Picture Archiving and Communication System (PACS): Clinician's Perspective About Filmless Imaging

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Abstract Picture archiving and communication systems (PACS) are most appropriate means of acquiring, archiving, and communicating all forms of radiology imaging. The present study is to decide applicability of PACS, its exact role in patient care, and benefit as a teaching tool. To compare conventional imaging with picture archiving and communication system from user's point of view, impact of PACS on patient care and teaching. This was a single center, observational study over a period of 4 weeks from 15 January 2010 to 15 February 2010 carried out in Pravara Rural Hospital. For the present study, 100 users from various clinical disciplines were included who routinely use PACS. A pretested questionnaire related to various aspects of PACS was devised considering its advantage to clinicians, role in patient care, and as tool for teaching. Out of 100 users, 85 % users reported PACS easy to very easy for handle. Ninety-four percent users reported PACS as useful tool for the hospital. Fifty-one percent of users found image quality at image review workstation to be good to very good against 49 % found it poor to very poor. There have been several studies to demonstrate the benefits of PACS to users, but many of these have concentrated on radiology trainees, users in a particular department. Present study concentrates on the impact that PACS has made to the working of the clinicians in many different disciplines. The perceived benefits of PACS outnumbered the disadvantages and reflected the widely documented benefits of PACS in the literature.

Keywords Picture archiving and communication system (PACS)

Introduction

Picture archiving and communication systems (PACS) are becoming recognized as the most appropriate means of acquiring, archiving, and communicating all forms of imaging. It is an expensive technology, but becoming increasingly popular. The benefits which it brings to the hospital as compared with film based imaging have been documented. It is being seen as an indispensable part of the drive towards a full electronic patient record. Large amount of literature is available about PACS, but very few reports have been published about its exact benefit to clinicians. The present study was done to know applicability of PACS, role in patient care, and teaching.

Aims and Objectives

To compare conventional imaging with picture archiving and communication system from user's point of view and impact of PACS on patient care and teaching.

Materials and Methods

This was a single center, observational study over a period of four weeks from 15 January 2010 to 15 February 2010 carried out in Pravara Rural Hospital. PACS was established in Pravara Rural Hospital, Loni in January 2009. For the present study, 100 users from the Department of Surgery, Medicine, Obstetric and Gynecology, Pediatrics, Orthopedics, ENT, and Ophthalmology were included who routinely use PACS. Radiologist, nursing, and clerical staffs were excluded from the study. A pretested questionnaire related to various aspects of PACS was devised considering its advantage to clinicians, role in patient care, and as tool for teaching. The questionnaire had combination of responses to statements graduated from 1 to 5 (Table 1).

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In the present study, complete response was received from all 100 respondents. All responses in the form of hard copy were collected, and further analysis was done.

Observations

Present study was carried out in Pravara Rural Hospital, Loni over a period of 4 weeks from 15 January 2010 to 15 February 2010. For the present study, 100 users from the Departments of Surgery, Medicine, Obstetric and Gynecology, Pediatrics, Orthopedics, ENT, and Ophthalmology were given questionnaires related to various aspects of PACS. Users of PACS marked their responses from 1 to 5 for each questions. All 100 users participated and submitted their responses as per time schedule. Analysis of data was done subsequently showed the following observations (Table 2).

Out of 100 users, 85 % users reported PACS easy to very easy for handle. Ninety-four percent users reported PACS as useful tool for the hospital. Fifty-one percent of users found image quality at image review workstation to be excellent. Out of 100 users, 73 % found availability of radiological reports along with images as very useful tool. Fifty-five percent users

Table 1 Questionnaire about PACS

Responder faculty/resident	1	2	3	4	5
Please mark your response as tick [√]					
1 strongly disagree, 2 disagree, 3 not decided, 4 agree, 5 strongly agree					
1. PACS is easy to handle					
2. PACS is the useful tool for the hospital					
3. Quality of image on image review workstation is excellent					
4. Availability of radiology reports on the PACS is advantageous					
5. PACS has improved patient care					
a. Able to show patients their radiological images					
b. Reduction in the time taken to find images for review					
c. Reduction in the time spent finding radiology reports					
d. Patient's consultation has become more time efficient					
6. Impact of PACS on conduct of ward rounds					
a. Changed the way the rounds are conducted					
b. Made it easy to review images during ward rounds					
c. Reduced efforts and time taken to find out images					
d. Able to conduct round efficiently					
7. PACS is easy and convenient than using films					
8. PACS has improved your working pattern					
9. PACS has changed your professional life to a great extent					
10. Introduction of PACS fulfilled most of your expectations					
11. PACS is a good teaching tool					

