

A Study On Implementation of Lean Six Sigma In Radiology Department

**By :
Dr. Neha Raisane
MBA – HM 19**

INTRODUCTION

Radiology represents a branch of medicine that deals with radiant energy in the diagnosis and treatment of diseases. This field can be divided into two broad areas – diagnostic radiology and interventional radiology.

In Diagnostic radiology a variety of imaging techniques such as X- Ray, Ultrasound, Computed tomography, Magnetic resonance Imaging (MRI) are used to diagnose or treat diseases.

Interventional radiology is the performance of (usually minimally invasive) medical procedures with the guidance of imaging technologies.

LITERATURE REVIEW

- Lean is gaining steam in the healthcare and imaging world.
- Radiology is a good fit for the lean tools and approach, (Jonathan B. Kruskal, MD, PhD, radiology professor at Harvard Medical School),July 2014 in SCBT- MR Newsletter.
- Karstoft and Tarp(March ,2011)have the following outcomes of working with Lean –
 - a) decreasing waiting time for the patients
 - b) optimised workflow during the examinations
 - c) an increased number of patients processed during a working day with only a marginal increase in costs
 - d) a higher productivity and more time gained for the staff for education, etc.

RATIONALE

- Radiology department is a high revenue generating department provided it functions properly and patient satisfaction can also be very high if high quality services are provided.
- Lean six sigma increases patient satisfaction as well as reduces errors by improving the processes.

OBJECTIVES

- To identify the gaps between the current state and ideal state as per the internal benchmarks set by the organisation.
- To suggest the solutions for the problems and implement it.

METHODOLOGY

Research design- Descriptive, Observational research design

Study time line- Two and half months

Area of Study- Narayana multispecialty hospital, Ahmedabad

Study Population - Patients who have availed the radiology facilities

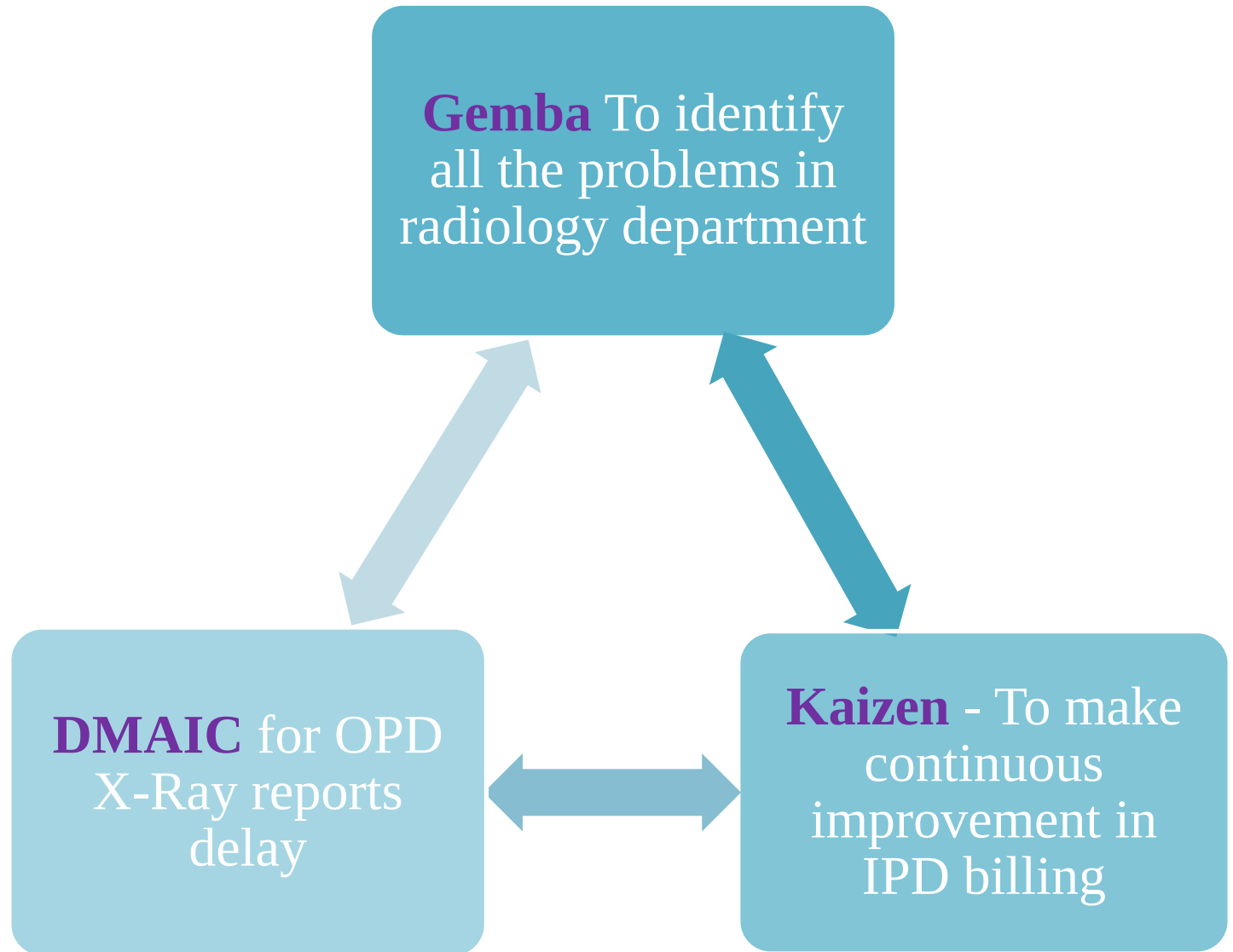
Sample size – Process documentation and a small sample as per the tool used.

