



A study on Operation Theatre Scheduling using DMAIC Approach

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Introduction

- **Scheduling** of Operation theatre is an important factor contributing to the operation theatre efficiency.
- It involves determining the average length of common operations and fitting them into the calculated available operating time.
- The scheduling of Operating Theatre plays an important role towards the patients satisfaction by minimizing his/her total waiting time before undergoing major or minor operations.
- Poor scheduling of Operating Theatre cause preoperative delays

Objectives

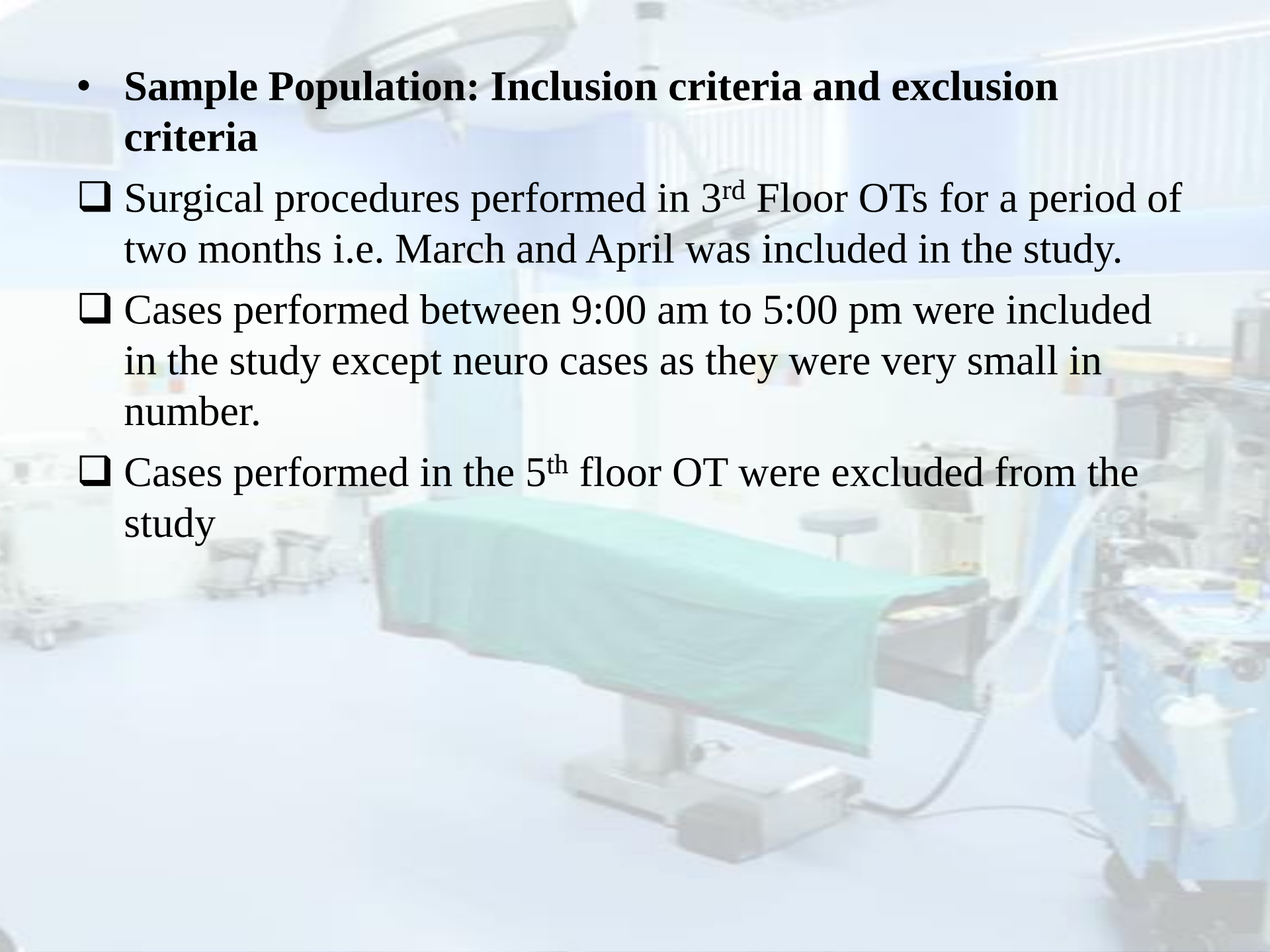
- To observe the operation theatre time schedule and to find out whether surgery is performed on schedule time or not.
- To identify the gap between scheduled time and actual time of surgeries, if any.
- To identify the reasons for first case delays and all case delays.
- To provide recommendations to improve the operation theatre scheduling by reducing the first case delays and all case delays

Methodology

- **Study design and approach:** descriptive-cross sectional study.
- **Location of study:** OT complex, located on 3rd floor, of The Mission Hospital, Durgapur.
- **Time frame:** March 2015-April 2015(including all the working days except Sundays and gazetted holidays).
- **Study Timings:** 9:00 am-5:00pm
- **Study Approach:** Six sigma methodology-DMAIC approach
- **Study tool:** Minitab Software
- **Sampling technique:** The sampling technique is purposive sampling
- **Sample size: Total Sample Size:404**
 - ❑ Cardiac cases(CABG,MVR,ASD,VSD,TVR,ICR for TOF)=165
 - ❑ Ortho cases=97
 - ❑ General Cases (Urology, Gynecology, Plastic, General and Other surgeries) =142

- **Sample Population: Inclusion criteria and exclusion criteria**

- ☐ Surgical procedures performed in 3rd Floor OTs for a period of two months i.e. March and April was included in the study.
- ☐ Cases performed between 9:00 am to 5:00 pm were included in the study except neuro cases as they were very small in number.
- ☐ Cases performed in the 5th floor OT were excluded from the study



Study procedure

DMAIC approach is used.

- **Define** the system through current process map, the voice of the process and their requirements.
- **Measure** key aspects of the current process and collection of relevant data.
- **Analyze** the data to investigate and verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered. Seek out root cause of the defect under investigation.
- **Improve** or optimize the current process based upon data analysis.
- **Control** the future state process to ensure that any deviations from the target are corrected before they result in defects and continuously monitor the process

Surgeon/surgeon assistant calls the OT coordinator for OT booking of their case one day prior to surgery

OT coordinator checks for OT slot availability and availability of instruments with sister in-charge and technician

OT coordinator informs the surgeon about the same and book the case.

On the day of surgery, OT coordinator calls from recovery to ward to shift the patient to OT recovery

Patient is shifted to the pre operative area of the recovery

PHASE I-Define

Patient is transferred to OT by OT technicians and GDA staff

Anesthesia induction is done by anesthetist

Procedure is performed

Recovery from anesthesia

Patient shifted to post operative area of recovery and finally shifted to ward/ICU

PHASE II-Measure

Data collection phase of the study

Data collection:

➤ Primary data source

- Observation
- Informal Interviews OT coordinator, OT nursing staff ,OT Technicians, Surgeons and Anesthetists.

