Application of Hospital Information System in Radiology Department for Patient Management

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Abstract— Hospital Information System (HIS) used to access information, improve documentation, reduce errors and make use of time. The principle aim of this research was to determine to improve in waiting time, clinical correlation notification period and end user satisfaction after application of HIS in radiology Department in hospital. Quantitative cross-sectional study conducts for a period of one month, before and after execution of HIS in Radiology department in Saroj medical institute, Delhi. Data set was used for this research was extracted from database of the HIS and Radiology Maintenance record regarding clinical correlation and waiting time. The self developed questionnaire is made to access end user satisfaction regarding system. The questionnaire was distributed among Physician, Nurses, Administrative staff, Billing Staff and Radiology staff. The questionnaire has two parts. First part comprising was related to Demographic information of the participants and the Second part including 25 question concerning of end user satisfaction. The data was analyzed using Microsoft Office Excel. The finding of the study revealed that the waiting time in study for the different department in radiology, i.e., X-ray has been reduced from 26.78 to 18.33 hours, CT scan from 15.85 to 10.03 hours and Ultrasound from 27.7 to 14.86 hours after implementation of system and also Clinical correlation report notification period for X-ray, CT scan and Ultrasound reduced from 3-4 to 1 day. On the other hand, end user satisfaction in terms of questionnaire shows administrative staff has the highest mean score (3.8+0.70) whereas Physician has lower mean score (1.96+ 0.61). Thus, HIS result in improve efficiency of working staff, patient management progress, waiting time in study as well as Clinical correlation report notification period. The "End user satisfaction" shows Administration staff is more adaptable whereas physician shows less concern towards system.

Keywords: Hospital Information System (HIS), Clinical Correlation, Waiting Time

I. INTRODUCTION

India has faced many serious challenges in healthcare sector over the years, but timely they progress through making various policy and programme. The acceptance and involvement of IT systems lead to improve healthcare services to simplify their Clinical, Financial, Administration processes through application software known as HIS. It is an approach in Indian Hospital via. Ministry of Health and Family Welfare, Government of India which is Comprehensive integrated Information system i.e., different Hospital combine to work as one unit as one source, one route as well as one management. They are designed to manage different task effectively and efficiently [1,2].

Their role is specific by different way in a unit such as in clinical trial, avoids as unsuitable data gathering and timely notified by means of email to study nurses and physicians about patient which are suitable for clinical trials. By these reduce telephonic communication as well as visit to a place to identify the suitable patient for clinical trial [3]. Computerized white board links with HIS supporting in Emergency department. Example – Emergency radiology in various ways such as it provided up-to-date information, keep track of examination information and serves as an exchange of information centre for radiologists, emergency physicians, radiology technologists and radiology service representatives [4]. The computerized physician order entry (CPOE) system came under CIS may conducive in supporting physician and nurses as by improving patient safety, user-friendliness, drug order management (i.e., drug interaction, allergic alert, etc.), decision support and reduce prescription errors [5]. The surveillance related to Adverse Drug Events (ADEs) in the system has role to monitor and evaluate the effect of drug on patient either beneficial or harmful and to continually improve the use of drug according to their outcome and hence provide appropriate safe and effective drug therapies and Administrative healthcare data work in decision making in health facility by analysing patterns in morbidity, mortality and length of stay. [6,7]

The analysis of performance and control of waste of time as such it may different for different perspective view. By nurses point of view, it include paper-based documentation, waiting for service delivery, elective surgery cancellation, etc. and by physician view it include noscomial infection, transferring between wards and the restroom antibiotic overuse and unnecessary operations [8].

This system protects highly sensitive patient data via Standards intimated by Healthcare Information and Management Systems Society (HIMSS) and Health Insurance Portability and Accountability Act (HIPAA) [9]. They provide some access control in terms of user ID and password, limited parameter of information related to patient. Nursing data is secure in electronic health record by several ways such as periodic security update, encrypting confidential information in information transferring process, data practice policy access to servers by authorized people and the hardware and software repair by authorized staffs [10,11]. The follow-up documentation improves data quality, reduce data entry efforts, and notify lodged patient and securely data accessibility to relevant physician by Health level 7 (HL7) [12].

