

ASSESSING PATIENT SAFETY IN MRI PROCEDURE: CAHO VALIDATED PREM TOOLS

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Snehal

Under the Supervision and Guidance of

Dr. Sanjay Gupta

2025



**ETERNAL
HOSPITAL**



An Affiliate of
**Mount
Sinai
New York**



Ref: EHCC&RI/HR/Office/12159

Date: 07-Jun-2025

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Snehal student of IIHMR University, Jaipur has completed her internship at "Eternal Hospital, Jaipur" from 17th Mar'25 to 7th Jun'25.

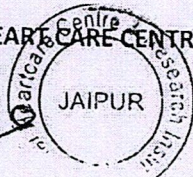
Eternal Heart care Centre & Research Institute, Jaipur is a 225-bedded multispecialty Hospital.

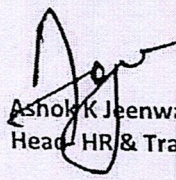
During this period, she was inducted, oriented and trained in the working and processes of Quality Department under the guidance of Dr Ruchi Khanna.

During the period we found her sincere, intelligent, obedient and hard working.

We wish her all the best for future endeavours.

For ETERNAL HEART CARE CENTRE AND RESEARCH INSTITUTE, JAIPUR




Ashok K Jeenwal
Head HR & Training

(A Unit of Eternal Heart Care Center & Research Institute Pvt. Ltd.)

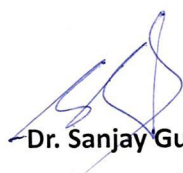
3A, Jagatpura Road, Near Jawahar Circle, Jaipur - 302017, Rajasthan (India)
Phone : +91-141-5174000, 2774000, Website : www.eternalhospital.com

CIN No. U85110RJ2007PTC023653

Certificate from Faculty Guide and School Dean

CERTIFICATE

This is to certify that dissertation title **Assessing Patient Safety in MRI Procedure: CAHO Validated PREM Tools** is a record of the research work undertaken by **Snehal** in partial fulfilment of the requirements for the award of the degree of MBA Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

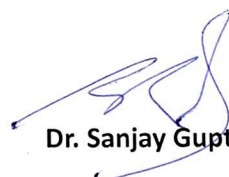
A blue ink signature of Dr. Sanjay Gupta, consisting of stylized, overlapping loops and lines.

Dr. Sanjay Gupta

Faculty Guide

IIHMR University, Jaipur

Date: 09-06-2025

A blue ink signature of Dr. Sanjay Gupta, consisting of stylized, overlapping loops and lines.

Dr. Sanjay Gupta

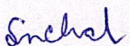
School Dean

IIHMR University, Jaipur

Date: 09-06-2025

DECLARATION BY STUDENT

I hereby declare that this dissertation titled "**Assessing patient safety in MRI procedure: CAHO validated PREM tools**" is the Bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.


(Signature)

Name of Student: Snehal

Date:

ABSTRACT

INTRODUCTION:

Magnetic Resonance Imaging (MRI) is a vital diagnostic modality in modern medicine. MRI scans are commonly used for diagnosis, but they still carry certain safety risks such as strong magnetic fields, contrast agents, and patient discomfort or anxiety. Ensuring patient safety and comfort is crucial for optimizing MRI procedures. Despite technological advances, patient-related safety incidents can occur due to insufficient communication or poor procedural awareness. This study aims to evaluate the effectiveness of pre-procedural communication and preparedness from the patient's perspective using a CAHO-validated Patient-Reported Experience Measure (PREM) tool.

OBJECTIVES:

- Assess patient awareness about MRI procedures
- Evaluate the effectiveness of communication between healthcare providers and patients.
- Ensure informed consent and understanding of safety precautions.
- Improve patient preparedness and comfort during the MRI process
- Enhance post-scan understanding and expectations.

METHODOLOGY

- The study was carried out over two months in the Radiology Department of EHCC Hospital, Jaipur.

A total of 100 patients, aged 18 and above, who were undergoing MRI scans and gave their consent, were included.

- Patients in emergencies, under sedation, or under the age of 9 were excluded.
- After the MRI procedure, each participant was asked to fill out a CAHO-approved PREM questionnaire to share their experience.
- . Data was collected using a standardized and CAHO-recommended MRI safety questionnaire, which includes 21 close-ended questions covering key domains like informed consent, allergy screening, contrast safety, metal screening, privacy, procedural awareness, and post-scan communication.

- Patients filled out the questionnaire post-procedure. Each response was recorded as “Yes,” “No,” or “Not Applicable.” The data was analysed using descriptive statistics to identify compliance trends and communication gaps.
- Graphs and charts were used to show patient satisfaction levels and pinpoint areas needing attention.

RESULTS

The analysis revealed excellent compliance (100%) in several critical areas such as informed consent, allergy history, removal of metallic items, and patient privacy. Patients were also well-prepared regarding scan instructions and availability of reports. However, major gaps were found in communication—only 20% of patients were informed about scan duration, and 70% received complete pre-scan screening. Post-scan hygiene was notably poor with only 40% observing handwashing protocols. While 85% of patients reported a comfortable experience, improvements are needed in managing noise, temperature, and continuous communication.

CONCLUSION

This study highlights significant variations in communication practices in MRI safety protocols. While certain areas such as consent, cost explanation, and basic procedural information are well-addressed, others like contrast side effects, noise expectations, and emotional preparedness are inadequately communicated. These gaps could impact patient comfort, compliance, and overall safety.

The findings underscore the importance of implementing a structured patient education checklist and enhancing staff training to ensure uniformity in MRI safety practices. Integrating this feedback mechanism into routine MRI protocols can serve as a continuous quality improvement tool to promote patient-centred care.

Keywords: MRI safety, patient feedback, CAHO PREM, communication, patient satisfaction

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude to my academic mentor, Dr. Sanjay Gupta, for their invaluable guidance, continuous support, and encouragement throughout the course of this study. Their expertise, insightful feedback, and unwavering patience have been instrumental in shaping the direction and quality of my dissertation.

I am deeply thankful to the faculty and staff of IIHMR University, Jaipur, for providing a conducive learning environment and the resources necessary for the completion of this research. A special thank you to Dr. Ruchi Khanna and Dr. Pracheesh Prakash Pandey, whose constructive criticism and motivation helped refine my work.

I would also like to acknowledge the participants/respondents whose input and cooperation were essential for my research.

To my family, I am forever indebted for their unconditional love, emotional support, and belief in my capabilities. Their constant motivation gave me strength during the most challenging phases of this journey.

Finally, I extend my heartfelt appreciation to my friends and peers who stood by me and contributed through thoughtful discussions, reviews, and encouragement.

This dissertation reflects the collective support and inspiration I have received from all these remarkable individuals.