➤ Secondary Data Source

- OT case list which includes Patient's Name, Age, Sex, Wards allocated to him or her, Surgeon Name, Anesthetist name, Surgery to be performed, scheduled time for surgery and HMIS

Speciality wise Data

Cardiac Cases

Measurement Parameters	Average Time (in mins)
Case delay	52 mins
Time between patient wheel in OT to induction	23 mins
Time between completion of induction to incision done	26 mins
Time between incision done till the completion of surgery	4 hours 22 mins
Time between completion of surgery to patient is wheeled out of OT	33 mins

Ortho Cases

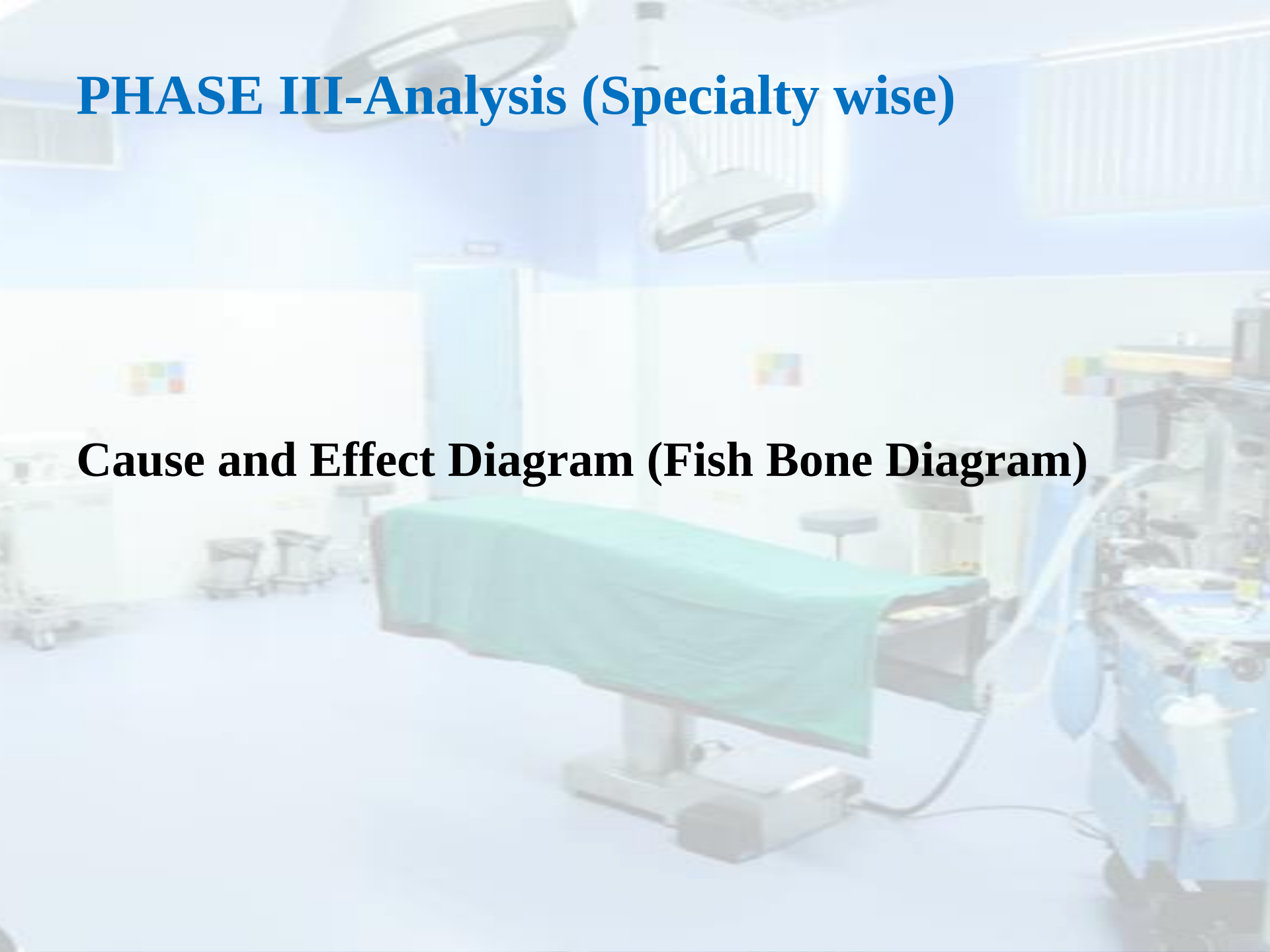
Measurement Parameters	Average Time (in mins)
Case delay	48 mins
Time between patient wheel in OT to induction	10 mins
Time between completion of induction to incision done.	20 mins
Time between incision done till the completion of surgery	1 hr 15 mins
Time between completion of surgery to patient is wheeled out of OT	13mins

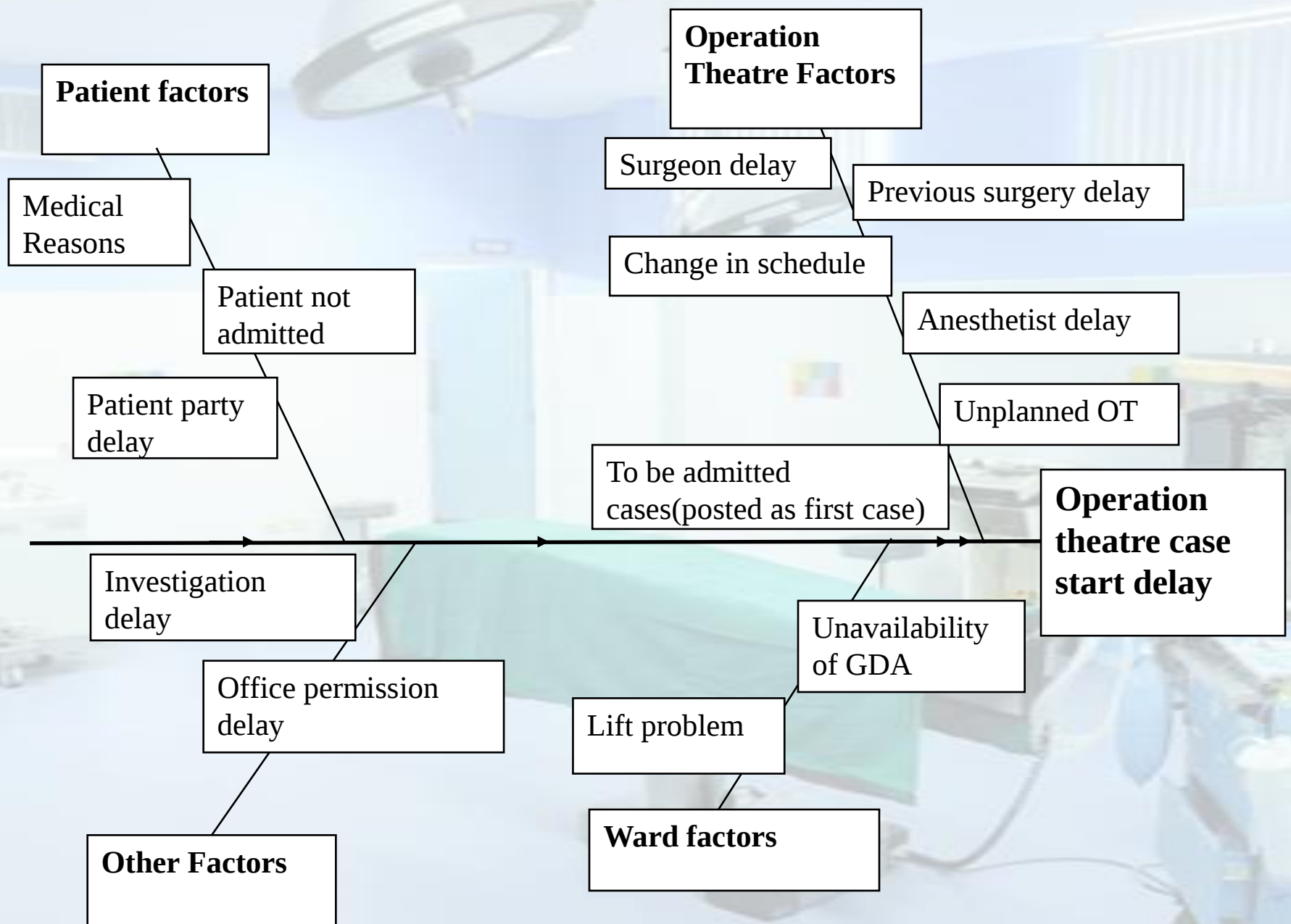
General Cases

Measurement Parameters	Average Time (in mins)
Case delay	40 mins
Time between patient wheel in OT to induction	10 mins
Time between completion of induction to incision done.	14 mins
Time between incision done till the completion of surgery	1 hr 02 mins
Time between completion of surgery to patient is wheeled out of OT	10mins

PHASE III-Analysis (Specialty wise)

