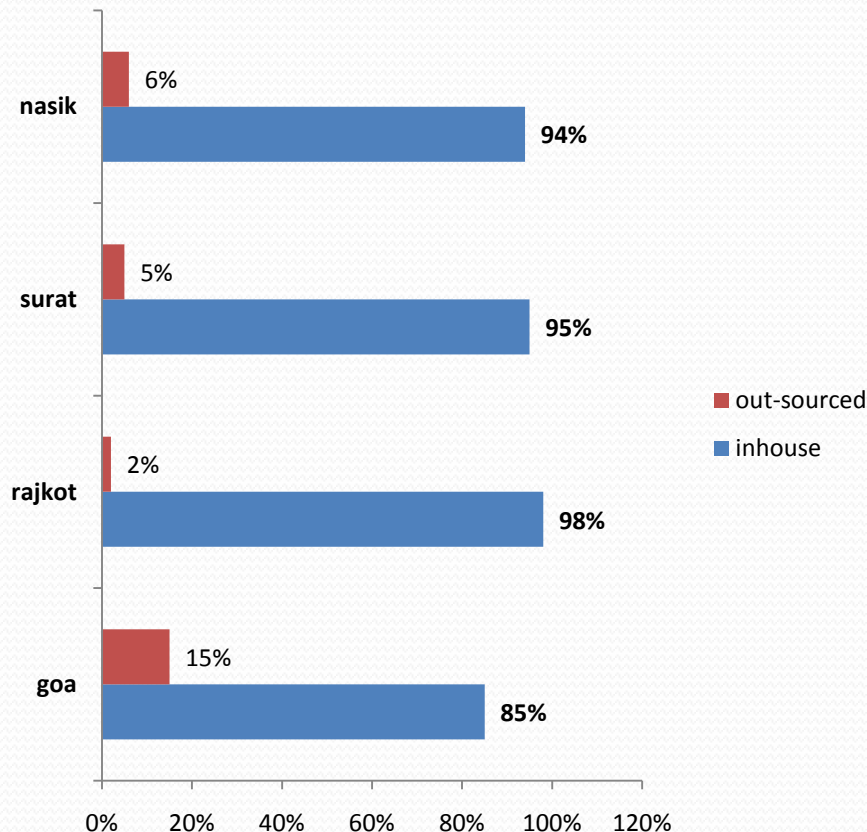
- Points in consideration-
- No. of samples that can be taken at once.
- No. of tests that can be performed by one sample.
- Average time taken for one cycle
- Monthly volume of bio-chemistry tests –
 - Goa- 1904 tests
 - Rajkot – 42,056 tests
 - Surat – 10948 tests
 - Vashi -1298 tests
 - Nasik – 11,376 tests

BLOOD CELL COUNTER



- Points in consideration-
- No. of samples that can be taken at once.
- No. of tests that can be performed by one sample.
- Average time taken for one cycle
 - Goa- 575 tests
 - Rajkot- 10,645
 - Surat - 3708
 - Vashi -11 tests
 - Nasik- 2836 tests.

Percentage of Inhouse and outsourced lab-tests



Points of consideration –

- Volume of cases of in-house and outsourced tests.
- Inhouse tests taken into consideration are-
 - Bio-chemistry tests
 - Haematology
 - Clinical pathology tests
- Outsourced tests taken into consideration are
 - Microbiology
 - Histopathology

OBSERVATIONS-

- Dialysis-records of the cases done in ICU is not maintained in the ICU master register , either they are recorded in the patient's yellow card or in the dialysis unit register only.
- Blood borne-pathogen cases record is not maintained separately at any of the locations.
- At, Goa Third slot from 4-8 pm may be utilized for more no.of patients.

- Radiology

- it was being observed that time-in, time-out is not documented .
- This particular format is being followed at the locations

s.no	date	Time-in	OPD/ IPD no.	Patient name	Depart ment name	Techni cian name	test

- In HIS entry also, the procedure end time is not mentioned only, total time from patient's entry to exit(time when the reports are being despatched) is kept.

UHID no.	Order no	Patient name	test	department	Order date time	Test acknowledged date and time	

- 
- Cardiology-
 - at certain locations time-in , time-out documentation was not seen for ECG,ECHO, PFT tests
 - Endoscopy-
 - time-in ,time-out documentation was there at all the locations except, one

- 
- Ventilators – Intubation and extubation time of ventilators is not being recorded at most of the locations ,except a few locations where the intubation and extubation dates are mentioned
 - Portable ECG-Machines are there at every Nursing station and wards.

GENERAL RECOMMENDATIONS-

- Critical equipment at unit bank to be created –where only active no. of ventilators can be utilized .
- Critical- case mix focus to be increased
- Rational deployment of resources
- Centralized equipment store ,for portable machines which are there at various departments and nursing station from where the equipment can be given on loan basis as per requirement .

- 
- Though, there are certain equipments for which the utilization rate is low but, there is still a scope of improvement viz. dialysis unit at Goa and Rajkot where the third slot may be used to cater increased no. of patients
 - Equipments can be relocated –
 - Mother and child unit at Goa
 - Aesthetic department is fully equipped and cases happening are almost negligible so, these equipments shall be relocated to some other location
 - ICU-2 closed at Nasik so equipments from there can be kept in spare or relocated or common pool
 - Surat, has 3-ECG machines which are functional but, not in use so can be relocated

- 
- Clinically, maintaining the proper documentation of data
 - Templates shall be created where on six-months or yearly basis data can be captured.



TEMPLATE →

Department name	Equipment name	Total no .of cases in a month	Average time for test /procedure	time for which machine used in a month	Functional hours of department



Thank You