Data collection- **In Gemba**- by observing the patients from the registration counter to the radiology department till they get their reports and leave the department. Whole process is observed.

In DMAIC- Turnaround time for 100 patients (Phase 1) and 100 patients(Phase 2) for OPD X-ray patients.

In Kaizen – Process is observed for IPD Patients and data tracked through IPD audit Form for 88 patients.

TOOLS USED:



ABOUT THE TOOLS

Lean tools used in this study are:

I. Gemba-Literally translated, “*Gemba*” means ‘the real place’. In lean, this means the place where work is actually being done or value is being created.

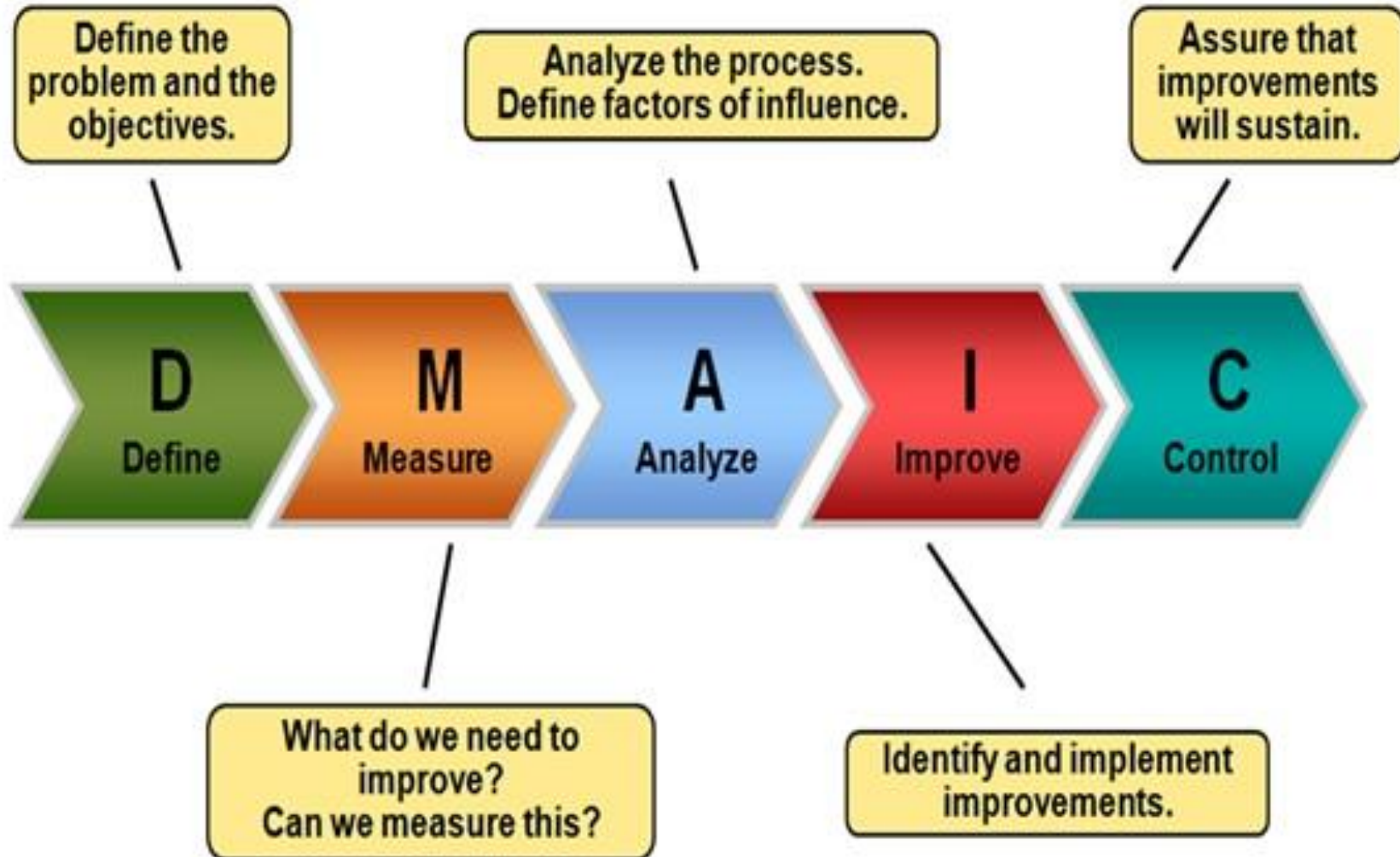
- This concept stresses:

1. Observation: In-person observation, the core principle of the tool
2. Value-add location: Observing where the work is being done
3. Teaming: Interacting with the people and process for improvement.

- After observing the processes in the radiology department – evaluation of work environment, interaction with the staff, safety hazards and inefficiencies were identified as follows;

DATA ANALYSIS

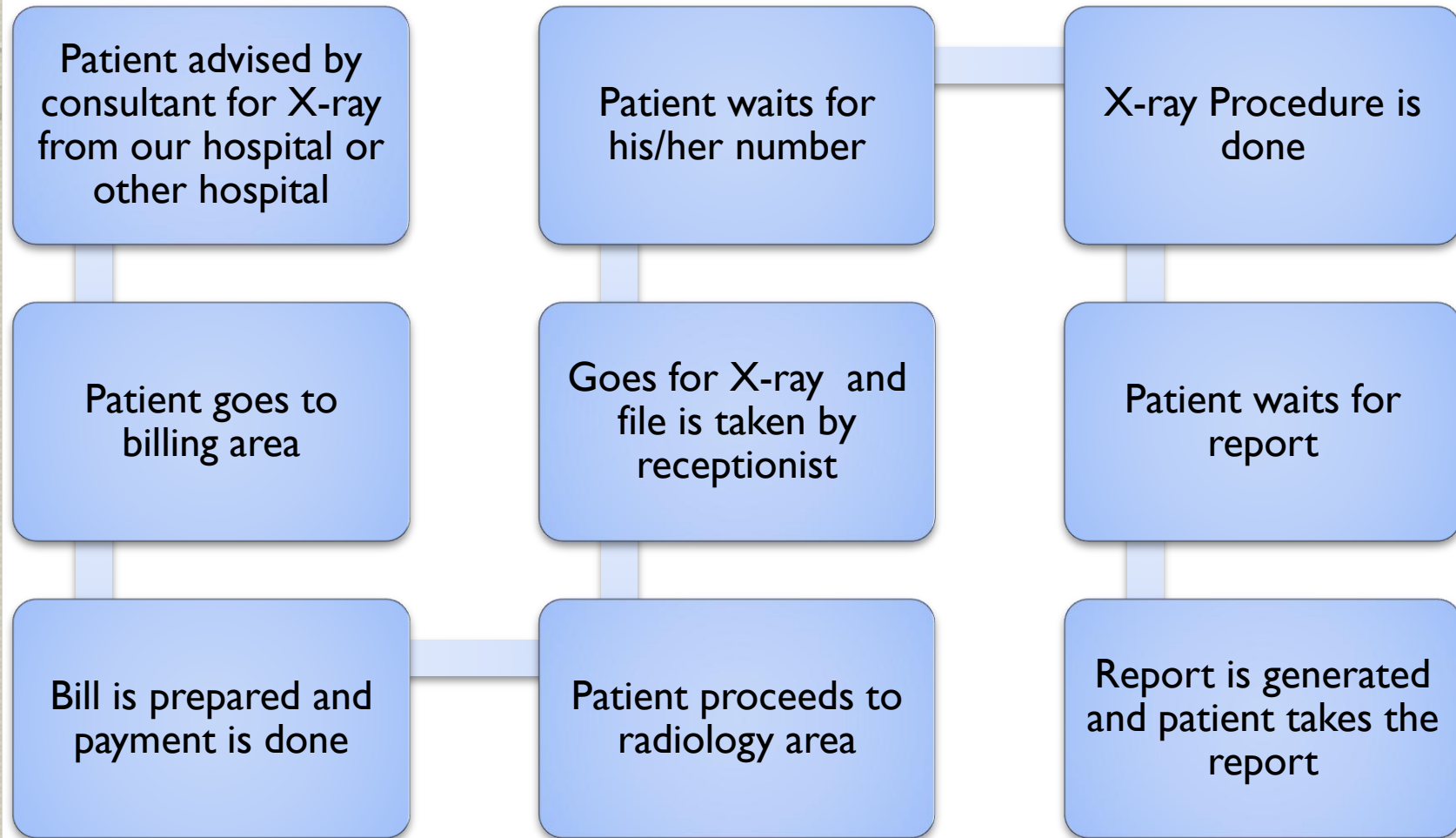
S.No.	Current State	Ideal State
1	For X-ray OPD patients reporting time was very long	As per the internal benchmarks set by the organisation, the reporting time for X-ray should be 60 minutes.
2	Billing error for IPD patients who are beneficiaries of radiology procedures	Every procedure done in any department should be entered in the patient bill and it shall be charged.
3	Patient feel disoriented when they visit radiology department	Signages and Guide system should be proper in the hospital.
4	Patient safety- not ensured	Double lock and key should be present and all the signages should be clear so that patient does not enter danger zones.
5	TLD badges, lead shield and lead apron used sometimes	TLD badges and Lead apron lead shield should be used regularly.