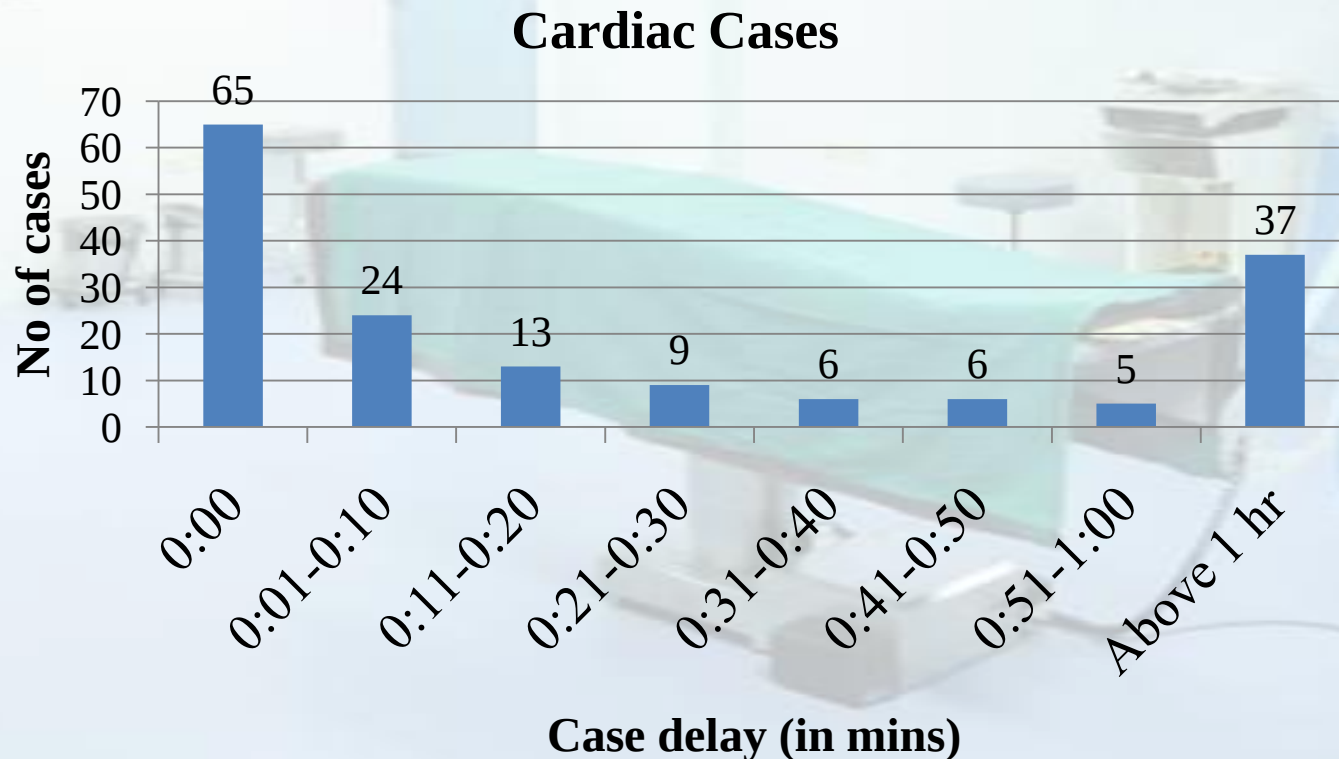
Cause and Effect Diagram (Fish Bone Diagram)





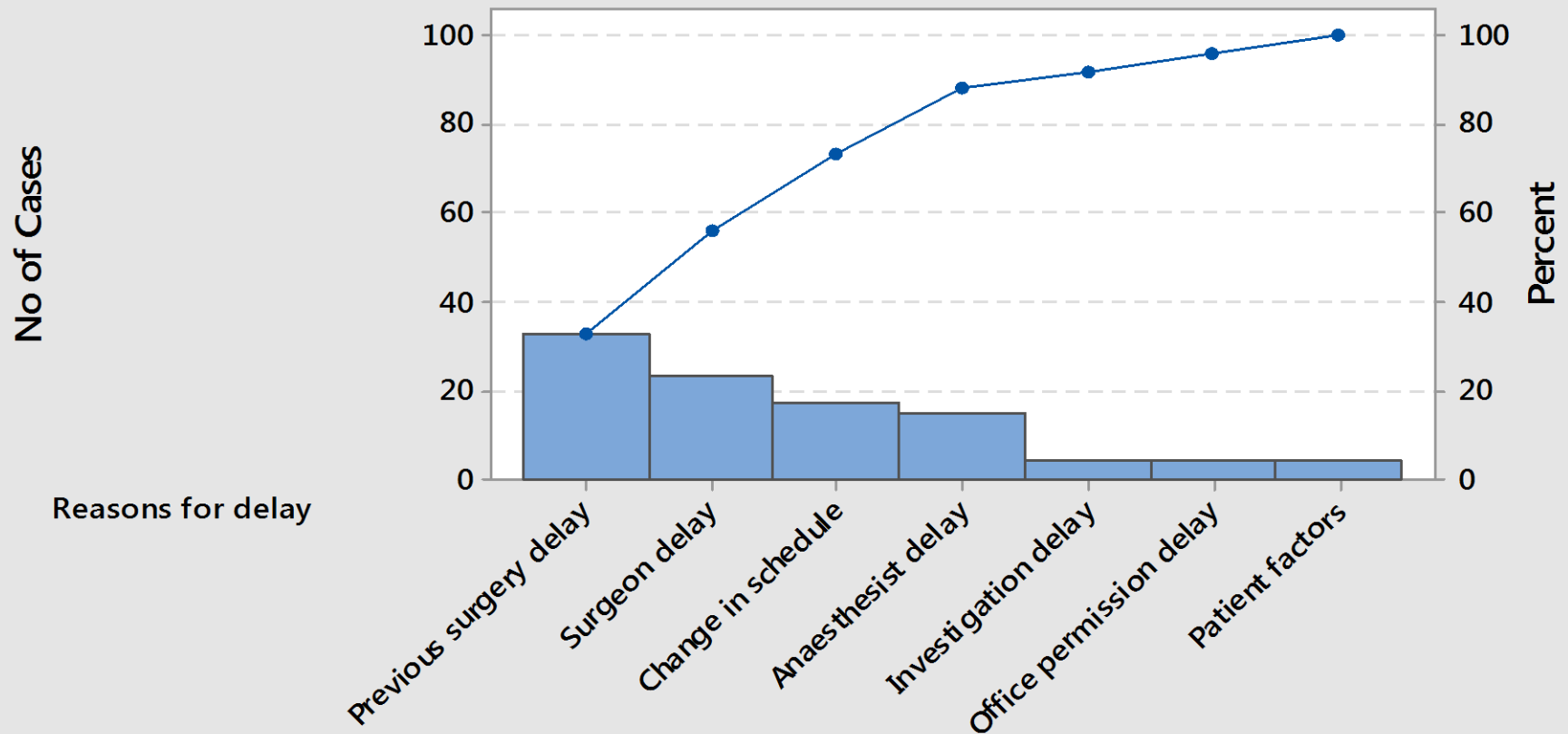
Cardiac Cases

- Total No of Cases:165
- No of cases started on scheduled time: 65 (39%)
- No of cases delayed: 100(61%)
- Average case delay:52 minutes



Cardiac Cases Delay (Pareto Analysis)