TABLE OF CONTENTS

S No.	Topic	Page no.
1.	Abstract	1
2.	Acknowledgement	3
3.	List of figures	4
4.	List of tables	5
5.	List of abbreviations	6
6.	Chapter 1: Introduction	8
7.	Chapter 2: Review of Literature	14
8.	Chapter 3: Methodology	17
9.	Chapter 4: Results	22
10.	Chapter 5: Discussion	28
11.	Chapter 6: Conclusion	30
12.	Chapter 7: Recommendations	32
13.	References	34

LIST OF FIGURES

FIGURE NO	CONTENT
FIGURE 1	PRE SCAN EXPERIENCE
FIGURE 2	POST SCAN EXPERIENCE
FIGURE 3	CONTRAST AND NON-CONTRAST MRI

LIST OF ABBREVIATIONS

EHCC	Eternal heart care centre
MRI	Magnetic Resonance Imaging
OPD	Outpatient Department
PREM	Patient-Reported Experience Measure
CAHO	Consortium of Accredited Healthcare Organizations
PACS	Picture Archiving and Communication System
RIS	Radiology Information System
PCS	Patient care services
IPD	In – patient department

DISSERTATION REPORT

**Assessing patient safety in MRI procedure: CAHO
validated PREM tools**

CHAPTER 1:

INTRODUCTION

Medical imaging is a crucial component of the healthcare industry since it helps doctors identify, treat, and prevent diseases. A diagnosis must always be supported by medical imaging. An essential component of validating any diagnosis is medical imaging. Medical imaging is a crucial component of validating any diagnosis, in addition to medical knowledge and discernment, which forms the basis of health practitioners' diagnoses and conclusions.

Medical imaging MRIs and CT scans allow doctors to monitor the effectiveness of treatment and make necessary modifications. Medical imaging produces rich data that allows patients to obtain better, more comprehensive care. also assist with the problem's therapy and follow-up care.

Medical imaging is the use of technology to see the human body to diagnose, monitor, and treat medical problems. We are familiar with some of the several types of medical imaging that are used. Various imaging techniques include magnetic resonance imaging (MRI), computed tomography (CT), and positron emission tomography (PET).

1.1 Background of the Study

Magnetic Resonance Imaging (MRI) is a non-invasive diagnostic technique that has revolutionized medical imaging. Utilizing strong magnetic fields and radio waves, MRI provides detailed images of organs and tissues within the body. It is widely used in diagnosing neurological, musculoskeletal, cardiovascular, and oncological conditions. Despite its invaluable clinical utility, MRI procedures come with inherent risks and challenges, particularly related to patient safety, informed consent, and communication.

MRI safety is multifaceted. Patients may have metallic implants, pacemakers, or undisclosed allergies to contrast agents used during MRI scans. Furthermore, the strength of the magnetic field can interact with medical devices and foreign objects, potentially endangering the patient if proper screening and preparation are not conducted. Anxiety and discomfort during the MRI scan, particularly due to claustrophobia and noise, also impact patient cooperation and scan quality.

While technological safety measures have improved, patient-related factors remain a concern. Inadequate communication, lack of proper counseling, and insufficient patient knowledge regarding the procedure contribute significantly to safety lapses. These gaps can result in delayed scans, procedural cancellations, or, in worst-case scenarios, harm to the patient.

Therefore, ensuring patient awareness, improving communication, and implementing systematic feedback mechanisms is essential for optimizing MRI safety. It is within this context that Patient-Reported Experience Measures (PREMs) become critical tools for evaluating and improving healthcare delivery.

1.2 Rationale for the Study

The central idea behind this study is that patients are not just passive recipients of healthcare services, they are active participants. Understanding their experience before, during, and after a procedure such as MRI provides crucial insights into the strengths and weaknesses of current clinical practices.

PREM tools, especially those validated by recognized quality institutions like the Consortium of Accredited Healthcare Organizations (CAHO), are structured questionnaires designed to gather feedback directly from patients regarding their experiences. These tools assess communication quality, consent processes, clarity of instructions, and perceive safety and comfort during medical procedures.

MRI procedures, particularly in outpatient settings, often suffer from communication gaps between healthcare providers and patients. Patients may not be adequately informed about the need for the scan, the associated costs, preparation steps, or potential side effects of contrast agents. As a result, there is a significant need to gather patient feedback post-procedure to evaluate these gaps and make systemic improvements.

By using a CAHO-validated PREM tool in this study, we aim to bring standardization, reliability, and validity to the assessment process. The structured feedback will help radiology departments improve patient communication, informed consent processes, and overall procedural safety. This study, conducted at EHCC Hospital, Jaipur, is particularly relevant as it aligns with quality improvement objectives and supports CAHO accreditation criteria.

1.3 Significance of the Study

This research holds significance on multiple levels:

For Patients: It empowers them by giving a voice to their experiences and concerns, potentially enhancing their trust and engagement with the healthcare system.

For Healthcare Providers: It highlights specific areas where communication and patient education may be lacking, allowing for targeted training and process refinement.

For Administrators and Policymakers: It offers evidence-based insights that can support accreditation, policy updates, and continuous quality improvement initiatives.

For Clinical Practice: It promotes a culture of safety and patient-centered care by integrating patient feedback into routine clinical audits.

Furthermore, in a developing healthcare system like India's, where resource optimization and patient satisfaction are key challenges, leveraging PREM tools adds value to both operational efficiency and care quality.

1.4 An overview of the radiology department

The Department of Radiology at EHCC Hospital provides a full range of radiological services related to MRI, CT, Ultrasound, Fluoroscopy, Mammography, X-Rays and intervention procedures. They have installed technologically advanced, state-of-the-art medical equipment in our endeavor to provide the best diagnostic output with excellent patient comfort. The department is also actively involved in pushing boundaries in the world of radiology and imaging through various research activities.