PHASE I - DEFINE

- The scope of problem is defined.
- Defining the problem in quantifiable terms and determining how the performance is measured.
- The main problem focused here is delay in reporting time in X-ray reports.
- It is important to follow the internal benchmark so as to increase the patient satisfaction.
- Method: Observational study
- Tool: Process mapping

CURRENT PROCESS IN RADIOLOGY



PHASE II - MEASURE

- This is a phase of data collection.
- This measurement will provide the current or the baseline data before any intervention made for improvement.
- Method: Time motion study
- **Total cycle time-** The time at which the patient has entered the radiology department and has given his or her file up to the time in which he gets his/her reports.
- **Standard reporting time-** The time at which the study is completed up to the time he gets his reports(as per internal benchmarks reporting time should be 60 minutes.)

Turnaround Time for X-ray

- Sample size – 100 (Phase I) 100 (Phase II)
- Exclusion criteria- IPD patients and Health check up patients.
- The following data is for 72 patients:
 - **Waiting time -00:15:18**(Fifteen minutes)
 - **TAT (reporting time) -1:47:00**(one hour forty seven minutes).
- For 28 patients the report is delayed more than one day.

PHASE III - ANALYZE

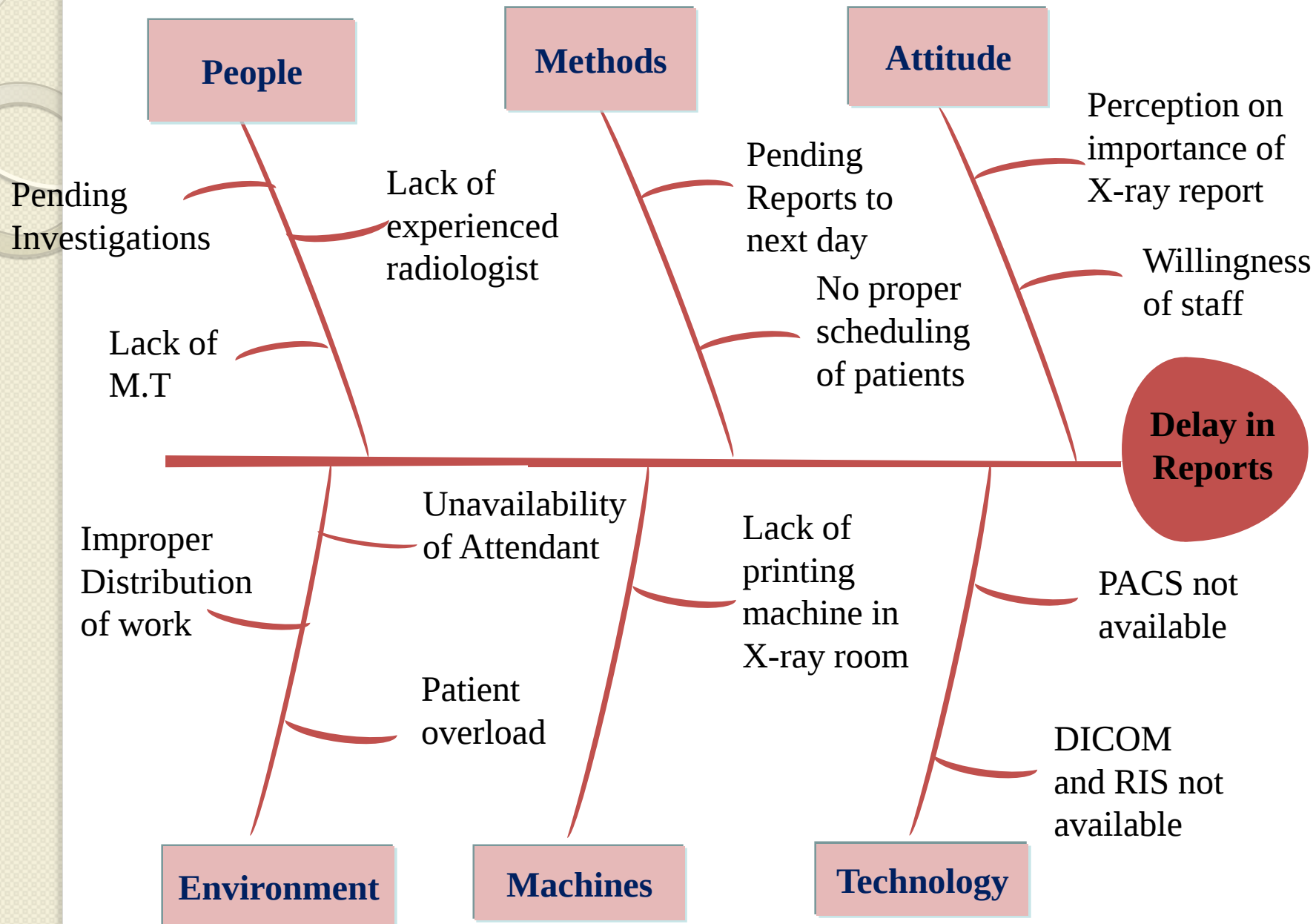
- This is to analyze the current performance both qualitatively and statistically for identifying the root cause of delay in reports of X-ray.