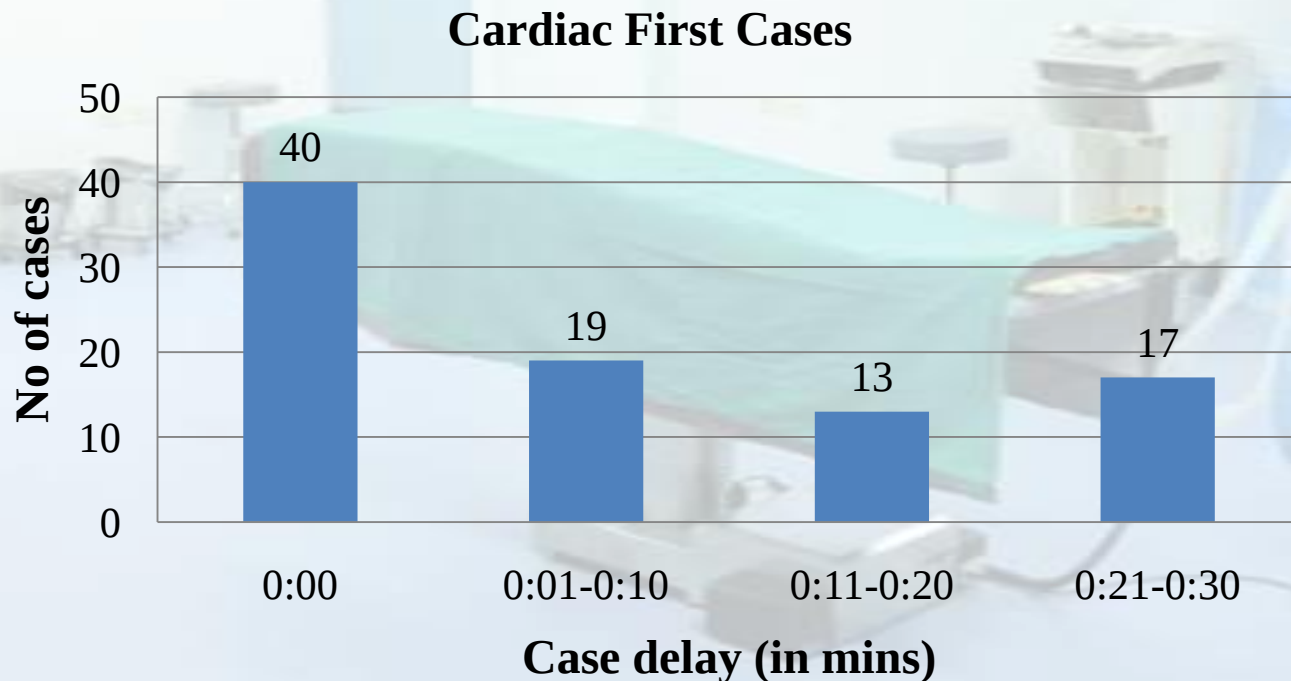
Cardiac Case



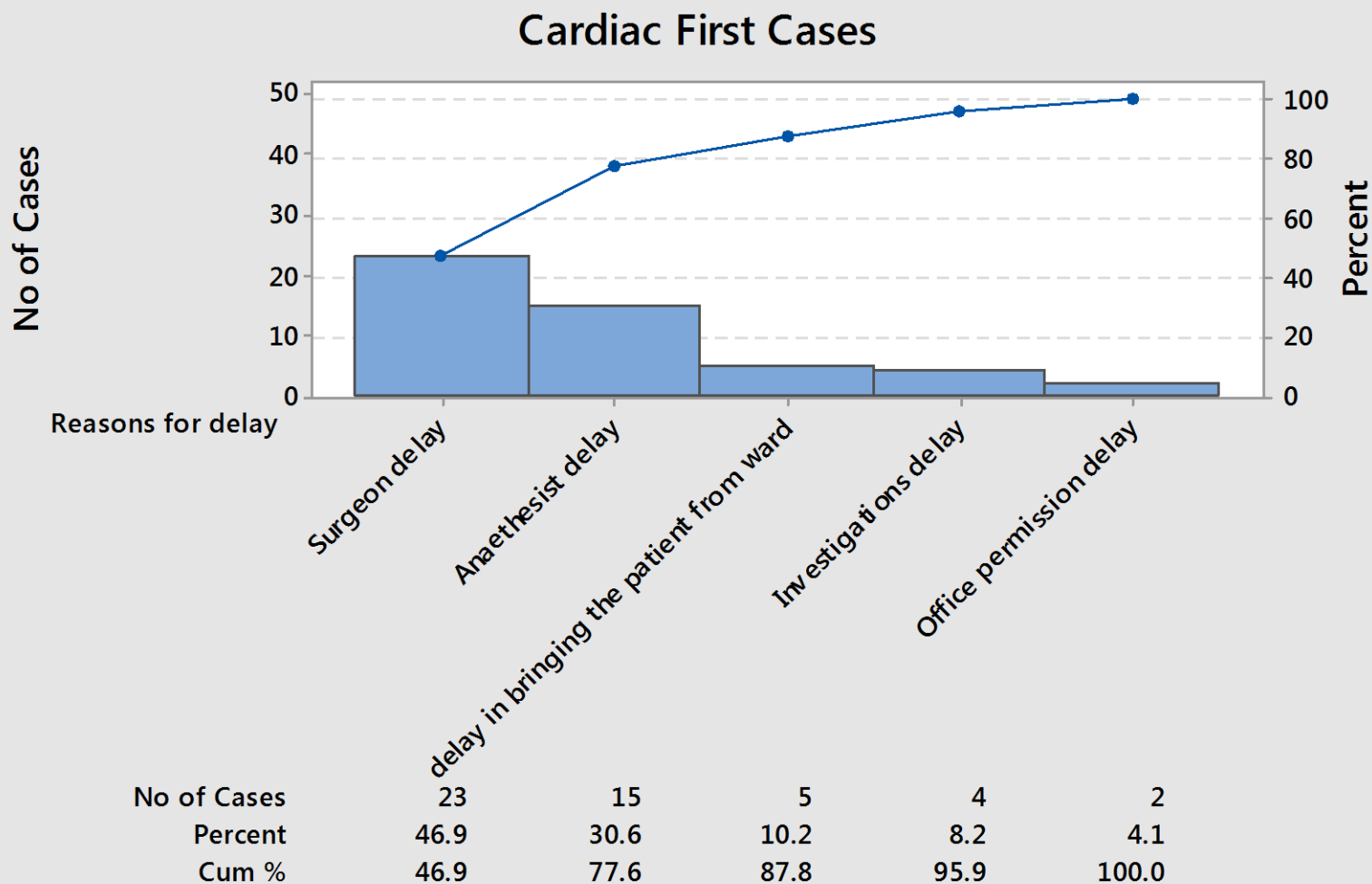
No of Cases	33	23	17	15	4	4	4
Percent	33.0	23.0	17.0	15.0	4.0	4.0	4.0
Cum %	33.0	56.0	73.0	88.0	92.0	96.0	100.0

Cardiac First Cases

- Total No of Cases:89
- No of cases started on scheduled time: 40(45%)
- No of cases delayed: 49(55%)
- Average first case delay:19 minutes

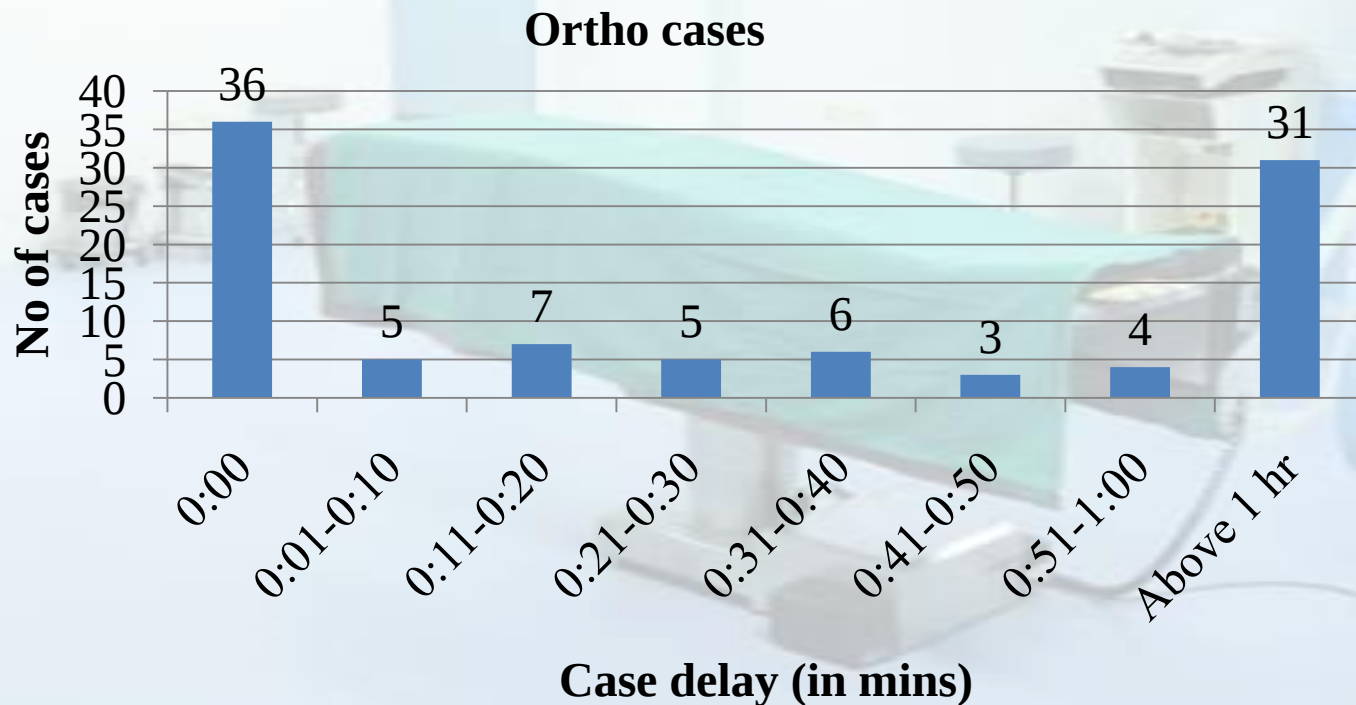


Cardiac First Case Delay (Pareto Analysis)

