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Saudi patients' preferred modes of receiving radio imaging reports from radiologists, their impact, and determinants – a survey

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Abstract. – OBJECTIVE: To review patients' perspectives regarding getting imaging reports from radiologists and the factors affecting their desired mode of receiving reports.

SUBJECTS AND METHODS: This cross-sectional survey was conducted in 2022 at a tertiary hospital in Saudi Arabia. Patients undergoing imaging investigations were surveyed regarding real-time communication and delayed communication for normal and abnormal reports. We also asked about the impact of receiving reports and their timing. We used a five-point graded Likert scale for responses. The scores of responses were correlated by age group, gender, and type of report.

RESULTS: We surveyed 377 patients. 37.4% (141) of participants and 40% (181) of participants expressed a strong desire or a desire to receive reports on the same day. The scores for receiving same-day abnormal reports were higher than for normal reports (*p*-value = 0.03). 259 (68.7%) patients wanted to get the report from their physician. Significantly more patients with abnormal reports wanted to review them with their physicians than patients with normal reports (*p*-value < 0.001). Getting reports quickly positively affected the mental health of patients. 57% of patients preferred receiving reports on abnormal findings within two hours, while 45.9% preferred receiving routine or normal reports within the same time frame. The value of radiologists' prompt reporting is appreciated by patients regardless of the type of results. Females reported a more positive impact on mental health from getting a radiology report sooner than males (*p*-value = 0.028). Age group did not correlate with real-time communication, delayed reporting, or the impact on mental health.

CONCLUSIONS: The desire to quickly receive investigative radio-imaging reports by Saudi patients was complemented by reviewing the outcome with the attending physician, and it had a more positive impact on mental health in females than in males.

Key Words:
Radio-imaging, Patient centered approach, Reporting of investigations, Physician interphase, Tele-reporting, Mental health.

Introduction

Radio imaging is a vital investigative tool to help physicians and surgeons diagnose, select a management mode, and monitor progress when caring for their patients. Radiologists' contributions continue to increase despite the fear of artificial intelligence being used more and more to review digital images[1,2]. Conventionally, radiologists who report the findings of these investigations do not communicate them to patients and their relatives[3]. However, the modern patient-centered approach to health care has made the client an important fulcrum; therefore, different healthcare providers liaise with the patient and the physician. Thus, radiologists are expected to communicate with the patient and relatives about the findings of an investigation as soon as possible and using simple, understandable terminology[4,5].

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With recent advances in investigative tools and the digitalization of image viewing, the time required for capturing images, transferring them to an expert for viewing and interpreting, montaging different images, and comparing the findings with previous reports has become easier and quicker[6]. However, their workload has increased due to increased dependence on radiological investigations for diagnosis and radiology's widespread use in screening for health ailments and research. This often results in delays in interpreting and communicating results to physicians and clients[7]. Thus, a balance to provide accurate reporting of an investigation as soon as possible has become challenging but essential.

Delay in getting investigation reports negatively affects patients' mental health. Waiting causes anxiety, and not understanding the meaning of a report and a delay in reviewing it with the physician are known to cause anxiety and often depression among patients if abnormal reports are shared with patients without explanation[5]. However, radiologists' sharing the report with patients directly remains debatable even after two decades[8,9].

With electronic health information management systems, transferring information from one department to another and from one hospital to another using the same network has become easy and quick. In addition, online appointment systems and digital communication tools enable patients to receive lab and radiology tests wherever it is most convenient for them, regardless of their physician's or radiology department's location. Furthermore, clinicians can now utilize social media and the internet to contact clients and deliver reports. Although reporting is said to be quick, the preferred pattern of how radiologists should send reports to physicians has been established but has not yet spread to patients[10,11]. While formulating such norms, it is essential that feedback from all stakeholders be obtained and acted upon.

Few studies[12-15] have mentioned patients and referring physicians' opinions about how radiologists report to patients, the need for review reports with the attending physician, and variations in a normal report *vs.* abnormal findings noted in radio images. However, to the best of our knowledge, no such study has been undertaken on Arab patients.

In this research paper, we present the patients' perspectives on current and desired modes of receiving radio imaging reports, their impact on mental health, the desired time frame of receiving reports, and demographic determinants at city hospitals in the Qassim Region of Saudi Arabia.

Subjects and Methods

Setting

The current cross-sectional prospective study was conducted at Buraydah City Hospitals in Saudi Arabia between June and September 2022. Informed written consent was obtained for the survey. The Helsinki Declaration was strictly followed to conduct the study. Adult patients undergoing radio imaging examinations at all government hospitals of the study site were the study population. Patients who underwent breast imaging and fluoroscopic examinations or who declined to participate were excluded.

Sample Size

To calculate the sample size for a cross-sectional survey, we assumed that the prevalence of patients' preferences for direct patient communication and access to radiologic study results would be 50%. To achieve a 95% confidence interval and an acceptable error margin of 5%, we needed to interview at least 357 patients. To compensate for loss of data, we added an additional 5% to the sample. Thus, the final sample was to be at least 375 patients. We used Openepi software to calculate the sample size[16].