Table 2 Response of users

No.	Item	1	2	3	4	5
1	PACS is easy to handle	3	7	5	41	44
2	PACS is the useful tool for the hospital	3	1	2	48	46
3	Quality of image on image review workstation is excellent	2	4	43	18	33
4	Availability of radiology reports on the PACS is advantageous	13	4	10	28	45
5	PACS has improved patient care					
	a. Able to show patients their radiological images	21	10	14	20	35
	b. Reduction in the time taken to find images for review	26	6	7	7	54
	c. Reduction in the time spent finding radiology reports	10	18	9	22	41
	d. Patient's consultation has become more time efficient	21	12	16	7	44
6	Impact of PACS on conduct of ward rounds					
	a. Changed the way the rounds are conducted	18	2	22	13	45
	b. Made it easy to review images during ward rounds	8	6	6	10	70
	c. Reduced efforts and time taken to find out images	5	4	6	16	69
	d. Able to conduct round efficiently	16	2	7	30	45
7	PACS is easy and convenient than using films	7	1	13	27	52
8	PACS has improved your working pattern	12	11	9	30	38
9	PACS has changed your professional life to a great extent	5	2	8	14	71
10	Introduction of PACS fulfilled most of your expectations	7	1	30	52	10
11	PACS is a good teaching tool	22	26	1	19	32

opined great improvement in OPD consultations due to ability of showing radiological images to patients. Majority, i.e., 61 % reported great improvement in reduction in time spent in finding images for review. Out of 100 users, 63 % reported significant decrease in time spent finding radiological reports. Out of 100 users, 51 % reported more time efficient consultation of patients. Fifty-eight percent users agreed that availability of PACS has caused major change the way rounds were taken. Eighty percent of users opined that PACS made review of images during ward rounds easy. Eighty-five percent users opined that PACS reduced time and effort to find out images during rounds. Seventy-five percent users opined that PACS made ward rounds more efficient. Out of 100 users, 79 % reported PACS is easy and convenient to use than traditional film based system. Sixty-eight percent users reported improvement in their working pattern after availability of PACS. Eighty-five percent users reported great improvement in their professional life. Out of 100 users, 62 % users reported that PACS fulfilled most of their expectations. Fifty-one percent users opined PACS is a good teaching tool.

Discussion

PACS is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images [1]. Proponents stress its benefits, including the elimination of expensive silver-based film, improved access to new and old films for all clinicians, reduction in the physical storage requirement of bulky films, and lower personnel costs [2]. A limited user survey was undertaken at the Hammersmith Hospital prior to the development of the web browser technology with many fewer users having access to the system. Their survey concentrated on medical staff and on the availability of images and reports before and after the PACS installation [3]. There have been several studies which have attempted to demonstrate the benefits of PACS to users, but many of these have concentrated on particular groups of users such as radiology trainees, users in a particular department or have been more focused in their approach [4–6]. The present study concentrates on the impact that PACS has made to the working of the hospital as a whole and on the working lives of individual clinicians in many different disciplines.

Item 1 PACS is easy to handle

The results were very encouraging as most of users opined that PACS was easy to handle.

Item 2 PACS is the useful tool for the hospital

The results showed 94 % agreeing that PACS had been a useful tool for the hospital. Marked and unanimous response of participants suggested advantage of PACS to the institution.

Item 3 Quality of image on image review workstation is excellent

Mixed response was reported by respondents, i.e., 51 % as image quality as excellent. This could have been due to short experience of the users and will need more experience and time to appreciate the quality.

Item 4 Availability of radiology reports on the PACS is advantageous

The availability of radiology reports alongside the images was considered useful by the majority with 73 % scoring 4 or 5 for this response. For many staff, the existence of a report is as important as the images themselves and the possibility to view both items simultaneously is a great strength of PACS.

Item 5 PACS has improved patient care

For clinicians in outpatient clinics, PACS had improved their consultations with the majority scoring 4 to 5 on all four sections of question 5. The ability to easily demonstrate images to patients, the improved efficiency in finding images, reports, and the overall improved efficiency of the consultation all showed a favorable response. For clinicians whose practice is heavily dependent on

radiology images, such as orthopedic surgeons, the advent of PACS has made a substantial difference to the conduct of their clinics.

Item 6 Impact of PACS on conduct of ward rounds

Item 6 was worded to explore how much PACS had impacted the conduct of ward rounds. Majority of the users reported availability of PACS made ward rounds more time efficient. It reduced time to find images. Overall, PACS changed the way round is conducted.

Item 7 PACS is easy and convenient than using films

Overall, users preferred PACS to film and found it easy and convenient. One of the declared benefits of PACS is the instant availability of images and the need no longer to handle films and film packets physically.

Item 8 PACS has improved your working pattern

The response to this question was very surprising. The fact that 68 % of respondents scored 4 to 5 on this question shows the impact of PACS on improving the working life of many different staff groups. To find such a positive response from such a wide variety of staff groups indicates the substantial impact that PACS has made on the perception of the quality of working life experienced by staff.

Item 9 PACS has changed your professional life to a great extent

For the majority, PACS has resulted in a significant change in professional life. Factors like improved access to images, the ability to discuss images over the telephone, because the images were available in many places simultaneously, the improved time management that PACS enabled, and the absence of lost images.

Item 10 Introduction of PACS fulfilled most of your expectations

This question investigated the degree to which clinicians expectations had been met. Sixty-two percent of respondents scored between 4 and 5 and opined that PACS met with their expectations.

Item 11 PACS is a good teaching tools

This question was constructed to view ability of PACS as a good teaching tool. Mixed responses were found from users, but majority of users opined PACS as a good teaching tool. Widespread use and more application of PACS will be needed to change adverse opinion. The response of the users to the implementation of PACS indicated that it had been a useful advance for the hospital, with images of good quality available alongside reports. It had enabled some improvement in the way in which outpatient clinics and ward rounds were conducted. For most respondents, the system had lessened frustration, improved their working lives, and met with their expectations.

Conclusion

The availability of PACS in a tertiary care hospital and medical college is a step forward to filmless imaging.

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Conflict of interest The authors do not have any disclosable interest.

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