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A Checklist to Improve Patient Safety in General Radiology

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Abstract

Background: *The role of checklist is to identify and classify the risks to the safety.*
Aim: *The purpose of this study is to improve patient safety in radiology department.*
Methods: *The study population included patients of both gender of age group 20-50 years. Overall patients included were 50. The data was collected on daily basis from 1 October 2021 to 31 March 2022.*
Result: *The result involves the positive result with significance level of 0.05 which clearly proves that patient safety was improves by using checklist.*
Conclusion: ***T****his study proves that patient safety can be improves by using safety checklist and Chi- square test applied for the results.*

Keyword: Radiology, Safety. Patients

1. INTRODUCTION

Human factor is indeed the unavoidable factor that harms the patient. The simplest way to reduce the risk of damage is to do safety tests. A checklist is list of items to perform the appropriate process. A variety of checklist devices are present which includes paper, mechanical and electronic checklists [(2)]. The function of checklist supports documentation of the data, memory guide and supports the items categorized as a list. There are several affected person troubles in radiology. Patient suffers radiation exposure radiation dose which harms the body by causing deterministic and stochastic effects. A checklist is a legal list of the module this is used to review or carry out particular process.

Use of checklist in health care promotes procedure development, put off the mistakes and it improves the affected person protection [(3)]. Checklists are used to improve critical safety process and the communication.

The checklist can be used as a tool for the departmental quality validation, self-assessment and peer assessment [(4)]. A checklist that allows the technician to perform normal routine plan of action and the procedure can be verified by using checklist to confirm that all the steps are completed. A “read-and-do” checklist takes place afterwards because the checklist is read out other individuals [(5)].

The increase in the use of checklist promotes patient safety by achieving safety goals. Checklist improves the diagnostic errors and accuracy of radiologic studies. It is important to note that the effectiveness of checklist depends on the quality. Checklist has improved the process for patient care in the hospitals.

With the improvement in the patient safety, checklist creates a confidence that the process is completed accurately. With the help of checklists, we can complete repetitive tasks more quickly. Checklist provides accountability and gives personnel a sense of security. Checklist has positive impact on health outcomes which includes complications, injuries, reducing the mortality and other patient harm.

The purpose of the checklist is to identify and classify the risks to the safety. By using checklist, we become more productive and achieve proper goals. Use of checklist notably increases the patient safety within the hospitals.

Some other patient safety points to be used:
The patient safety can be improved by using ALARA principle as this principle ensures the safety of both patients and personnel. The health workers ensure that the patient is instructed about the procedure before any examination so that they can sit/stand without any motion. Any motion of the patient body may relate to the artifacts on the radiograph. Proper radiation shielding devices must be present in the department. It includes lead shields, lead apron, gonadal shield etc. Before starting of procedure ensure that the doors are properly closed.

Avoid double or over exposure so that the does not receive excessive radiation to the body. Collimation of the body region is very important factor so that other part of body does not receive any radiation. In females, ask for last menstrual period (LMP) before any radiation related procedure. But if examination is important consult the radiologists in the department.

Radiation protection in radiology department:
There are three fundamental principle of radiation protection given by ICRP:

1. Justification
2. Optimization
3. Dose limit

Justification is also known as benefit vs risk principle.
Optimization also known as as low as reasonably achievable (ALARA) principle.
Dose limit states that one should not exceed the range of technical factors. If the technical factors arise it may cause harm the patient which may causes deterministic or stochastic effects in the body.
Time, distance and shielding (TDS) should be in the use while doing any procedure.
Minimize the time to be spent the radiation areas as it reduces the radiation dose.
Exposure time = exposure ÷ exposure rate

Distance follows Inverse Square Law which means double the distance from source of radiation. When the distance increases by factor 2, the dose rate decreases by factor 4. Therefore, more distance is equal to less radiation.

Use of proper shielding also helps to minimize the radiation dose.
Place an appropriate shield between the radiation source and the worker.