Study Procedure

Our investigator approached the patients in the waiting area of the digital imaging department, explained the purpose and objectives of the research, and gave those who agreed a pretested survey form. The demographic details included gender and age group. The participants were asked to explain how the radiologist communicated with patients about their scan results (all reports, normal and abnormal) in real-time. In the next section, they responded to questions related to communication delays. Their preference was to receive all reports, normal and abnormal, and review them with the attending physician. In the third section, the questions were related to positive and negative effects of the reporting pattern on their mental health. Finally, participants provided their desired time frame for receiving both normal and abnormal reports. One response required participants to select one of five graded Likert-scale-based options[17]. The participant circled the most desirable time frame option to receive their report.

The survey questionnaire was adopted from a survey by Thai et al[4] in the USA. The questionnaire was translated into Arabic for understanding by the participants of the present study. We applied the random process of selecting each

city hospital, day of the week, and morning or afternoon shift for fair representation of the entire study population. The questionnaire was pretested and underwent reverse translation to ensure clarity of questions and internal validity. The principal investigator constantly supervised the survey at different hospitals and provided telephonic guidance in case of confusion regarding the survey tool.

Statistical Analysis

The data were entered on the Microsoft Excel® spreadsheet. After a consistency check, the data was analysed suing SPSS Version 23 (IBM Corp., Armonk, NY, USA). The univariate nonparametric method of analysis was performed. The qualitative variables were presented as number and percentage. The outcome variable, being categorical with five ordinal values, was analyzed to estimate median and interquartile range (IQR)[18]. To compare outcomes of normal *vs.* abnormal reports, male *vs.* female, and age groups of less than 40 years and more than 40 years, we used the Wilcoxon rank test to estimate z and two-sided *p*-values. A p-value < 0.05 was considered statistically significant.

Results

We surveyed 377 patients attending radio imaging departments for their examinations. There were 182 (48.3%) males and 195 (51.7%) females. Of the participants, 37 (9.8%) were less than 20 years of age, 211 (56%) were 20 to 39 years of age, and 129 (34.2%) were 40 and older. There was adequate representation of both genders.

The desire to receive the radio imaging report on the same day was expressed strongly by 141 (37.4%) patients and affirmatively by 181 (40%) of patients. The median and IQR of patient response scores for real time communication, delay in communication, and social impact on mental health is presented in Table I. The score for getting the report on the same day was higher for abnormal reports than for normal reports (Wilcoxon z = -2.97, p-value = 0.03). 259 (68.7%) patients wanted to receive the report through their physician. To review the report with their physician was desired significantly more for abnormal reports than for normal reports (Wilcoxon z = -4.35, p-value < 0.001). Getting reports early positively affected the mental health of patients.

Patients' perceptions of an acceptable delay in receiving both normal and abnormal radio imaging reports are presented in Table II. More than half of patients preferred to receive abnormal reports within two hours of testing whereas normal reports were expected to be communicated within eight hours, according to 70% of patients.

The comparison of responses regarding patients' preferences for receiving normal and abnormal reports in real-time communication, delay in reporting, and impact on mental health is shown in Table III. Females reported a positive impact on mental health by getting radiology reports sooner compared with males. (p-value = 0.028).

Table I. Patient perceived response score for different components of receiving report from radiologists.

Components of receiving report from radiologists		Patient response score		Validation
		Median	Inter quartile range	
Real time communication	All results same day	1.0	-1.0; 2.0	Wilcoxon ranked test z = -2.97 p-value = 0.03
	All normal results same day	1.0	-1.0 1.0	
	All abnormal results same day	1.0	-1.0; 2.0	
Delayed communication	Wait and review all results with physician	1.0	0.0; 2.0	Wilcoxon ranked test z = -4.35 p <0.001
	Wait and review normal results with physician	0.0	-1.0; 1.0	
	Wait and review abnormal results with physician	1.0	-1.0; 2.0	
Social impact on mental health	Waiting for my exam results causes anxiety	1.0	0.5; 2.0	Wilcoxon ranked test z = -11.67 p-value <0.001
	Receiving my exam results sooner would reduce anxiety	1.0	1.0; 2.0	
	Receiving results will increase anxiety	-2.0	-2.0; 0.0	

Table II. Patient perceived acceptable time frame for getting radio imaging reports.

	2 hours	8 hours	24 hours	2-3 days	1 week
Abnormal report	215 (57%)	59 (15.6%)	67 (17.8%)	27 (7.2%)	9 (2.4%)
Normal report	173 (45.9%)	88 (23.3%)	68 (18%)	36 (9.5%)	12 (3.2%)

Chi-square = 5.25 degree of freedom = 4, *p*-value = 0.022.

Table III. Comparison of patient response score for normal and abnormal reports by gender and age groups.