Location: Ground floor

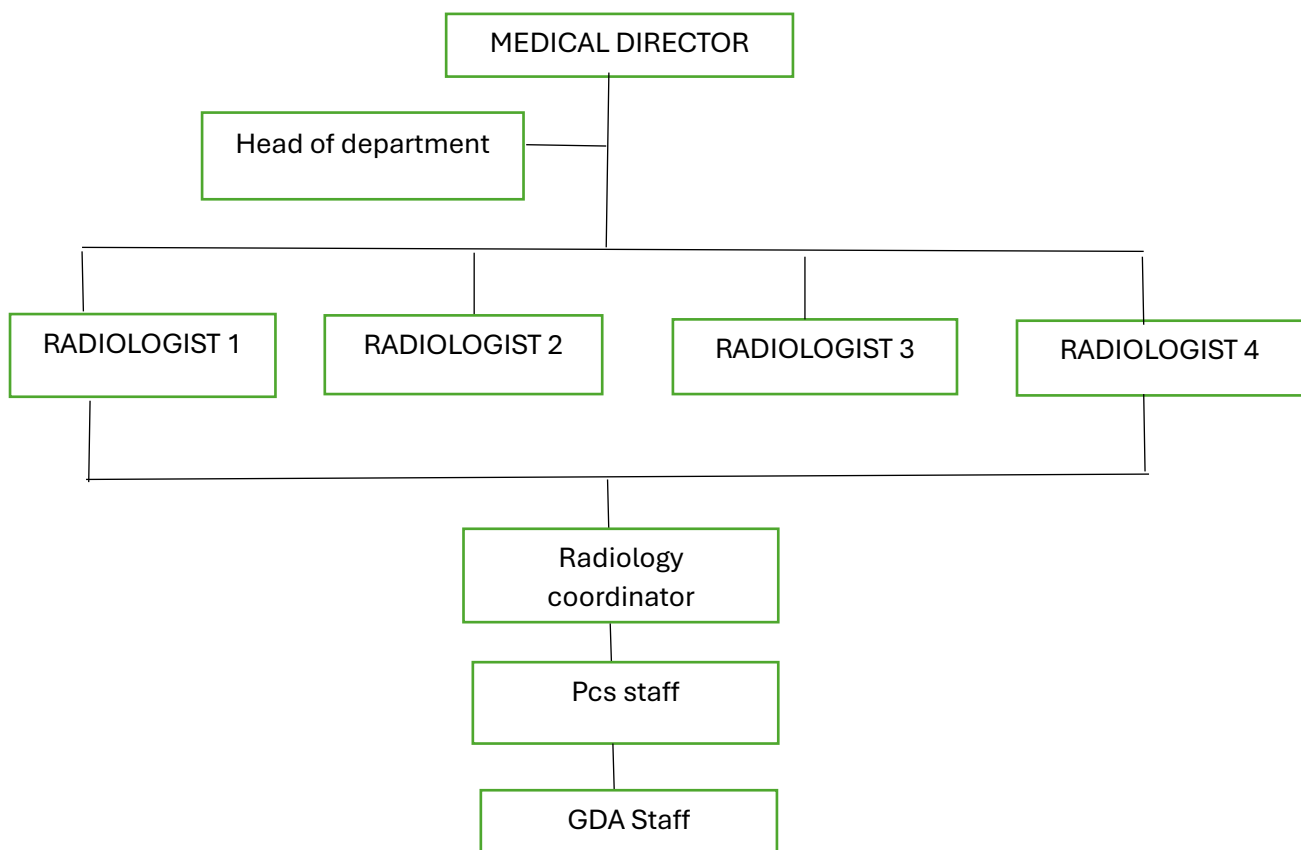
Equipment: X-Ray (portable as well as Steady), MRI (3.0 T), CT scanner, USG Machine (on floor and steady)

Manpower: 5 Radiologists

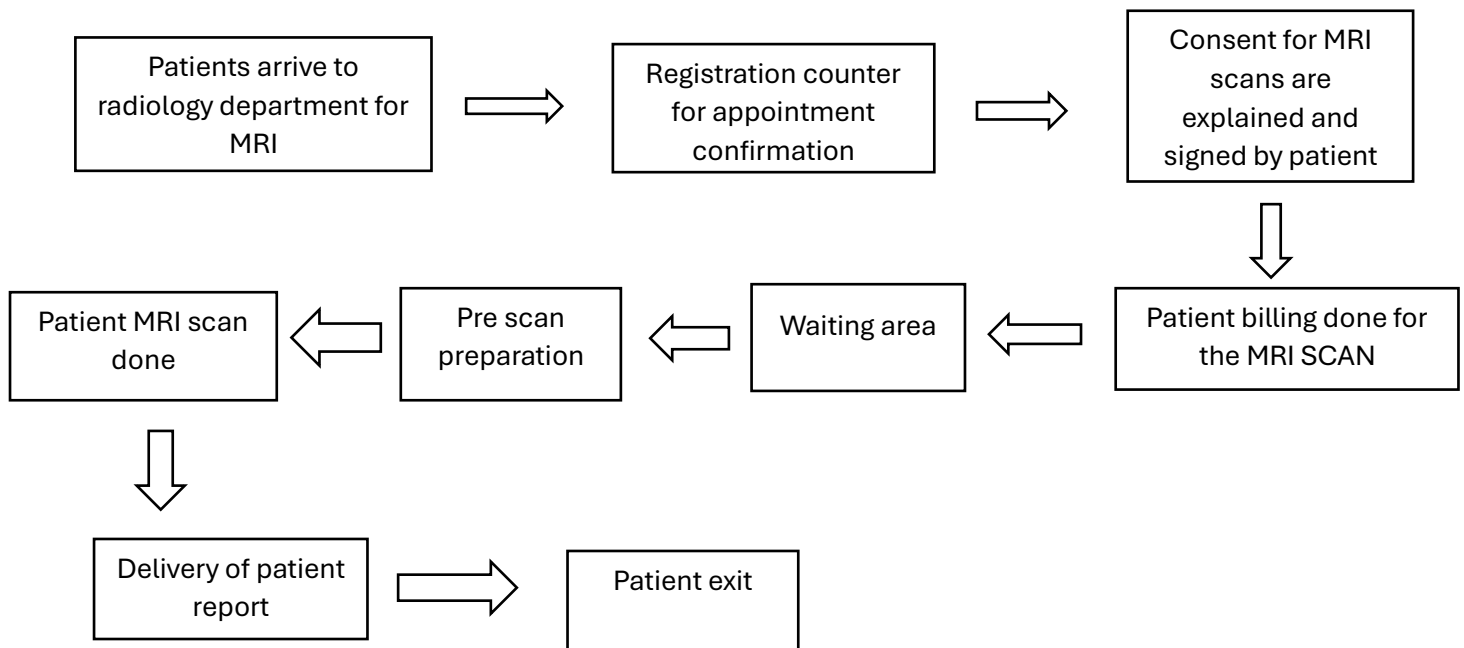
5+5+7 Technicians (MRI+CT+X-Ray) 4 Patient Care Services Staff + 1 Radiology coordinator

5 Ground Duty Assistants

Department leadership team:



1.5 PATIENT JOURNEY AT RADIOLOGY DEPARTMENT



1.6 PROCESS FLOW AND PACS

After receiving the MRI request from the clinician, the patient comes to the billing counter. There, depending on the availability of the time slot and the urgency of the scan, appointments are given, and patient data and scan requests are registered in the system.