To prevent occupational body from unnecessary radiation, use lead lined equipment's. This equipment's includes:

Stay in radiation area only when needed. Avoid unnecessary working in the radiation department. Lead aprons are the secondary barriers to minimize the radiation dose. These aprons protect the individual from scattered radiation.

Other protective equipment's includes lead lined gloves, lead glasses, thyroid shields and gonadal shields. Images of gonadal shield, lead apron, lead glasses and thyroid shield.

Justification:
The topic chosen to improve patient safety with the help of checklist in the radiology department and to prevent patients from unnecessary radiation exposure dose.

Aims & Objectives:
The aim of the study is to improve patient safety in the radiology department.

Objectives:
1. To study the importance of checklists in the radiology department.
2. To improve the patient safety using safety checklists in the radiology department.

2. METHOD AND MATERIAL

1. Source of data:
Patients, who came into the Radiology Department of Shree Guru Gobind Singh Tricentenary Hospital & Research Institute for Radiological examination.

2. Study duration:
This study was carried out over a period of **24 months** in the Radiology department of SGT Hospital and Research Institute.

3. Study design:
This study will be an Observational and Prospective study.
In which we include total 50 patients will be including in this study in which both Males and Females will be taken. The patient age included in this study is between 20- 50 years.

4. Study area:
Patient who will come to Radiology Department of SGT Hospital &Research Institute will be taken for this study.

Inclusion Criteria:
- All patients with complains of having are referred to department of radiology for radiological procedures.
- Adults aged 20-50 including both males and females presenting with non-traumatic and traumatic complaints.

Exclusion Criteria:
- Having metallic implants & pacemakers in MRI.
- Having Claustrophobia.
- Patients with recent operative history for MRI examination.

Sample Size:
- A convenient sample of 50 cases having both male and female of non-traumatic and traumatic history for radiological examination.

Methodology:
- This study shall be carried out at Department of Radio-diagnosis of SGT Medical College, Hospital & Research Institute, Budhera, Gurugram. Informed written consent will be taken from the patient before the study.

Clinicalevaluation:
A detailed previous history of the patient such as their previous radiological investigation reports or any other previous history related to their investigation shall be documented at the time of initial examination.

3. Result and Discussion

Table.1. Distribution of study participant's responses from consent forms to correct results.

Consent	Consent	Correct results	p-value
No	21(42%)	5(10%)	
Yes	29(58%)	45(90%)	0.0003*
Total	50(100%)	50(100%)	

In this present study, table 1 shows the distribution of consent form filled by the patients and having provides the correct result. 58% patients filled the consent form appropriately and 42% patients did not follow the rules. In such cases about 90% patients provided the correct results and only 10% did not provide the right results. Chi-square test was applied for any significance behind it, and the results was significant at 0.05 level of significance.