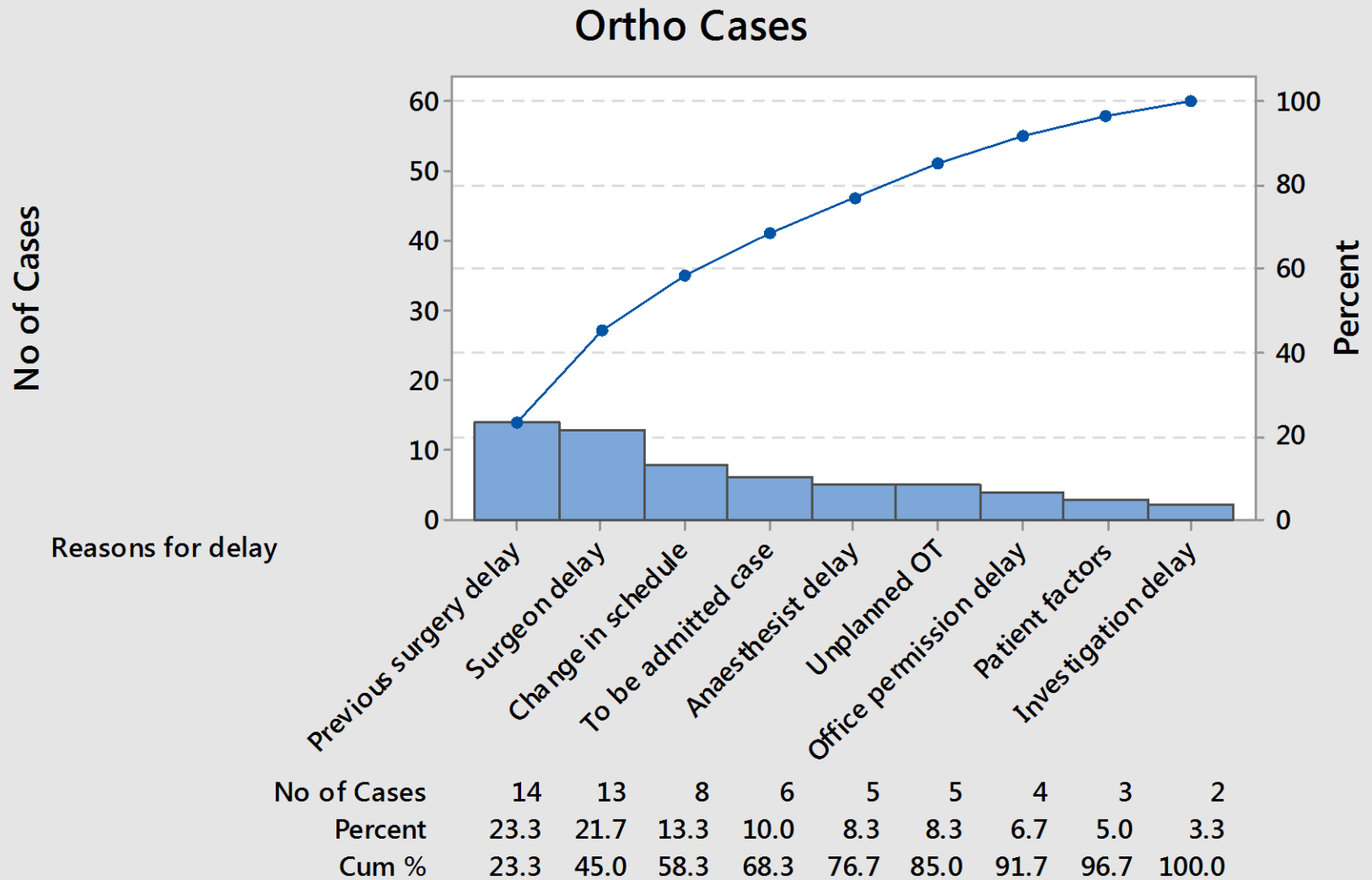


Ortho Cases

- Total No of Cases:97
- No of cases started on scheduled time: 36 (37%)
- No of cases delayed: 61(63%)
- Average case delay :48 minutes

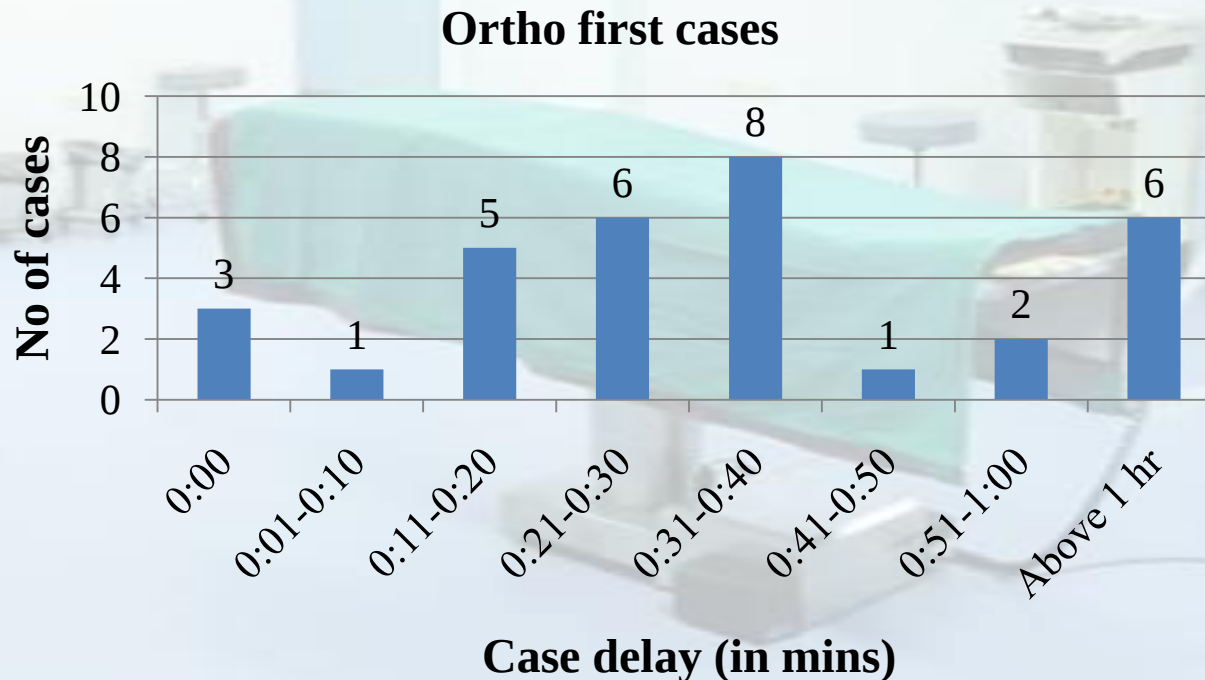


Ortho Case Delay (Pareto Analysis)