- Method used:

Identifying cause for delay: **Fish bone analysis**

A fishbone diagram, also called a cause and effect diagram or Ishikawa diagram, is a visualization tool for categorizing the potential causes of a problem in order to identify its root causes.

Fish Bone Analysis



PHASE IV - IMPROVE

- **For Radiologists**

1. A duty roster can be made for doctors so that one person shall be assigned for X-ray reports.
2. Proper scheduling should be done for all the procedures-USG,MRI,CT,X-ray separate number should be given to each patient turn wise.
3. Hiring of one full time experienced radiologist and one Medical transcript.

- **For patients**

1. Proper signage should be there and one full time attendant should be present to guide all the patients.
2. A series of informational handouts should be given to the patients regarding the procedure as many patients are unaware of the reason for scheduled procedures, or what they were supposed to do or not do leading up to the day of their procedures.

- **Advanced Technology**

1. PACS,RIS and DICOM should be implemented.
2. One more computer printing machine required in X-ray room.

PHASE V - CONTROL

- This phase deals with the measurement of impact after improvement interventions and to ensure that gains obtained are sustained for a long time.
- It includes the continuous monitoring after improvements are implemented.
- In this study this phase is not included because of limited time.

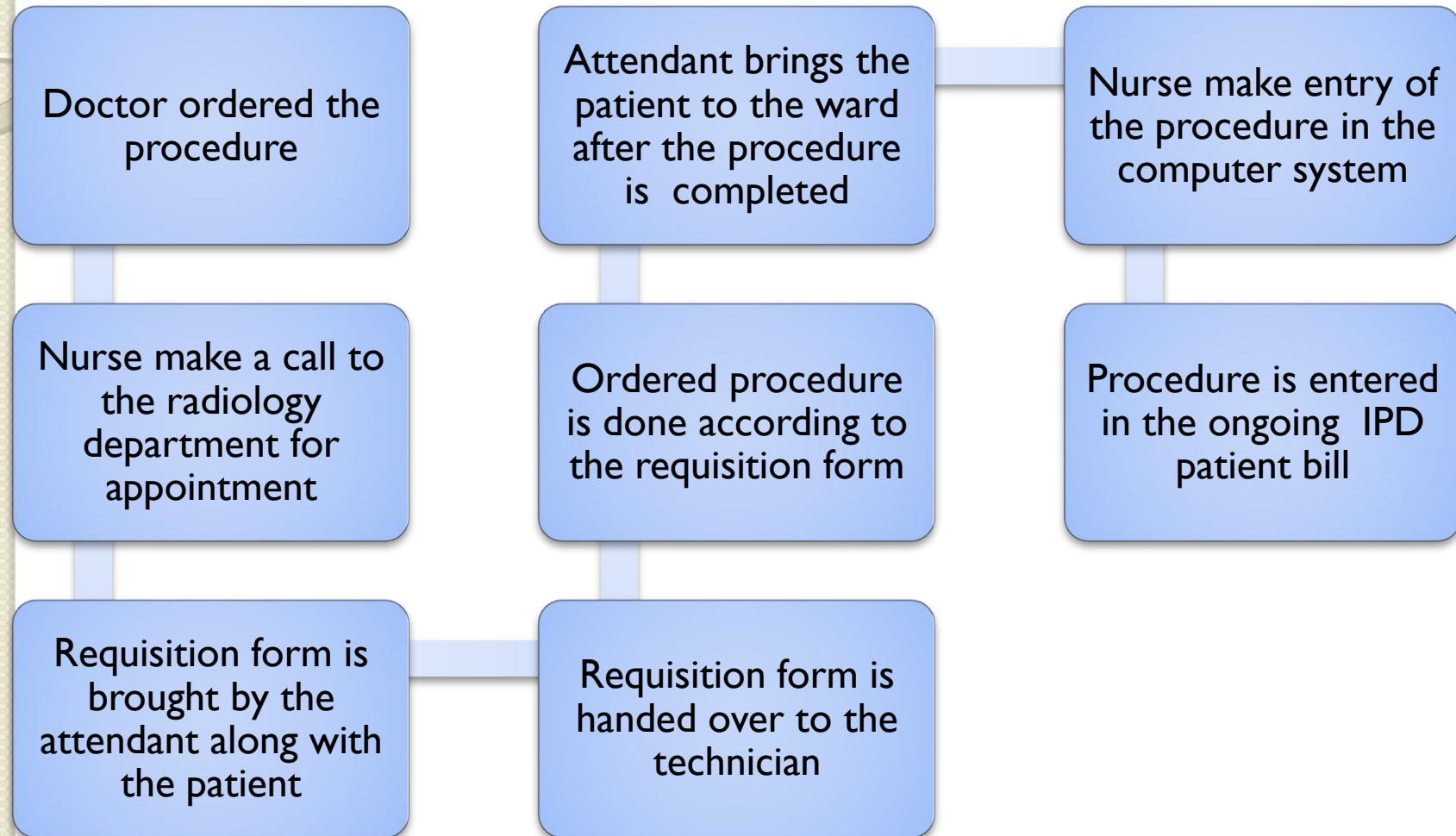
KAIZEN

Kaizen means “continuous improvement” Kaizen aims to eliminate waste in all systems of an organization through improving standardized activities and processes.

The continuous cycle of Kaizen activity has seven phases:

- 1) Identify an opportunity- Improvement in IPD Billing process
- 1) Analyze the process- Current Process of IPD billing is observed
- 2) Develop an optimal solution- IPD audit form
- 3) Implement the solution- IPD audit form implemented
- 4) Study the results- The results were checked after implementing IPD audit form and the billing errors were detected.
- 5) Standardize the solution
- 6) Plan for the future

CURRENT PROCESS(For IPD Patients)



IPD AUDIT FORM

X- Ray/USG/CT Scan/MRI AUDIT FORM

Date:

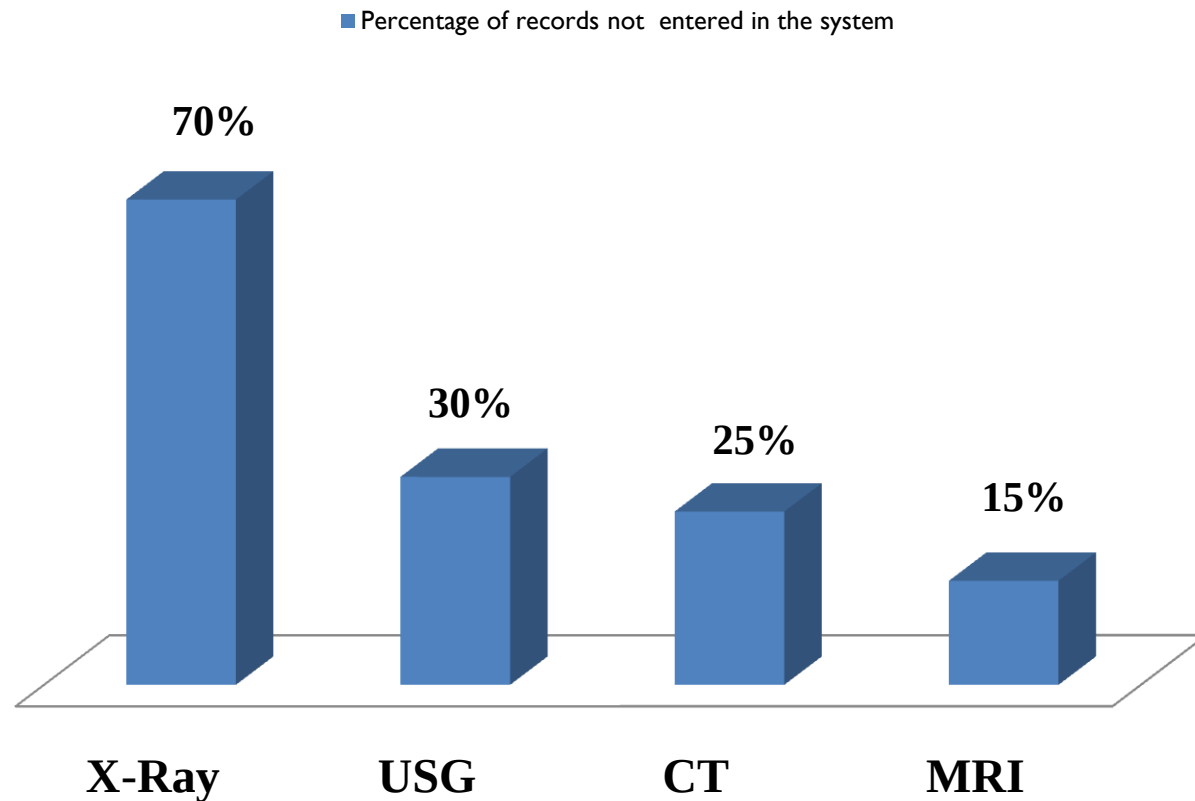
S. No.	MRN	NAME	IPD	PROCEDURE NAME
1				
2				
3				
4				
5				

