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The Survey of Residents and Radiologists' Attitudes about Access to Patient Information in Teleradiology in Iran

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Abstract: Teleradiology improves patient care by allowing radiologists to provide services without actually having to be at the location of the patient. This is particularly important when a sub-specialist such as a MRI radiologist, Neuroradiologist, Pediatric radiologist or Musculoskeletal radiologist is needed, since these professionals are generally only located in large metropolitan areas working during day time hours. Teleradiology allows for trained specialists to be available. This study aimed to assess the attitudes of residents and radiology professionals towards the necessity of the availability patients' data in Teleradiology. The survey included residents and radiologists in hospitals affiliated to Semnan and Mazandaran Universities of Medical Sciences in Iran. In this study, questionnaires and interviews were used. Results showed that 75% too much needed to patients' clinical data for interpreting of radiology images. Most of the population stated that due to the necessity of making available patient's record when presenting diagnosis, the use of technologies such as Teleradiology and other communication infrastructures are considered as effective factors. The results of this survey showed that quality of patient care can dramatically be increased by using mechanisms such as building infrastructures of Teleradiology, Telecommunication, HIS/RIS and PACS systems.

Key words: Radiologists, attitude, patient, information, Teleradiology, Iran

INTRODUCTION

Teleradiology is often defined as the electronic transmission of radiographic images from one geographical location to another for the purposes of interpretation and consultation. Teleradiology has been subject of a number of health technology assessments in different countries. With regard to the context of use (Takada *et al*., 2003; Krupinski *et al*., 2003). Also, Teleradiology refers to electronic transmission of radiographic images through infrastructures of Telecommunications and in the long routes.

Teleradiology is the most advanced medical expertise in Telemedicine. It can enhance the accuracy of physicians diagnosis (Gale *et al*., 1997; Lee *et al*., 1998; Berry and Barry, 1998). Teleradiology is transmission of electronic medical images through internet to remote locations to improve and accelerate the diagnosis and the treatment. The increased development and deployment of digital imaging systems and the quickly increasing availability of high bandwidths allowing transmission of large data volumes at high speed have dramatically widened the scope of this medium (Larson *et al*., 2005; Binkhuysen *et al*., 1995). This technology provides fast and cost effective services to patients by radiologists who are based in health centers located in remote locations. Teleradiology was first developed for military purposes. Field units could sent radiology images to hospitals at the home country for diagnosis and further patient management.

The 1st commercial Teleradiology systems in the eighties worked with camera systems or video-grabbed selected hardcopies for subsequent digitized image transfer. An improvement was the introduction of the laser digitizer which also had the disadvantage of being able to handle only one image at a time. In the mid-80's the 1st generations of PACS were installed in the medical environment for clinical evaluation. It soon became clear that the change from analogue to digital processing of medical images could change the workflow dramatically (Binkhuysen, 1992).

The use of compression technology and RIS/PACS in conjunction with the Teleradiology, makes easier and faster access to information. Teleradiology providing unlimited access to images for attend physicians, students, residents and other users wherever are located will be effective in continuing patients' care and increasing of experience and knowledge of physicians

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(Larson *et al*., 2005). Teleradiology had become a reality but it took another 10 years before the relatively low performance and high costs of the computer systems available at that time would develop into feasible applications. Besides the lack of affordable image handling systems the high cost of data transmission was also a serious hurdle hindering a more widespread implementation of Teleradiology.

However during the last decennium most technical limitations have resolved thanks to the widespread introduction of digitization processes in radiology practices and the low cost of internet communication (Thrall, 2007).

Now-a-days, the spread of internet access for everyone has facilitated the sharing of radiology images and the getting of diagnostic feedbacks among physicians and other clinical staff. So that one of the goals of Teleradiology is to make available medical information and records for physicians through RIS/PACS and the infrastructures of Telecommunications. Therefore, Teleradiology through instant access to information needed for physicians is effective in reducing of treatment risks and in patients' improving. It provides the capability for physicians to access to the required information wherever they need them via PC, PDA, phone, video conferencing services etc. (Franken *et al*., 1997a, b; Hearaly *et al*., 2008). This reduces the time required for the interpretation of radiology reports and providing additional information, improves diagnostic reports and treatment (Anderiol *et al*., 2004; Rowberg and Price, 1991; Tachakara *et al*., 2001).

In the country, due to the increased volume of radiology reports, the reduction of direct contact between care providers and distribution of patient data in various clinical systems deployed in different places, radiologists when reviewing and interpreting of reports have not adequate and timely access to patients' records and information. This study aimed to assess the attitudes of residents and radiology professionals towards the necessity of the availability patients' data in Teleradiology.

MATERIALS AND METHODS

The survey included residents and radiologists in hospitals affiliated to Semnan and Mazandaran Universities of Medical Sciences in Iran. Random and purposive sampling was carried out. In this study, questionnaires and interviews were used. A review of the literature, a survey instrument was developed that included up to two parts primarily related to demographics and then statistical society attitudes towards the role of patient information in the interpretation of radiology images. A covered letter described the aims of the study, explained that response to the survey implied consent to participate and the participants were assured that all individual responses would be kept confidential.

A pilot version of the questionnaire was sent to 20 people randomly selected from the list of educational supervisor of the hospitals. The final version of the questionnaire which was an anonymous questionnaire was given to all residents and radiologists of the hospitals. The 20 pilot study participants were excluded from selection. Two questions were raised in the interviews:

- What are the reasons that cause the clinical data are not used for the interpretation of radiology images?
- How the patient's clinical information can be helpful in the interpretation of radiology images?

The data were interpreted based on the interviews reports and data from questionnaires. Inter-rater reliability for the categories was assessed and there was found high reliability (0.95). Analysis of questionnaire data was conducted with the SPSS application.