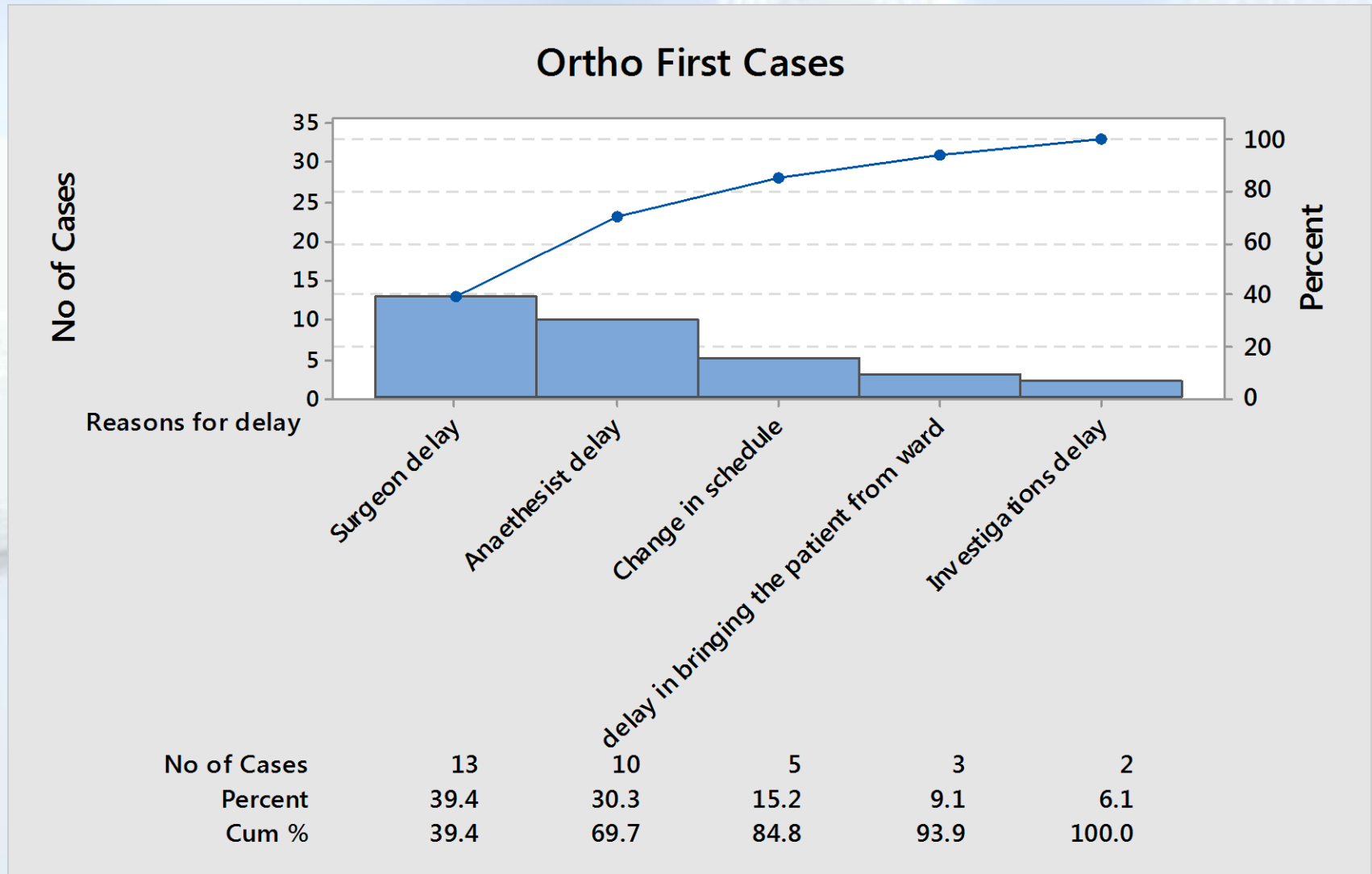


Ortho first Cases

- Total No of Cases:35
- No of cases started on scheduled time:3 (9%)
- No of cases delayed: 32(91%)
- Average first case delay:39 minutes

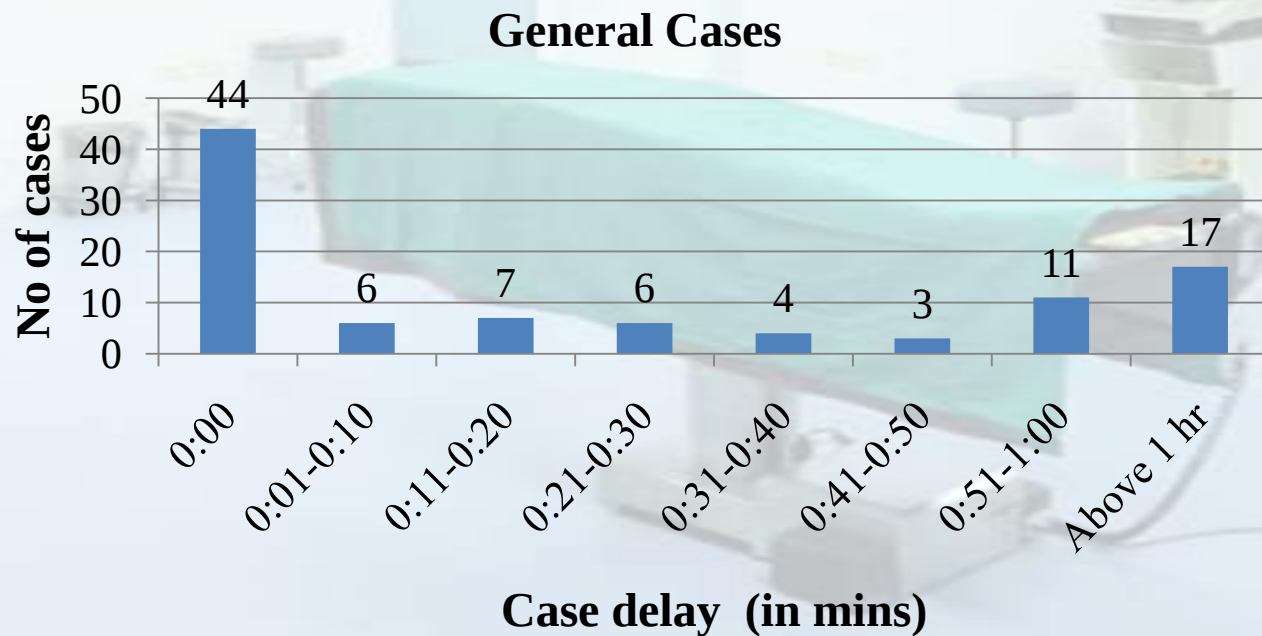


Ortho First Case Delay (Pareto Analysis)