Employee ID._____

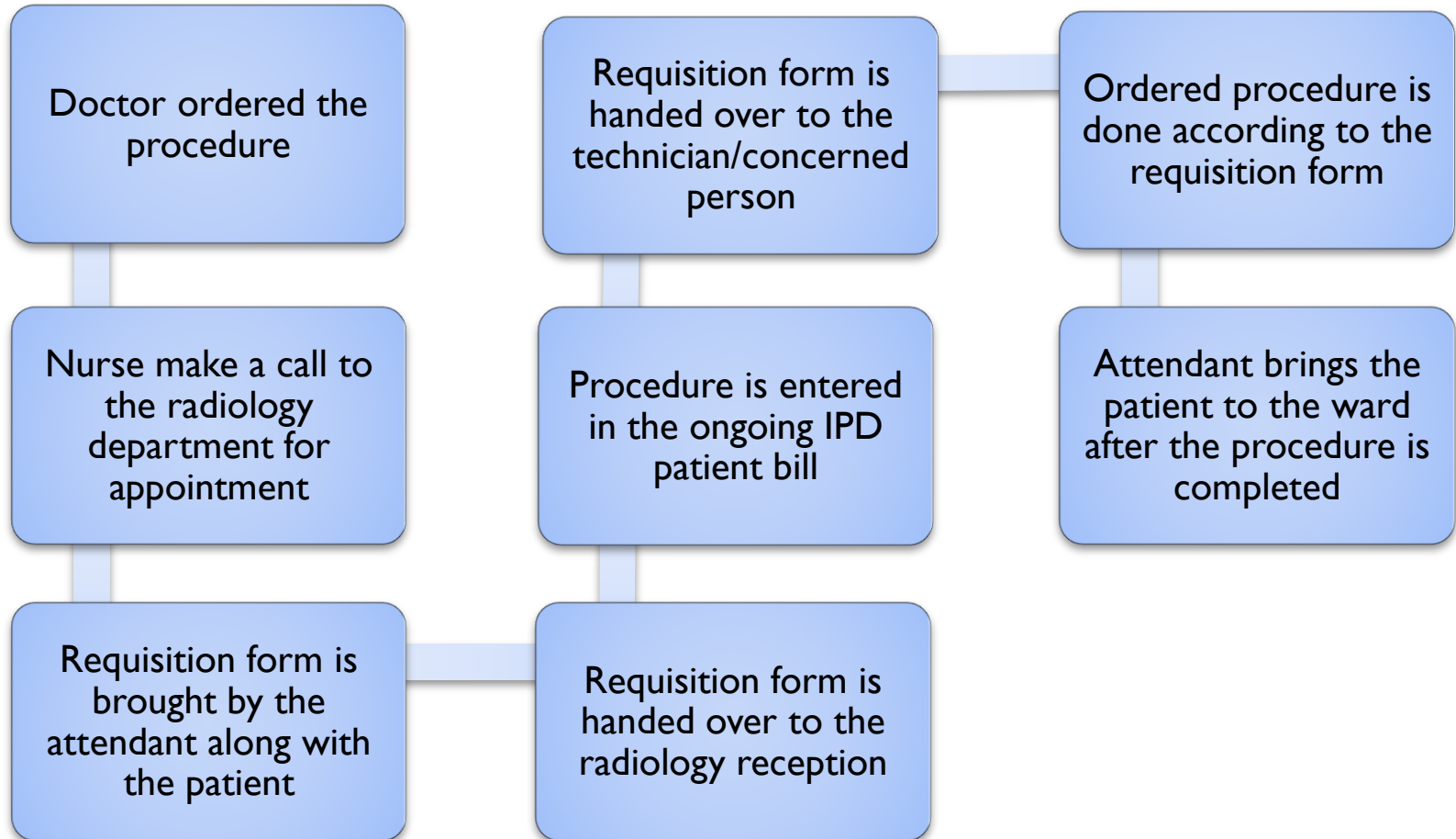
Auditor Sign._____

Study the Results(Records Tracked through IPD Audit Form)