Further in forthcoming aspects, HIS is one of the initiatives under Health Department that aims at increasing the availability and accessibility of Healthcare services for

the target beneficiary as well as usage and sharing of timely and accurate health information within and outside state for quick decision making and optimal utilization of resources.

II. METHODOLOGY

This Quantitative cross-sectional study was conducted one month before and after implementation of HIS in Radiology department, i.e., from 12 June 2019 to 11 July 2019 and 22 January 2020 to 21 February 2020 in Saroj Medical Institute, Delhi.

The data was collected from database of the HIS and Radiology Maintenance record regarding Clinical Correlation and Waiting time from different sub-departments, i.e., X-ray, CT scan and Ultrasound. A Self developed Questionnaire is made to access end user satisfaction regarding system. The questionnaire was distributed among 36 participants which are Physician (5), Nurses (20), Administrative staff (3), Billing Staff (3) and Radiology staff (5).

The Questionnaire has two parts. First part related to Demographic information of the participants including age, gender, marital status, educational degree and employment. The Second part of Questionnaire Including 25 question concerning of Quality viewpoint (1 question), Information quality (4 question), Service quality (4question), Using criteria (4 question), Perceived benefits (5 question), Decision making (3 question) and Achievement based (4 question). The participants answered the questions based on the 5-point Likert Scale from strongly disagree to strongly agree. Each answer was score from 1 to 5. In order to analyze the collected data, Microsoft Office Excel was used.

III. RESULTS

In a study period from 12 June 2019 to 11 July 2019 and 22 January 2020 to 21 February 2020 in Saroj Medical Institute, Delhi, the following estimate as:-

A. Database compare with and without system instituted

To assess necessity of HIS, relevant database compare before and after implementation of system regarding Waiting time and Clinical correlation in different department of radiology. The pattern observes are as follows:-

1) Waiting time and Clinical Correlation in X-ray department

As it can be seen from "Fig. 1 and 2", waiting time before HIS instituted is 26.78 hours and after is 18.33 hours. The clinical correlation report notification period is 3 days before and after is 1 day respectively. Thus save a time of 8.45 hours for waiting and up to 2 days for report notification period in clinical correlation.
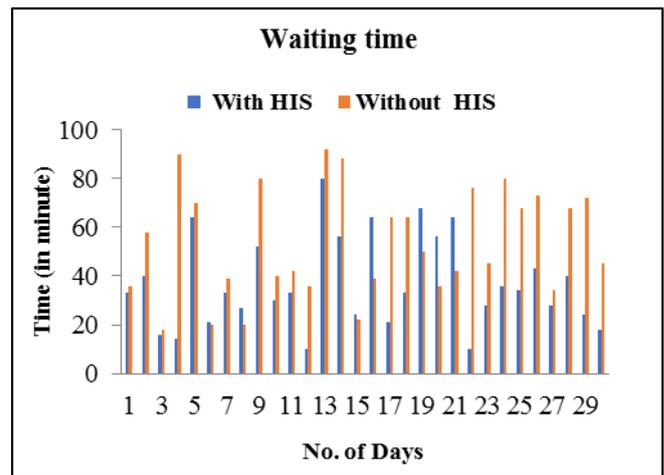

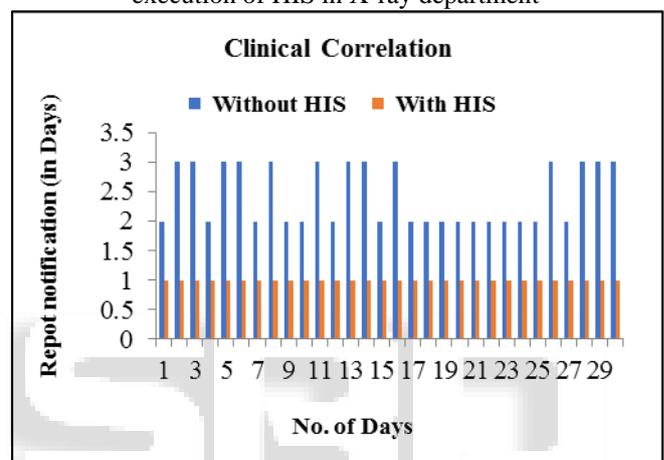Fig. 1: By comparing Waiting time, before and after execution of HIS in X-ray department