The patient's clinical history & details are scanned; based on these and the consultant's advice the radiologist decides the imaging protocols, and the MRI is conducted by the radiographer in guidance of the radiologist and the same is explained to the patient.

The PACS system is used to store the images and is then interpretation is done by the radiologist, after final review the final MRI Report of patient is generated and handed over.

Image Acquisition is managed by the Radiology Technician

Image Management-Review & Reporting done by Radiology Consultants

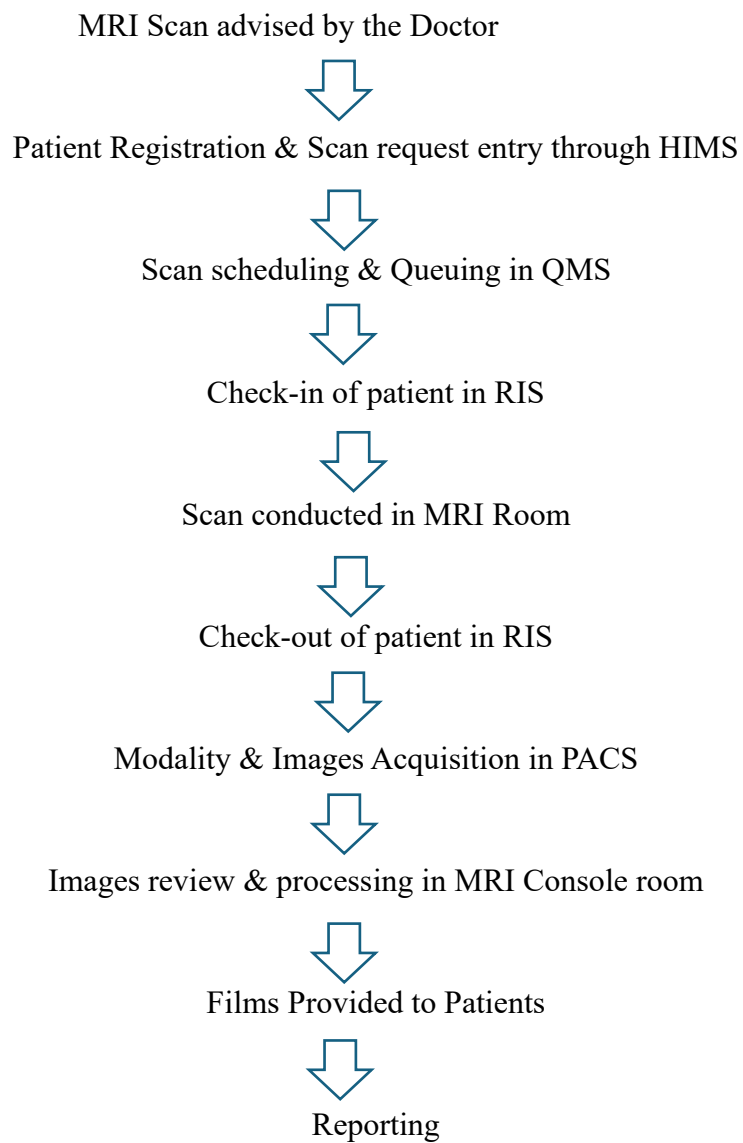
1.7 STANDARD OPERATING PROCEDURE OF MRI

Patient's Arrival with billing of a test

↓
Front desk counter

1. Waiting time is intimated to the patient.
2. Appointment is given to the patient; an appointment entry is done on google sheet with all the details of patient.
3. One copy of the bill and doctor's prescription is taken at the MRI front desk counter.
4. Then the file is given to the technician who is going to perform scan.

5. Patient's name is announced from MRI front desk counter when his/her number arrives.
6. After coming from CT/MRI room, file is handed to the patient.
7. Report and film collection TAT is intimated to the patient.



CHAPTER 2

REVIEW OF LITERATURE

Author	Study Location	Sample Size	Sampling Technique	Salient Features
Kanal et al. (2007)	USA	NA	Expert consensus	Developed ACR guidelines for MRI safety, highlighted zones and screening protocols.
Shellock & Spinazzi (2008)	USA	Review	Literature synthesis	Addressed MRI safety risks—ferromagnetic objects, implants, contrast reactions.
Bhardwaj et al. (2019)	India (Delhi NCR)	15 hospitals	Purposive sampling	Found gaps in staff training and signage regarding MRI safety in private hospitals.
Pandey et al. (2021)	India	250 patients	Random sampling	Patient feedback using CAHO PREM tool revealed anxiety due to lack of communication.
Darweesh et al. (2020)	Egypt	180 cases	Cross-sectional	Found lack of MRI-specific checklists increased safety incidents.
Varghese et al. (2022)	India (South)	300 patients	Stratified sampling	Validated CAHO PREM questionnaire for imaging safety; found clarity of instruction improved satisfaction.
Kaur & Bhatia (2023)	India (Punjab)	120 technicians	Convenience sampling	Identified low compliance with MRI zone protocols among junior radiology staff.
Chou et al. (2017)	Taiwan	500 cases	Observational	MRI-related adverse events were mostly due to insufficient pre-procedure screening.
Ramesh et al. (2020)	India	8 hospitals	Comparative sampling	Accreditation status (NABH/CAHO) linked to fewer patient safety complaints.
Joshi et al. (2022)	India (Maharashtra)	200 patients	Qualitative interviews	Found communication gaps during MRI prep caused fear and dissatisfaction.

Author	Study Location	Sample Size	Sampling Technique	Salient Features
Singh & Mehta (2023)	India (Delhi)	400 patients	Cross-sectional	Correlated staff training frequency with patient-reported safety in MRI.
Ahmed et al. (2021)	UAE	100 technicians	Random sampling	Staff familiarity with safety signage and ferromagnetic policy was suboptimal.
Kapoor et al. (2024)	India	NA	Conceptual framework	Proposed integration of PREM tools into daily MRI workflow for safety monitoring.
Fernando et al. (2018)	Sri Lanka	220 cases	Longitudinal audit	Identified MRI incidents decreased post staff re-training and protocol revisions.
CAHO (2023)	India	NA	Tool validation	Released updated CAHO-validated PREM tools focusing on diagnostic imaging safety.

CHAPTER 3

METHODOLOGY

3.1 Research Question

How effectively do CAHO-validated PREM tools assess patient safety and communication during MRI procedures?

This study investigates whether CAHO-validated PREM tools accurately capture patient perceptions of safety and communication protocols during MRI procedures. The aim is to identify strengths and areas needing improvement in hospital MRI practices, particularly within the OPD environment.

- **Sample Size:** 100 patients
- **Study Duration:** 2 months (April–May)
- **Study setting:** Radiology Department, EHCC Hospital, Jaipur.