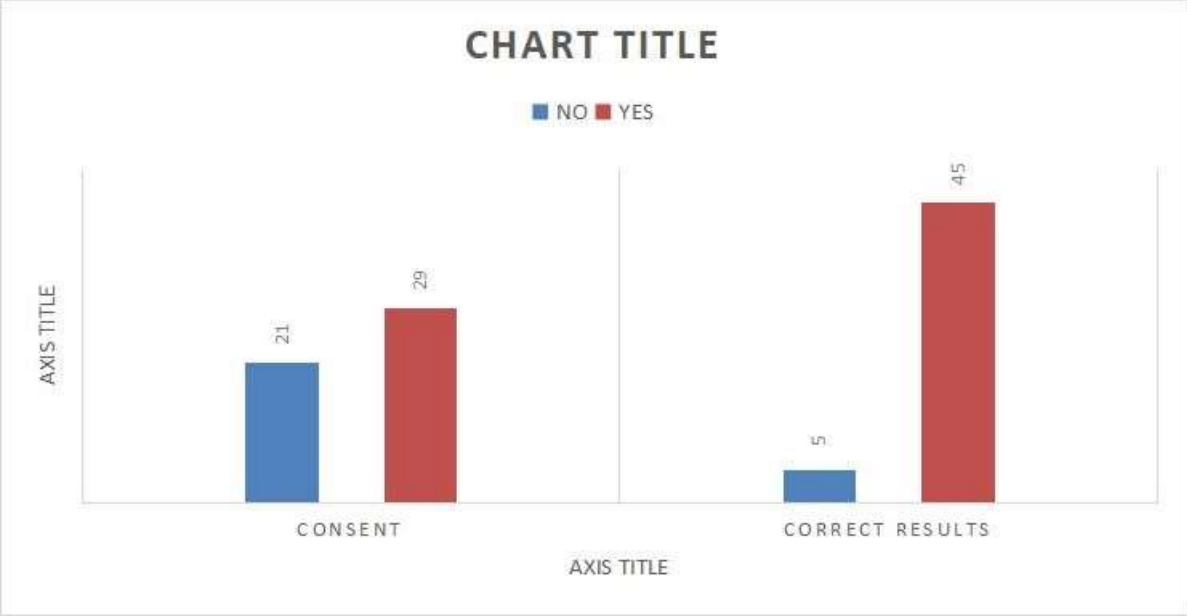


Table.2. Distribution of study participant's responses from procedure explained to correct results.

	Procedure	Correct results	p-value
No	11(22%)	5(10%)	
Yes	39(78%)	45(90%)	0.021*
Total	50(100%)	50(100%)	

In this present study, table 2 describes the distribution of procedure explained to the patients and having provides the correct result. 78% patients were explained the procedure appropriately and 22% patients may not. In such cases about 90% patients provided the correct results and only 10% did not provide the correct results. Chi-square test was applied for any significance behind it, and the results was significant at 0.05 level of significance.

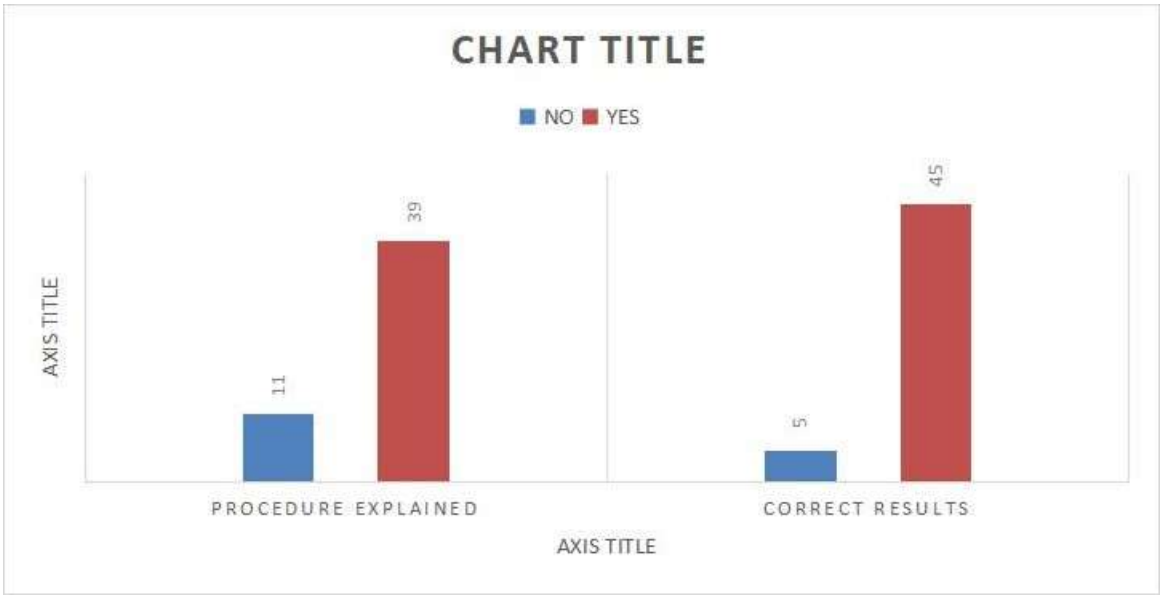


Table.3. Distribution of study participant's responses from radiation protection used to correct results.