Fig. 2: By comparing report notification period of Clinical correlation, before and after execution of HIS in X-ray department

2) Waiting time and Clinical Correlation in CT scan department

According to "Fig. 3 and 4", waiting time before HIS instituted is 15.85 hours and after is 10.03 hours. The clinical correlation report notification period is 4 days before and after is 1 day respectively. Thus save a time of 5.82 hours for waiting and up to 3 days for report notification period in clinical correlation.
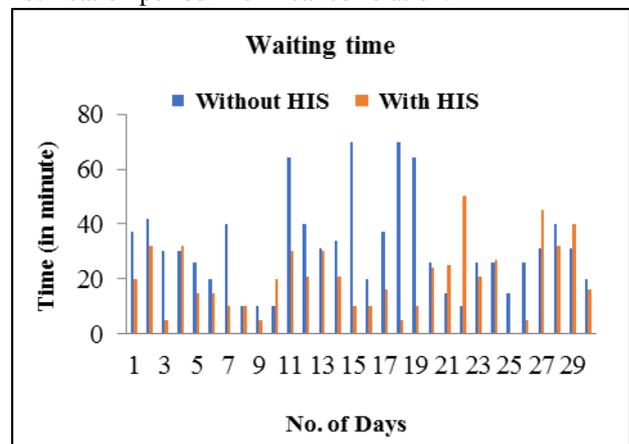

Fig. 3: By comparing Waiting time, before and after execution of HIS in CT scan department
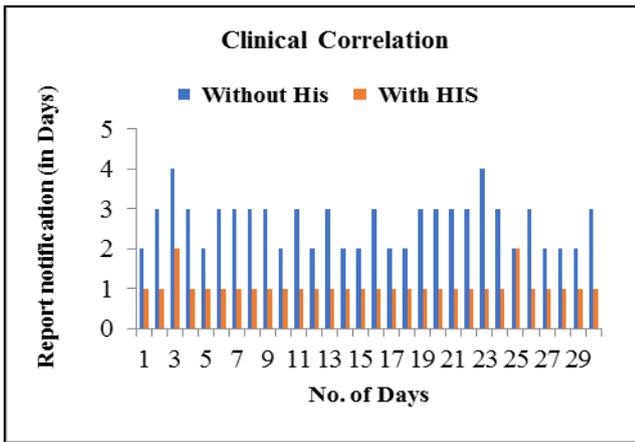
Fig. 4: By comparing report notification period of Clinical correlation, before and after execution of HIS in CT scan department

3) Waiting time and Clinical Correlation in Ultrasound department

In "Fig. 5 and 6", waiting time before HIS instituted is 25.70 hours and after is 14.86 hours. The clinical correlation report notification period is 3 days before and after is 1 day respectively. Thus save a time of 10.83 hours for waiting and up to 2 days for report notification period in clinical correlation.
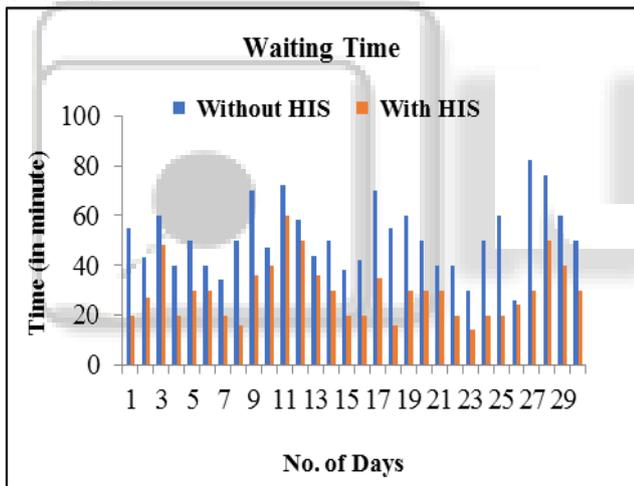