Percentage of records not entered in the system



Process plan for future(For IPD Patients)

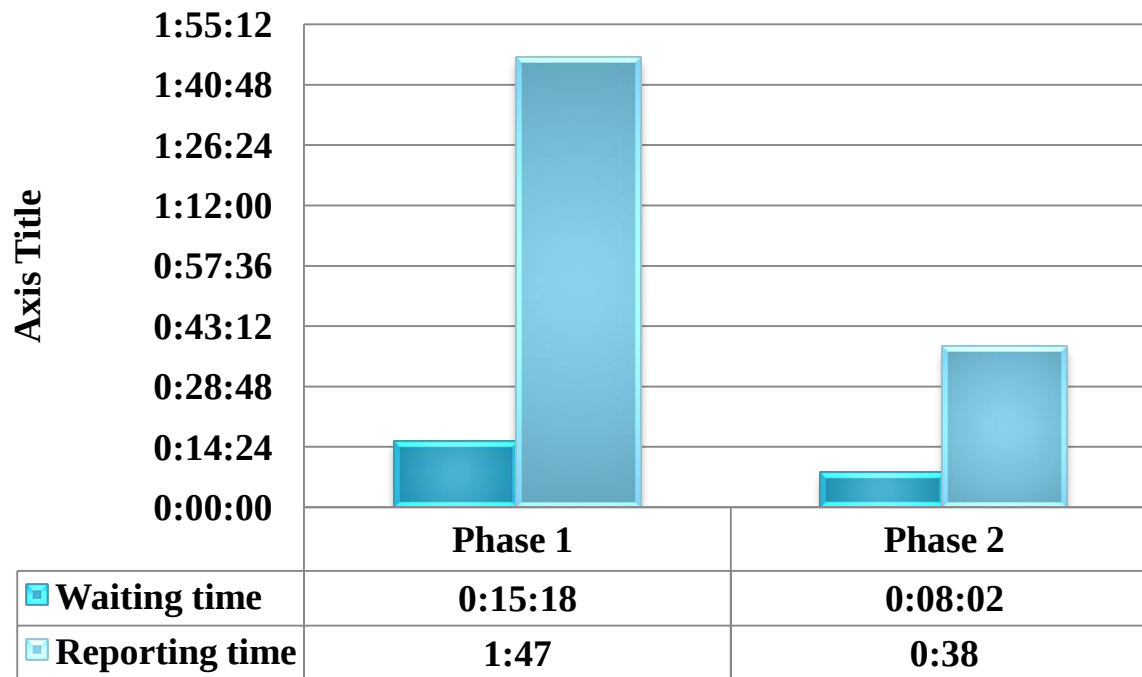


PRE AND POST STUDY FINDINGS

Various Findings From the tools used are:

1. Gemba- Process was observed and problems were identified which further suggested the use of another lean tools – DMAIC and Kaizen.
2. DMAIC-After implementing the DMAIC two phases were compared and it was found that there was improvement in reporting time

Comparison of Two Phases



FINDINGS

3.Kaizen-

It has been shown that 70% X-ray records, 30% USG records, 25% CT scan and 15 % MRI records were missed earlier and this data is now tracked through IPD audit form

CONCLUSION

- Radiology is part of the service industry and as a service provider one needs to understand quality and delivery of service. This includes knowledge of customer service, customer satisfaction and all its related issues as well as quality assurance and improvement issues

.

- Lean Six sigma if applied can improve all the processes and can eliminate all the errors in radiology department and increase the patient satisfaction.

SUGGESTIONS

- **For Patient safety**

1. Double lock should be present in MRI room and keys should be present with the staff.
2. A signage in Gujarati language for patients to understand the risk of entering the MRI room without precautions.

- **For Patient Overload**

1. A schedule can be maintained for OPD and IPD patients as both the IPD and OPD patients appear simultaneously in the radiology department.

- **For employee safety**

1. TLD badge delay -This form can be kept with the HR department so that as soon as any new employee comes – he/she can fill the form or it should be mailed immediately from RSO to the new employee in radiology department.

- **Separate billing Counter**

1. A separate billing counter can be made for the radiology department to ensure minimum billing errors.

*Thank
you*