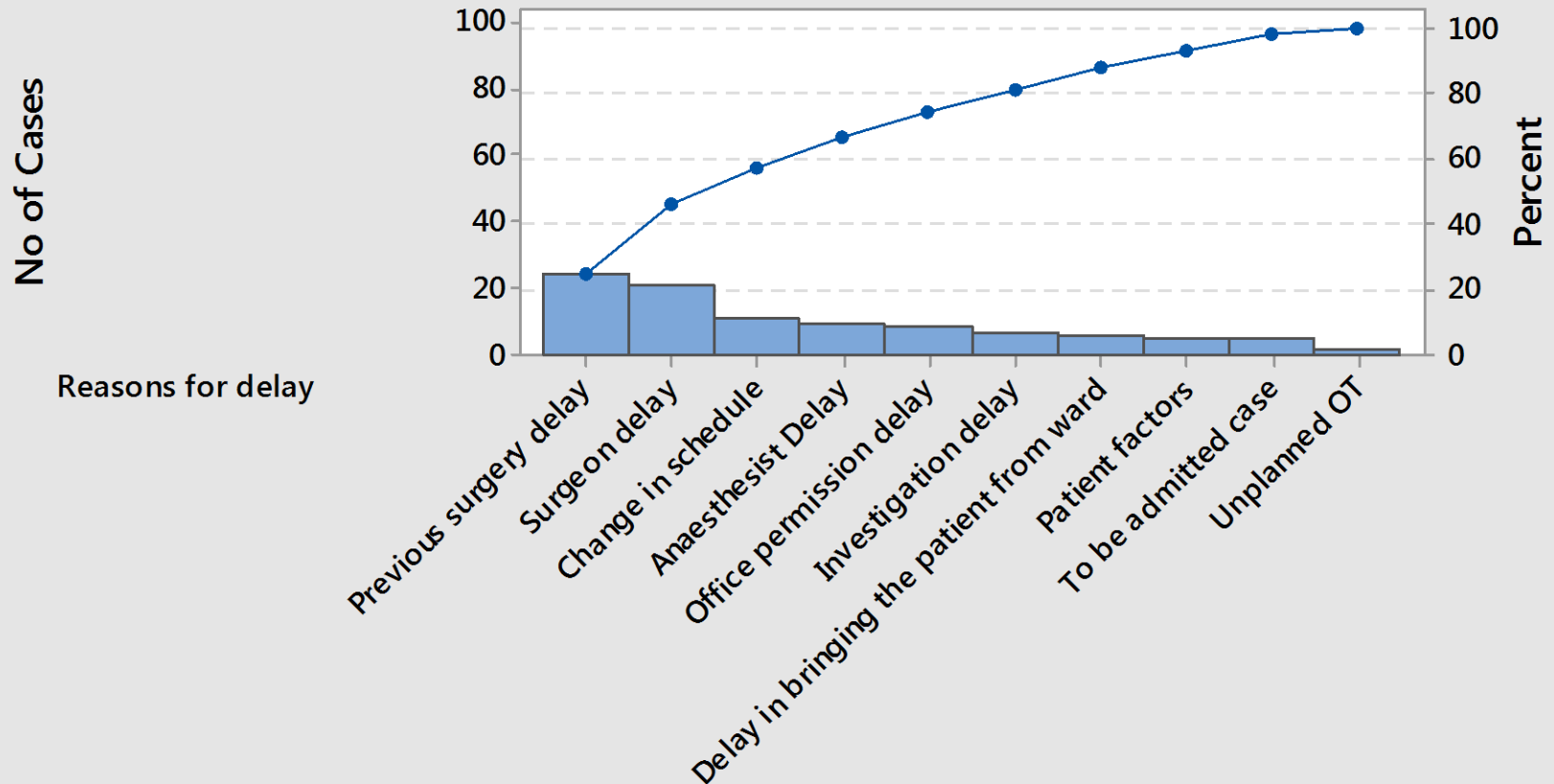
General cases

- Total No of Cases:142
- No of cases started on scheduled time:44(31%)
- No of cases delayed:98(69%)
- Average General Case delay:40 minutes



General Case Delay (Pareto Analysis)

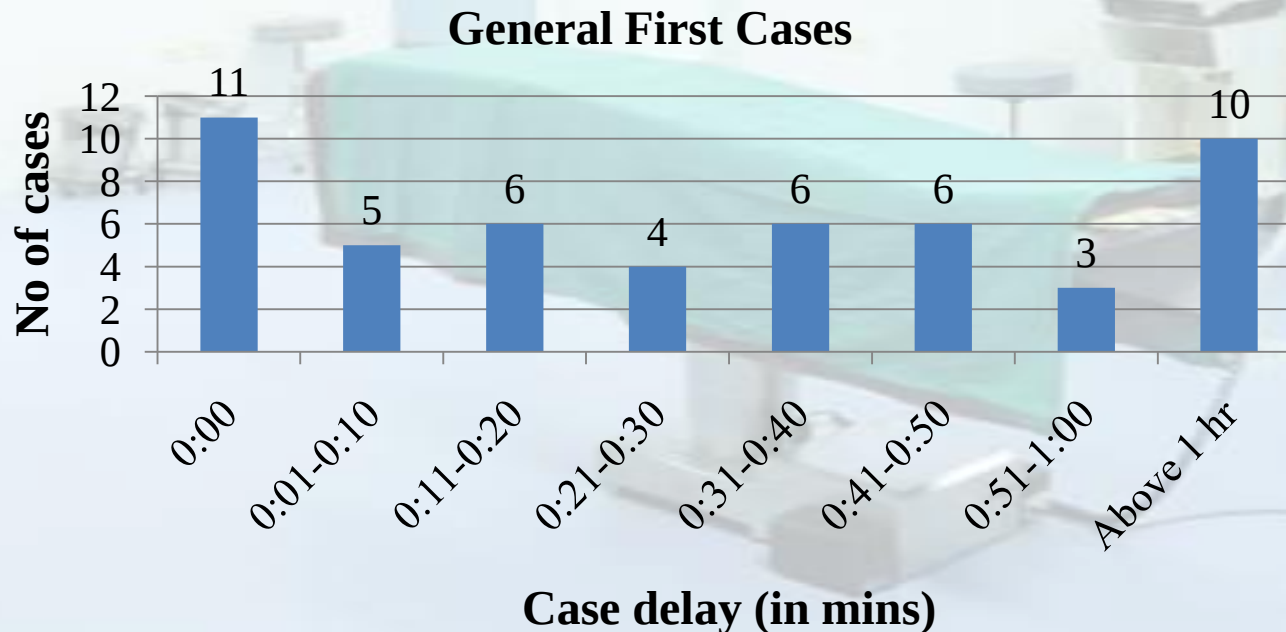
General Cases



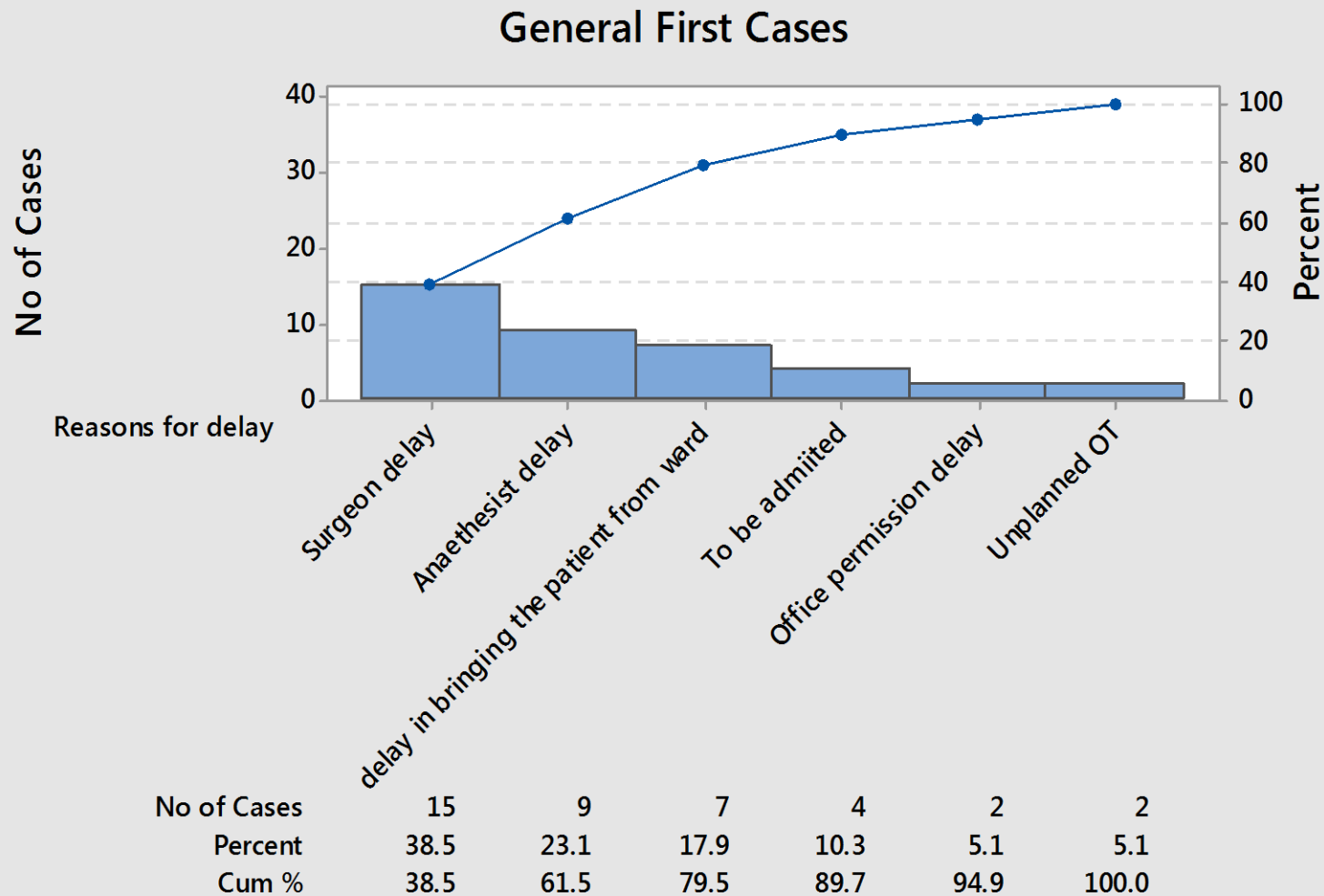
No of Cases	24	21	11	9	8	7	6	5	5	2
Percent	24.5	21.4	11.2	9.2	8.2	7.1	6.1	5.1	5.1	2.0
Cum %	24.5	45.9	57.1	66.3	74.5	81.6	87.8	92.9	98.0	100.0