RESULTS AND DISCUSSION

About 60% of the statistical society were involved in this study. Results showed that 65% of them were radiologists. About 60% were male and 52% were between 35 and 40 years of age. About 74% of them used HIS and 78% worked in teaching hospitals (Table 1). Results showed that 50% of the statistical community used the phone for exchanging of patients' diagnostic information (Fig. 1). Results showed that 75% too much needed to patients' clinical data for interpreting of radiology images (Fig. 2).

Table1: Demographic profile of residents and radiologists

Charactirctis	No.	Percentage
Job		
Radiologist	15	65
Resident	8	35
Sex		
Male	16	69
Female	7	31
Age		
>35	19	39
35-40	12	52
<40	2	9
The use of HIS		
Yes	17	74
No	6	26
Work location		
Teaching hospital	18	78
No teaching hospital	5	23

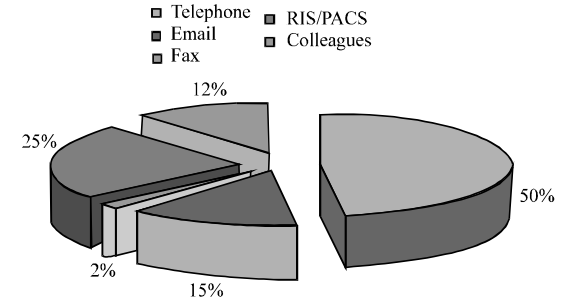

Fig. 1: The use of various communication means for exchanging of patients' diagnostic information between residents and radiologists

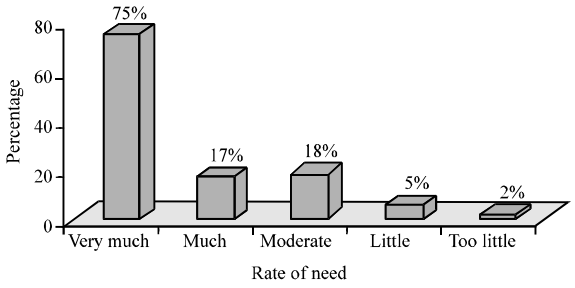

Fig. 2: Rate of residents and radiologists' needs to clinical information when interpreting radiology images

The findings showed that most radiologists for inserting their reports were using traditional methods and tools based on patient's medical records instead of using electronic services such as HIS. In interviews, they stated that in most cases in order to interpret their reports referred to patients' previous medical records. All of them stated that access to patient records and more information retrieval was important and it can be effective in more correctly interpretation, providing a more accurate diagnosis and revising of the final report.

Most of the population stated that due to the necessity of making available patient's record when presenting diagnosis and the taking of other experienced colleagues' comments, the use of technologies such as Teleradiology and other communication infrastructures are considered as effective factors. Some of radiologists stated that despite the importance of patients' medical data, the main factor for not using of Telecommunication technologies such as Teleradiology was the lack of access to these technologies in institutions where they were working.

Most of the statistical community stated that they were quite confident to their colleagues' recommendations that were found through the Telecommunications services. Some declared that had access to the opinions of colleagues and patient's data by using manual procedures and sending referral to colleagues. Information systems have largely increased care efficiency (Hearaly *et al*., 2008; Tachakara *et al*., 2001). Changes in technology and care have increased pressure and workload of radiologists in providing of timely interpretation of radiology images (Kangarloo *et al*., 2000). Although, now-a-days, many health care institutions are equipped with electronic patient records to increase availability of physicians to patients' diagnostic information but these systems are not still able to provide timely information to radiologists during clinical studies. Even when these systems are available in the reading room of doctors due to time constraints, it is not possible to evaluate the efficiency of clinical data. The studies have showed that many radiologists not only feel to have inadequate access to clinical data to interpret radiological images but also feel that there are not adequate mechanisms to track the patient status at every visit (Palombo *et al*., 2002; Kumar and Krupinski, 2008).

The results of this study showed that radiologists believed that much useful information of their patients is in medical records and despite the importance of the medical records in reaching the correct diagnostic interpretation, many radiologists when dealing with patients have not access to these records. Of course, time limitation was the main reason of lack of physician access to these information. It is necessary to use communication infrastructures such as Teleradiology services for quick access of doctors and overcoming barriers of distance and time constraints. The results suggest that most of radiologists were dissatisfied from methods used to access information for interpreting of medical images and they placed great priority for the improvement of mechanisms of access to patient records. They argued mechanisms that were currently used in hospitals for monitoring of patients status and tracking of their treatment are inefficient. Therefore, the need to create an integrated modular system for the identification, selection, the retrieval and automatic display of the needed information for professionals when interpreting of medical images and the need to create reminder and warning systems to track patient status.

Overall, these programs greatly impact on radiologist satisfaction and on the increase of quality of patient care and interpretation of diagnostic images. The results of this study suggest that we need a system that to be able to properly organize and retrieve the clinical data and then this information is provided for radiologists efficiently and timely. For example when interpreting of radiology images, clinical data can be retrieved and updated in electronic format through Teleradiology services. Results showed

that most radiologists said they are eager to use these services in future. Also, the majority of them believed that these systems will have great impact on the quality of their diagnostic interpretation. Also, many studies reported that radiologists tend to track the status of their patients through their interpretive reports.

CONCLUSION

According to the results of this survey, quality of patient care can dramatically be increased by using mechanisms such as building infrastructures of Teleradiology, Telecommunication, HIS/RIS and PACS systems and creating of warning systems to remind the future references of patients on the days, weeks or months later in order to make available the information required by radiologists to expedite diagnosis and to provide more accurate and more appropriate diagnostic and interpretive reports.

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