3.2 Study Design

This is a **cross-sectional observational study** conducted to evaluate the patient-reported experience on MRI safety protocols and communication using a **structured PREM questionnaire**.

3.3 Study Population

Patients who underwent MRI scans at the Department of Radiology, EHCC Hospital, Jaipur.

3.3.1 Inclusion Criteria

- Patients aged 18 years and above.
- Patients who gave informed consent to participate in the survey.
- Patients who underwent MRI scans at EHCC Hospital during the study period.

3.3.2 Exclusion Criteria

- Paediatric patients (under 18 years).
- Unconscious or cognitively impaired patients unable to understand or respond to the questionnaire.
- Patients unwilling to participate.

3.3 Data Collection Tool

A CAHO-validated PREM questionnaire was used, focusing on five key domains:

1. Pre-scan briefing and safety instructions
2. Communication effectiveness
3. Informed consent
4. Comfort during the procedure
5. Post-scan hygiene and expectations

3.4 Data Collection Method

The data was collected using **structured interviews** conducted post-MRI scan in the patient waiting area, under the supervision of trained staff to ensure clarity and completeness.



PATIENT RELATED EXPERIENCE MEASURES: MRI SAFETY PROCEDURE

When to use: The MRI safety questionnaire tool is to gather responses from patients who underwent a planned MRI procedure in an outpatient setting

When to serve tool: After the procedure

Exclusion - Emergency cases, Incapacitated Patients, children under the age of 9 years and patients under sedatives.

S.No.	Question / प्रश्न	Patient response		
1	Did the doctor inform you about the need for the MRI Scan in the plan of treatment? / क्या डॉक्टर ने आपको उपचार योजना में एमआरआई स्कैन की आवश्यकता के बारे में बताया?	Yes	No	
2	Did the hospital staff/ doctor explain you about the cost of MRI scan? / क्या अस्पताल के स्टाफ/डॉक्टर ने आपको एमआरआई स्कैन की लागत के बारे में बताया?	Yes	No	
3	Did the doctor inform you about the type of MRI scan needed and the part of the body involved? / क्या डॉक्टर ने आपको आवश्यक एमआरआई स्कैन के प्रकार और शरीर के संबंधित भाग के बारे में बताया?	Yes	No	
4	Did the staff inform you about the appointment (time & date) and estimated time duration of the MRI scan? / क्या स्टाफ ने आपको अपॉइंटमेंट (समय और दिनांक) और स्कैन की अनुमानित अवधि के बारे में बताया?	Yes	No	
5	Did the doctor take your permission (consent) for the MRI scan? / क्या डॉक्टर ने एमआरआई स्कैन के लिए आपकी अनुमति (सहमति) ली?	Yes	No	
6	Did the staff verify your name/ hospital registration number with the file or MRI request slip? / क्या स्टाफ ने आपकी फाइल या एमआरआई अनुरोध पर्ची के साथ नाम/ अस्पताल पंजीकरण संख्या की पुष्टि की?	Yes	No	
7	Did the staff ask you about any history of allergies? (for Contrast Enhanced MRI) / क्या स्टाफ ने आपसे किसी एलर्जी के इतिहास के बारे में पूछा? (कॉन्ट्रास्ट युक्त एमआरआई के लिए)	Yes	No	Not Applicable
8	Did the staff/doctor explain about side-effects of contrast? / क्या स्टाफ/डॉक्टर ने कॉन्ट्रास्ट के दुष्प्रभावों के बारे में बताया?	Yes	No	Not Applicable
9	Did the doctor advise for blood tests, which is required before the contrast-enhanced MRI? (S. Creatinine & S. Urea) / क्या डॉक्टर ने कॉन्ट्रास्ट युक्त एमआरआई से पहले आवश्यक रक्त परीक्षण (S. क्रिएटिनिन और S. यूरिया) की सलाह दी?	Yes	No	Not Applicable
10	Have you observed the staff performing hand wash/hand rub during the procedure? / क्या आपने प्रक्रिया के दौरान स्टाफ को हाथ धोते या सैनिटाइज करते देखा?	Yes	No	
11	Did the staff ask you about history of surgery with any metal devices like implants or pacemakers placed inside your body (in situ)? / क्या स्टाफ ने आपसे किसी सर्जरी का इतिहास और शरीर के अंदर लगे मेटल उपकरणों (जैसे इम्प्लांट या पेसमेकर) के बारे में पूछा?	Yes	No	



ETERNAL HOSPITAL

Patient Name: _____

UHID: _____ IP/OP: _____

Age: _____ Sex: _____

Department: _____

12	Did the staff inform you about removing all metallic wearable items like jewellery, coins, pen, watch, safety pins, belts etc. before MRI scan? / क्या स्टाफ ने आपको एमआरआई स्कैन से पहले सभी धातु से बनी चीज़ें जैसे गहने, सिक्के, पेन, घड़ी, सेफ्टी पिन, बेल्ट आदि हटाने के लिए कहा?	Yes	No	
13	Did the staff screen you with a metal detector device before entering the MRI Room? / क्या स्टाफ ने एमआरआई कक्ष में प्रवेश करने से पहले आपको मेटल डिटेक्टर से जांचा?	Yes	No	
14	Did you notice the caution signage's in the MRI unit or room? / क्या आपने एमआरआई यूनिट या कमरे में चेतावनी चिन्ह देखे?	Yes	No	
15	Did the staff ask you to change to hospital clothes in the changing room? / क्या स्टाफ ने आपको चेंजिंग रूम में अस्पताल के कपड़े पहनने को कहा?	Yes	No	
16	Did you have privacy in the changing room? / क्या आपको चेंजिंग रूम में गोपनीयता (प्राइवेसी) मिली?	Yes	No	
17	Did the staff inform you not to move or lie still during the MRI scan? / क्या स्टाफ ने आपको एमआरआई स्कैन के दौरान न हिलने या स्थिर रहने की जानकारी दी?	Yes	No	
18	Did the staff inform you about constraints of space where you lie down inside the MRI machine? / क्या स्टाफ ने एमआरआई मशीन के अंदर लेटने की सीमित जगह के बारे में बताया?	Yes	No	Not Applicable
19	Did the staff inform you about how to respond if you feel uncomfortable or scared during the MRI scan? / क्या स्टाफ ने आपको स्कैन के दौरान असहज या डर लगने पर क्या करना है, यह बताया?	Yes	No	
20	Did the staff inform you about the occurrence of loud noise when the MRI scan is in the process? / क्या स्टाफ ने आपको एमआरआई स्कैन के दौरान तेज़ आवाज़ आने के बारे में बताया?	Yes	No	Not Applicable
21	Did the staff tell you when and where the result/ report of MRI scan will be available? / क्या स्टाफ ने आपको बताया कि एमआरआई रिपोर्ट कब और कहाँ मिलेगी?	Yes	No	

3.5 Data Analysis

Quantitative data was analysed using percentage compliance and absolute patient numbers for each parameter.