General First Case

- Total No of Cases:51
- No of cases started on scheduled time: 11(22%)
- No of cases delayed: 40(78%)
- Average General First Case Delay:36 minutes



General First Case Delay (Pareto Analysis)



Other issues related to Operation Theatre

- **Pre anaesthesia check** up not done in 57% of cases (i.e. 230 cases out of 404 cases)
- **Incomplete site marking** form which is being filled in Operation theatre occurs in 55% of cases (i.e. 53 cases out of 97 cases)
- Allocated nurses do not accompany patients during his/her transfer to OT recovery.
- Operation theatre case list is not prepared till 6pm in the evening

PHASE IV: Improve

- All the cases or surgery should be started on the scheduled time so as to reduce the frequency of previous surgery delay which occurs due to the ripple effect of first cases. A combined effort of medical team is required which includes both surgeons and anesthetists
- Patient from the ward should be called an hour before the scheduled time of surgery.
- To be admitted cases should not be posted as first case and they should be posted as second case.
- All surgeons who have the OPD timings on the same day of the surgery should scheduled their case with the gap of 30 minutes between the finishing time of OPD and scheduled time of the surgery so as to prevent change in schedule.

- All the investigations of the admitted cases should be done one day prior to surgery.
- In case of to be admitted patients all the investigations should be done on OPD basis.
- Operation theatre case list should be prepared till 6pm in the evening so that it can be send to wards and other departments
- Confirmation for the Implants one day prior to surgery
- No two surgeries which requires same kind of instruments should be scheduled back to back and should be scheduled alternatively
- OPD basis PAC should be done and for the admitted cases PAC should be done one day prior to surgery
- Regarding office permission delays, a protocol can be initiated

Surgeon decides the case for next day and informs
RMO/Nursing/Ward coordinator

Ward coordinator informs Billing for clearance.
(Last call 4 PM)

Billing department calls up OT coordinator and conveys the
clearance or refusal. Last call for OT booking: 5PM

if clearance
is received
by 5 PM

YES

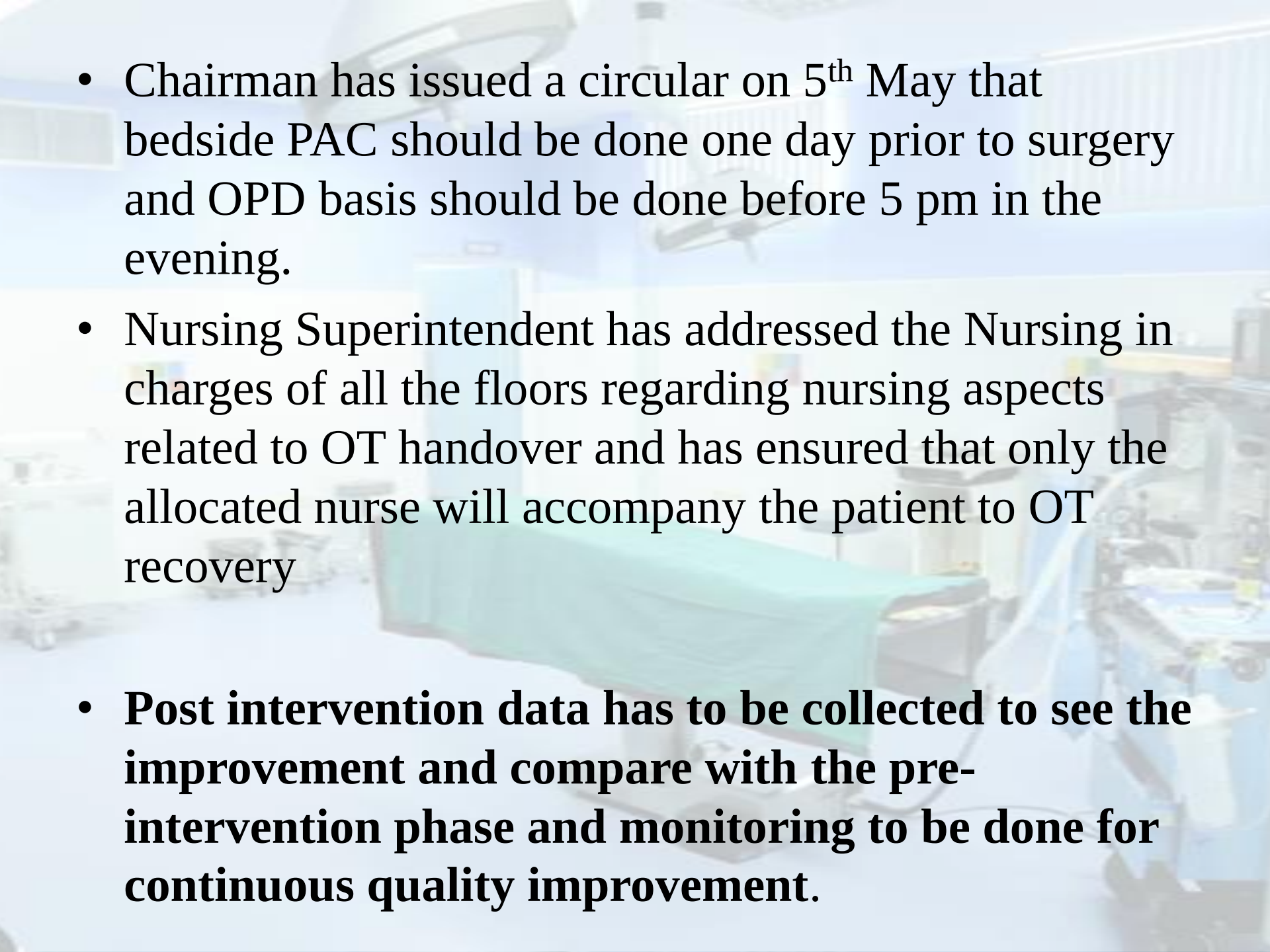
OT coordinator will
book the OT and
inform the surgeon
and all concerned
staff so that the
patient is ready for OT
the next day.

After 5 PM, the OT will be offered to any Surgeon with pending cases

PHASE V: Control

Implementation done on 5th May 2015 onwards:

- All the surgeries or cases have started scheduling at 8:00 am as before it was scheduled at 9:00 am.
- OT coordinator have started calling the patient from their respective wards one hour before the scheduled time of the surgery so that they can reach the OT recovery atleast half an hour before the scheduled time of surgery.
- To be admitted cases are not posted as the first case of surgery in Operation theatre

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- Chairman has issued a circular on 5th May that bedside PAC should be done one day prior to surgery and OPD basis should be done before 5 pm in the evening.
 - Nursing Superintendent has addressed the Nursing in charges of all the floors regarding nursing aspects related to OT handover and has ensured that only the allocated nurse will accompany the patient to OT recovery
 - **Post intervention data has to be collected to see the improvement and compare with the pre-intervention phase and monitoring to be done for continuous quality improvement.**

A photograph of an operating room with blue walls and a surgical table covered in a green cloth. Two large surgical lamps are hanging from the ceiling. The text "THANK YOU" is overlaid in the center.

THANK YOU