	Radiation	Correct results	p-value
N/A	15(30%)	0(0%)	<0.0001*
No	11(22%)	5(10%)	
Yes	24(48%)	45(90%)	
Total	50(100%)	50(100%)	

According to the table 3, it reveals the distribution of radiation protection used by the patients and having provides the correct result. 48% patients followed the rules appropriately and 22% patients did not follow the rules and almost 30% patients did not applicable for protection used. In such cases about 90% patients provided the correct results and only 10% did not provide the right results. Chi-square test was applied for any significance behind it, and the results were significant at 0.05 level of significance.

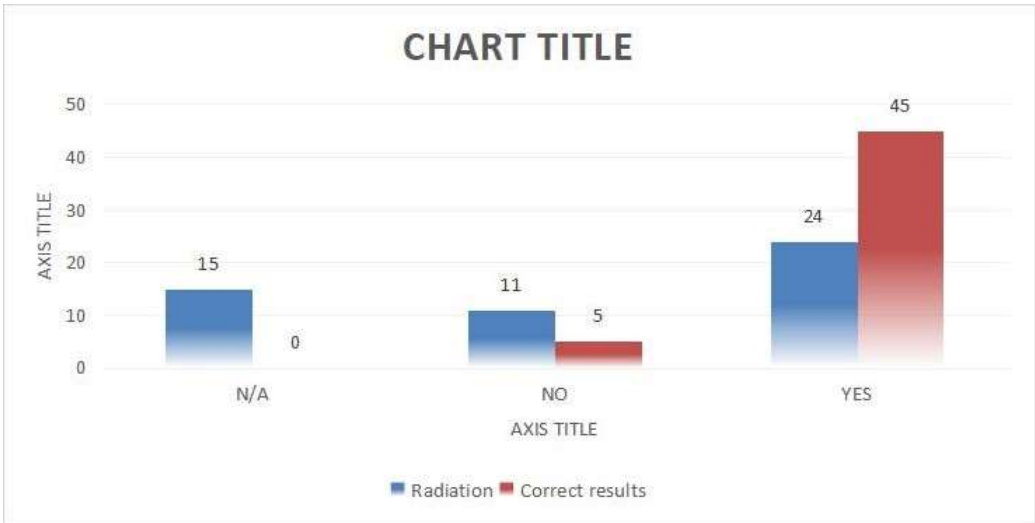
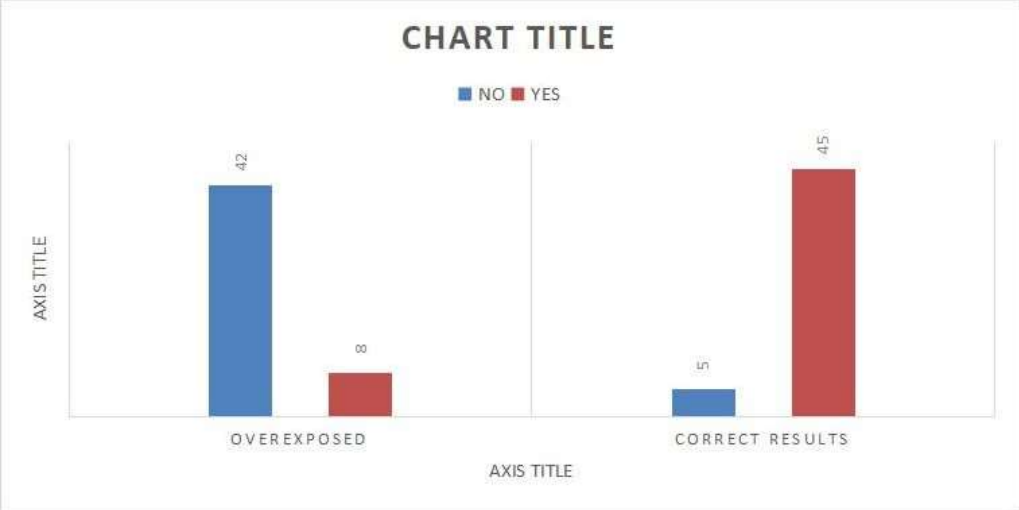


Table.4. Distribution of study participant's responses from overdosed to correct results.