- Compliance <40% was marked as a critical gap area.
- Visual tools like charts and graphs were used for representation.

3.6.1 Operational Definitions

- **Patient Safety:** Practices ensuring that MRI procedures do not cause harm to patients.
- **PREM:** Patient-Reported Experience Measures, a survey capturing patient feedback about their experience.
- **Compliance Rate:** Percentage of patients reporting a satisfactory experience or acknowledgment of a specific protocol.
- **MRI Protocol Adherence:** Alignment of the hospital's practices with recommended safety standards.

CHAPTER 4

RESULT

The following table presents compliance percentages and actual patient counts (out of 100) across evaluated MRI safety parameters:

PRE SCAN EXPERIENCE

PARAMETERS	COMPLIANCE	Patients (n=100)	
		YES	NO
NEED OF MRI	100 %	100	0
COST OF MRI	85%	85	15
TYPE OF MRI AND PART OF BODY INVOLVED	100%	100	0
DURATION	20%	20	80
APPONTMENT TIME AND DATE	100 %	100	0
CONSENT	100 %	100	0
VERIFICATION	100 %	100	0
HISTORY OF ALLERGIES	100 %	100	0
SIDE EFACTS	100 %	100	0
BLOOD TEST	N/A	N/A	N/A
REMOVING METALLIC ITEMS	100 %	100	0
SCREENING	70%	70	30
SIGNAGES	100 %	100	0
CHANGING ROOM	100 %	100	0
PRIVACY	100%	100	0

POST SCAN EXPERIENCE

PARAMETERS	COMPLIANCE	Patients (n=100)	
		YES	NO
HAND WASH	40%	40	60
HISTORY OF SURGERY	100%	100	0
LIE STILL	100%	100	0
CONSTRAINTS OF SPACE	90%	90	10
UNCOMFORTABLE	85%	85	15
LOUD NOISE	95%	95	5
REPORT	100%	100	0

Post-Scan Experience Parameters (n=100)

The analysis of post-MRI scan feedback from 100 patients reveals strong procedural adherence in several key domains, but also highlights a few significant areas needing attention:

1. Report Availability (100%)

All 100 patients confirmed receiving their MRI reports in a timely and organized manner, indicating excellent efficiency and operational reliability in report generation and distribution.

2. History of Surgery Noted (100%)

All patients reported that their surgical history was assessed before or after the scan. This reflects strong clinical vigilance and a robust documentation process, which is essential for both diagnostic accuracy and safety.

3. Instructions to Lie Still (100%)

Clear instructions to remain still were provided to all patients, demonstrating consistent communication by radiology staff, which is critical for image quality and avoiding re-scans.

4. Loud Noise Expectations Explained (95%)

A significant 95% of patients (n=95) acknowledged being informed about the expected MRI scanner noise. This high compliance indicates proactive patient counselling, but the remaining 5% highlight a need for uniform information delivery.

5. **Space Constraints Informed (90%)**

Ninety patients were briefed about spatial restrictions in the MRI scanner, indicating a high awareness level. However, 10% of patients reported not receiving this information, which could lead to anxiety or discomfort—especially in claustrophobic individuals. Improved pre-scan orientation or visual aids may help bridge this gap.

6. **Patient Discomfort Addressed (85%)**

While 85% of patients felt that their comfort was adequately managed, 15 individuals expressed unaddressed discomfort during the scan. This reflects a moderate shortfall in patient-centred care, suggesting that more attentive communication, temperature control, and noise-cancellation strategies may improve comfort perception.

7. **Hand Hygiene Post-Scan (40%)**

This is the lowest scoring parameter, with only 40 patients reporting visible hand hygiene practices post-procedure. This result is concerning, as it points to a serious gap in infection control standards. Strengthening hygiene protocols, including visible hand-washing stations, staff role modelling, and signage, is urgently needed to ensure compliance with basic safety practices.

Interpretation of Pre-Scan Experience

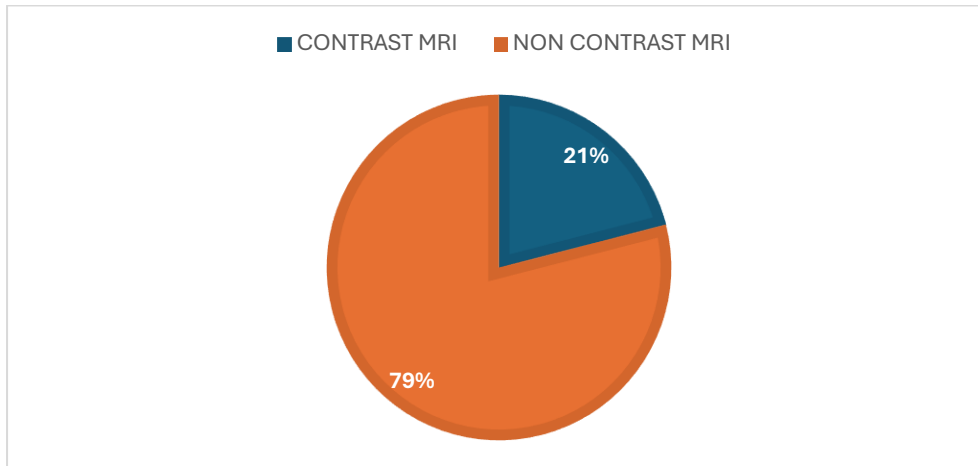
The pre-scan experience evaluation of 100 MRI patients revealed a high level of adherence to safety protocols and preparatory communication in most domains. Notably, **100% compliance** was recorded in key safety and communication parameters such as explaining the **need for MRI, type of scan and body part involved, appointment time and date, informed consent, identity verification, history of allergies, side effects, removal of metallic items, signage availability, changing room access, and maintenance of patient privacy**. This indicates a robust alignment of the hospital's operational practices with CAHO-recommended standards.

However, three critical areas demonstrated notable compliance gaps:

- **Duration of Scan Explanation (20%):** Only 20 out of 100 patients reported being informed about the expected duration of their MRI procedure. This substantial communication gap can lead to patient anxiety, unnecessary discomfort, or procedural confusion. It highlights the need for standardized communication protocols regarding scan timelines.
- **Screening Process (70%):** While most patients confirmed that safety screening was conducted, 30% reported no or unclear screening. This indicates inconsistent implementation of safety measures and necessitates **staff retraining, audit mechanisms, and standard operating procedures (SOPs)** to ensure universal compliance.
- **Cost Disclosure (85%):** Although relatively high, the 15% gap in explaining the MRI cost indicates partial communication on financial aspects. This could affect patient satisfaction and trust, especially in a private hospital setting. Strengthening **financial counselling** and integrating it into the pre-scan protocol could address this issue.