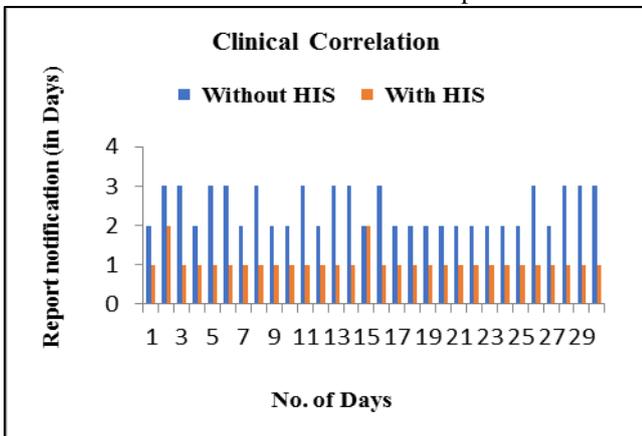Fig. 5: By comparing Waiting time, before and after execution of HIS in Ultrasound department.

Fig. 6: By comparing report notification period of Clinical correlation, before and after execution of HIS in Ultrasound department.

B. End user satisfaction towards System

In the Healthcare department (Fig. 7), 36 End users are selected consist of Physicians, Nurses, Radiology staff, Administrative staff and Billing staff. The questionnaire are distributed among users and it reveal that Administrative staff has highest mean score of 3.8 and Physicians with lower mean score of 1.96 (Table 1).

C. End user satisfaction towards System

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S.NO.	End User	Mean score	Standard Deviation
1.	Administrative staff	3.8	0.70
2.	Billing Staff	3.56	0.65
3.	Radiology Staff	3.2	0.64
4.	Nurses	3.04	0.61
5.	Physicians	1.96	0.61

Table 1: Mean score and Standard deviation related to end user satisfaction.
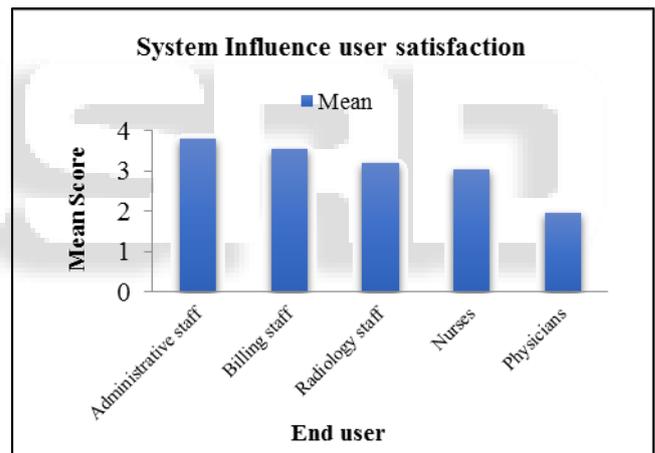

Fig. 7: Impact of System towards End user

IV. DISCUSSION AND CONCLUSION

Before execution of system in Radiology department the clinical correlation notification period was up to 4 days and after which patient treatment started. Similarly waiting time in study for radiology department has go through a number of steps to complete process, i.e., physician appointment, billing counter, take Receipt, receipt submit to radiographer clerk, Clerk coordinates transport with radiographer, transportation of patient to examination room by orderly and test initiates.

But after execution of such system the clinical correlation notification period was reduced to 1 day and similarly waiting time in study for radiology department decreased number of steps to complete process, i.e., physician appointment, billing counter, take Receipt, transportation of patient to examination room by orderly (as patient name and examination number display on screen outside department) and test initiates. The findings in the

study indicate that waiting time in study and clinical correlation report notification period has reduced.

The end user satisfaction survey is incurred in terms of questionnaire among Physician, Nurses, Administrative staff, Billing Staff and Radiology staff. The administrative staff shows more concede efforts towards system whereas physicians show less.

The study revealed that after implementation of HIS improves workflow in radiology department and ensures that system can work effectively and efficiently. Thus, results in timely availability of reports, the clinical decision have been reduced and Patient management improved.

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