	Overexposed	Correct results	p-value
No	42(84%)	5(10%)	<0.0001*
Yes	8(16%)	45(90%)	
Total	50(100%)	50(100%)	

In this present study, table 4 shows the distribution of overdosed by the patients and having provides the correct result. Only 16% patients had given the overdoses and 84% patients did not intake the overdoses of radiation. In such cases about 90% patients provided the correct results and only 10% did not provide the appropriate results. Chi-square test was applied for any significance behind it, and the results was significant at 0.05 level of significance.



The purpose of this research is to investigate the safety regarding patients on radiology department. This study is prospective and observational which includes 50 patients in which both males & female are present. The age of patient includes in this study is between 20-50 years. the research study includes the safety checklist in which some questions. Some questions are asked to patient according to their examination. This study was done to improve Patient Safety in the radiology department. Includes three section named A, B and C.

Section A includes planning and preparation of patient which further include questioning to patient like consent from patient taken or not, history known, indication known equipment's present and etc. Questions answer is yes/no. Section B includes before procedure. Detection include weather the right patient/ right procedure/ right site is to examined it or not, procedure explained to patient or not, possible complications discussed with the patient or not. Section C include after procedure which involve whether the image send to electronic picture archiving system or not, procedure and result explained to patient or not and whether the patient is provided with correct result or not.

The checklist also involved if the patient is over exposed or not and radiation protection given to the patient or not. Chi square test was applied for the result. In the result of this study the procedure of patient involves x-ray, CT, MRI and USG examinations. The result presents some important points which answered as YES/NO/NA.

The first table question includes consent required or not. In this out of 29 (58%) fill the consent form and 21(42%) patients have not fill the consent form before radiological examination. The correct result obtained is that 90% patients provide the correct result and only 10% did not provide right result. At the 0.05 threshold of significance, the outcome was remarkable.

The table 2 describes procedure explained to the patient. In this case out of 50 patients, the procedure was explained to 39 patients before procedure & 11 patients do not knows about the procedure. This step plays important role in patient safety because if the patient knows about the procedure which id to be done, it will help the radiographer to complete the procedure on time without any overdose/overexposure to patient. At the 0.05 threshold of significance, the outcome was remarkable.

In table 3, the patient is represented with whether or not radiation shielding was provided during in the radiographic examination. In this case, out of 50 participants, the radiation protection provided to the patient is 24 and in 11 patients the radiation protection was not provided and in 15 patients the use of radiation protection was not applicable. In such cases, about 90% patients provided the correct result and 10% did not provide the right result. At the 0.05 threshold of significance, the outcome was remarkable.

The table 4 represents the patients who were overexposed during the procedure. An overexposure usually means that the larger amount of X-rays passed through the patient's body. This table shows the overexposure of patients during the procedure. Out of 50 participants, 8 patients were overexposed and 42 patients did not receive any overdose from the x-ray source machines. Also, in this case patients were safe from overexposure because overexposure may cause some side effects to the body. In this questionnaire, 90% provided the correct

result and only 10% did not provide the appropriate result. At the 0.05 threshold of significance, the outcome was remarkable. So, this study proves that the uses of checklists are effective tools for enhancing patient safety in radiology department. By using checklist, we will boost the human factors, reducing errors. Safety checklists do not have any negative effects on patient safety issues.

4. Conclusion:

This prospective and observational study involves the use of checklists to improve the patient's safety in general radiology department. Fifty patients were involved in this study. Chi-Square test was applied to the study for results. In this study, we had selected thirty articles related to the safety checklist of patients. In most of the articles, we found that there was the use of safety checklist and these articles proves that patient safety was increased by using safety checklists. So, the study concludes that by using the safety checklist we can improve the patient safety by highlighting certain headings for the results. The study gives the significant result at 0.05 level of significance which further proves that safety checklist can improve the safety of the patients in the department. By using checklist, we become more productive and achieve proper goals. Use of checklist notably increases the patient safety within the hospital.

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