Overall, the pre-scan phase exhibits **excellent operational performance** in key patient safety and comfort areas. However, to enhance **patient-centeredness**,

communication practices—particularly around **scan duration**, **screening**, and **cost**—must be improved. Addressing these issues through **staff orientation**, **checklist-based procedures**, and **real-time patient feedback mechanisms** would lead to a more transparent and reassuring diagnostic experience.



Majority of scans were non-contrast, suggesting less complexity and lower risk of adverse contrast reactions.

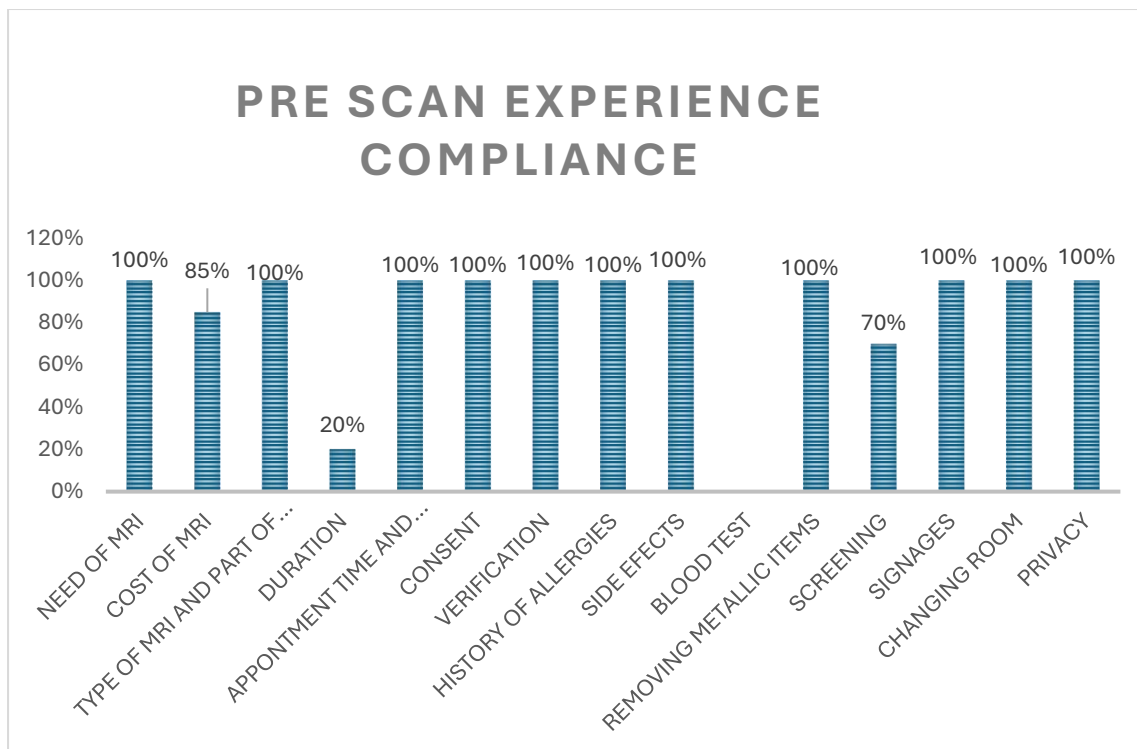
This pie chart illustrates the distribution of MRI scans conducted with and without contrast among 100 OPD patients observed for MRI safety protocols using CAHO-validated Patient-Reported Experience Measures (PREM) tools.

Out of the total **100 patients**:

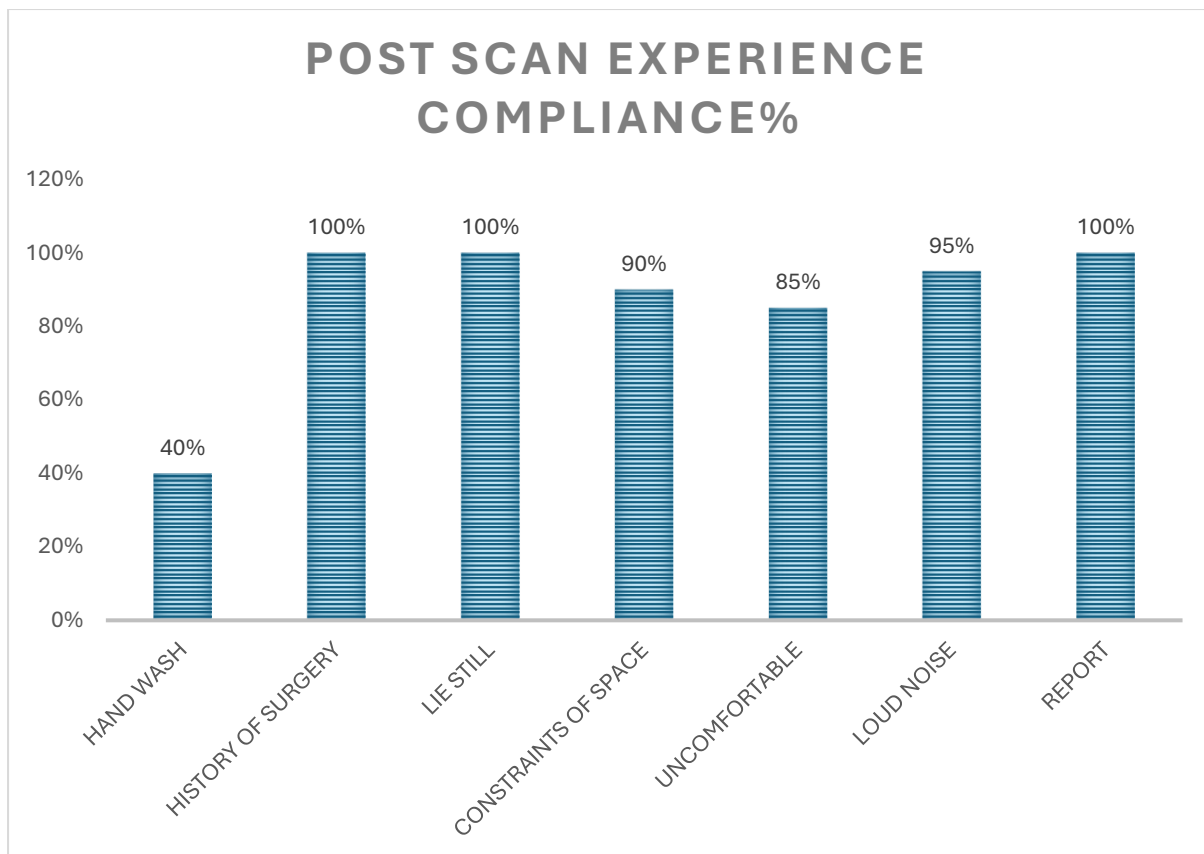
21% underwent Contrast MRI

79% underwent Non-Contrast MRI

This indicates that a significantly higher proportion of MRI procedures in the OPD setting were performed without contrast. The predominance of non-contrast MRIs could be attributed to various clinical factors such as the nature of presenting complaints, referring physician protocols, cost considerations, or safety concerns related to contrast media use.



- **Excellent Compliance (100%)** was observed in parameters such as informed consent, documentation of allergy history, removal of metallic items, and maintenance of patient privacy—indicating robust adherence to MRI safety protocols.
- **Areas Needing Improvement:**
 - **Duration Explanation (20%):** Most patients were not adequately informed about how long the MRI procedure would take. This represents a significant communication gap.
 - **Screening Implementation (70%):** While partially effective, this indicates a need for stronger adherence to screening protocols through staff training or procedural reinforcement.
 - **Cost Explanation (85%):** Although relatively high, there remains room for improvement in communicating the cost of MRI scans transparently.



The Post scan phase also showed strong adherence in several domains:

- High compliance (100%) was also recorded for areas such as history of surgery, instructions to lie still, and report availability—signalling procedural clarity and efficiency.
- **Loud Noise Awareness (95%) and Space Constraint Awareness (90%):** These suggest a well-prepared patient environment, though further sensitization could enhance patient comfort.
- **Hand Hygiene Compliance (40%):** Notably low and reflective of poor reinforcement of basic hygiene protocols. There is a need for visual cues and staff role modelling to improve perception and practice.
- **Patient Comfort (85%):** Despite good overall preparedness, 15% of patients reported discomfort that was not adequately addressed. Areas for improvement include noise reduction strategies, better temperature regulation, and more consistent communication during the procedure.

These findings collectively point to strong adherence to technical and safety standards but highlight the importance of improving communication and hygiene practices to create a more patient-centred MRI experience.

CHAPTER 5

DISCUSSION

The findings of this study provide an insightful evaluation of patient safety in MRI procedures at EHCC Hospital through the application of CAHO-validated PREM tools. The analysis reveals significant strengths in protocol compliance, particularly in the areas of informed consent, allergy history assessment, removal of metallic items, and the maintenance of patient privacy—all achieving 100% compliance. These findings indicate strong procedural governance and consistent implementation of fundamental safety protocols within the radiology department.

Moreover, the scan phase demonstrated exceptional preparation and procedural efficiency, with history of surgery, report availability, and instructions to remain still all scoring 100% compliance. These areas of high performance reflect effective pre-scan briefings and the presence of a structured workflow that enhances patient understanding and cooperation. Additionally, patient awareness regarding environmental factors such as loud noises and space constraints also showed high compliance (95% and 90%, respectively), indicating that the department has succeeded in setting accurate expectations prior to the procedure.

However, the study identified certain domains that need substantial improvement. One of the most concerning findings was the **low score in duration explanation (20%)**, highlighting a severe communication gap. Many patients reported being unaware of how long the MRI procedure would take. This not only impacts patient preparedness but may also elevate anxiety levels, thereby affecting the overall MRI experience. Better communication strategies and standardized briefing checklists can help address this gap.

Another area of concern was **incomplete screening compliance (70%)**. Although partially effective, the screening process is a critical safety component that must be thoroughly and consistently executed to avoid potential risks such as adverse interactions with ferromagnetic materials. This finding indicates the need for reinforcing standard operating procedures and offering targeted training to technical staff.

Post-scan hygiene practices, particularly hand hygiene, also revealed deficiencies. With only 40% of patients observing hand hygiene compliance, this aspect reflects inadequate promotion of infection control measures. Given the high visibility and importance of hygiene in modern healthcare, it is imperative that hand hygiene protocols are visibly enacted by staff and supported by educational signage in patient areas.

Overall, the study underscores the importance of not only technical and procedural compliance but also patient-centric communication and environment management. The PREM tool has proven to be an effective instrument for uncovering gaps that might otherwise be overlooked in standard audits. By integrating patient feedback into ongoing quality improvement plans, EHCC Hospital can significantly elevate the safety and satisfaction associated with MRI procedures. Moving forward, efforts should focus on bridging communication gaps, reinforcing hygiene behaviour, and sustaining a feedback-informed culture of safety.

CHAPTER 6

CONCLUSION

This study assessed MRI safety practices using CAHO-validated PREM tools at EHCC Hospital, Jaipur. The analysis highlighted exceptional compliance in crucial safety aspects such as informed consent, privacy, and pre-scan briefings. However, the study also revealed gaps in communication (e.g., procedure duration explanation) and hygiene (e.g., post-scan handwashing practices).

These findings emphasize the value of patient-centred assessment tools and the need to integrate patient feedback into quality assurance. Continuous training, communication reinforcement, and environmental comfort must be prioritized to ensure comprehensive MRI safety.

In conclusion, while EHCC demonstrates robust safety compliance, addressing communication gaps and environmental hygiene can significantly enhance patient safety and experience.

CHAPTER 7

RECOMMENDATIONS

RECOMMENDATIONS

- Train staff to perform hand hygiene in front of patients and place visual reminders near MRI rooms to boost patient confidence in infection control.
- Provide a working handheld or walk-through metal detector and place visible instructions near the MRI area to guide both patients and staff.
- Conduct periodic training sessions on patient communication and perform regular compliance audits to track improvements.
- Integrate PREM tool responses into quality improvement plans and close feedback loops with corrective actions.

REFERENCES

- Kanal, E., Barkovich, A. J., Bell, C., Borgstede, J. P., Bradley, W. G., Froelich, J. W., ... & Zaremba, L. A. (2007). ACR guidance document for safe MR practices: 2007. *American Journal of Roentgenology*, 188(6), 1447-1474.
- Shellock, F. G., & Spinazzi, A. (2008). MRI safety update 2008: Part 1, MRI contrast agents and nephrogenic systemic fibrosis. *American Journal of Roentgenology*, 191(4), 1129-1139.
- Darweesh, A. A., Youssef, M. F., & Zaki, S. M. (2020). MRI safety compliance and associated incident analysis in radiology departments. *The Egyptian Journal of Radiology and Nuclear Medicine*, 51(1), 1-6.
- arghese, B., Nair, R., & Thomas, M. (2022). Validation of CAHO PREM tools in diagnostic imaging: A South India experience. *Journal of Clinical Imaging Science*, 12(1), 44