Real time communication		Normal report			Abnormal report		
		Median	IQR	*p*-value	Median	IQR	*p*-value
Gender	Male (182)	1.0	-1.0; 1.0	0.745	0.0	-1.0; 1.0	0.146
	Female (195)	1.0	-1.0; 1.0		1.0	-1.0; 2.0	
Age-group	<40 years (248)	1.0	-1.0; 1.0	0.407	1.0	-1.0; 2.0	0.672
	40 + years (129)	1.0	- 1.0; 1.0		1.0	-1.0; 2.0	
Delayed communication							
Gender	Male (182)	0.0	-1.0; 1.0	0.154	1.0	0.0; 2.0	0.291
	Female (195)	0.0	-1.0; 1.0		1.0	-1.0; 2.0	
Age-group	<40 years (248)	0.0	-1.0; 1.0	0.898	1.0	-1.0; 2.0	0.645
	40 + years (129)	0.0	-1.0; 1.0		1.0	-1.0; 1.0	
Impact on mental health		**Positive impact**			**Negative impact**		
		Median	IQR	*p*-value	Median	IQR	*p*-value
Gender	Male (182)	1.0	0.0; 2.0	0.028	0.0	-1.0; 1.0	0.235
	Female (195)	1.0	1.0; 2.0		0.0	-1.0; 1.0	
Age-group	<40 years (248)	1.0	1.0; 2.0	0.478	0.0	-1.0; 0.0	0.428
	40 + years (129)	1.0	0.0; 2.0		0.0	-1.0; 1.0	

Discussion

This survey of a representative sample of adult Saudi patients from the Qassim Region suggests that more than three-fourths of patients were keen to receive radio imaging reports from radiologists on the same day. More patients expressed this desire for abnormal reports than for normal reports. Two-thirds of patients wanted to receive abnormal reports from the attending physician along with review and explanation. This desire to involve the attending physician was more pronounced for abnormal reports than for normal reports. Receiving an early report had a positive impact because it reduces anxiety among patients while waiting for radiology reports. Female patients were more relieved of anxiety by getting a timely report than male patients.

The desire to receive radio imaging reports on the same day by three-fourths of patients in our study is consistent with Thai et al's study[4]. They noted that 81.5% of 368 patients in New York in the USA wanted reports of radiological investigations on the same day. In another study in 2009 from Boston[19], also in the USA, the authors noted that only 12% patients wanted the radiologist to provide the report telephonically and another 2.6% wanted to meet with the radiologist to get the report. Rapid improvements in communication, social media use, wider use of patient portals, and patient-centered approaches could explain the difference in patients' responses regarding interaction with radiologists and getting quick reports for recent studies[20,21].

In our study more patients preferred to receive radio imaging reports with abnormal findings on

the same day than reports with normal findings. This ratio was similar for abnormal and normal reports (65.9% *vs*. 65.8%) in a study conducted in US[4]. Fewer than one-fourth of patients desired abnormal reports from a radiologist in the Boston study[19]. It seems that patients want communication from the radiologist for abnormal reports but through attending physicians who can correlate the radiology report with clinical findings and explain the outcomes of radiology testing in terms of a management plan. When a screening campaign on a healthy population is being conducted, the proportion of normal reporting is likely to be high. In the present study, patients referred for breast cancer screening were excluded. The patients routinely undergoing investigation and reporting for screening purpose were therefore less likely in the present study. Therefore, extrapolating from the outcomes of patient preferences for getting reports to the population undergoing screening should be done with caution.

The patients were keen to wait and liaise with the attending physician to review the report rather than get it from the radiologist if the report was abnormal. Studies[4,5,19] have documented patients' preference for physicians' involvement in discussing the imaging report after the clinical presentation. The patient's preference for waiting and involving the attending physician significantly differed between abnormal and normal reports in our study. This observation was consistent with the findings of Thai et al[4] and Mangano et al[19].

Most of the patients in the present study were referred to the radio imaging department if they were clinically suspected to have an ailment and the attending physician wanted either confirmation or a detailed staging of the disease to review the impact of possible interventions. In such situations, getting a normal report is a welcome relief for both patient and physician.

Female patients had more positive perceptions of getting a timely report from the radiologist compared with males. Such prevalence of anxiety and other mental health problems are higher in females than males[22]. Prioritization of releasing reports to female patients earlier should be considered to address their anxiety, and extra care should be taken to inform them in cases of abnormal reports. Patients assume that it takes less time for the radiology team to interpret images without abnormal findings, so they can report their findings more quickly. With technological support and the advent of artificial intelligence in the field of radiology, this has become possible; but the workload on human resources to meet such demands must be considered[23,24]. From a radiologist's point of view, this patient-centered approach to communicating with patients is beneficial but demanding. This approach makes radiologists feel like members of the health team interacting with patients instead of just being an addendum to clinical services[24]. However, radiologists will need effective training to develop the necessary communication skills to discuss the outcomes of the imaging evaluations with patients[21]. In addition, it is vital to maintain strong collaboration with the physicians providing referrals to collect all relevant clinical information. Therefore, frequent liaising and discussions with physicians are needed before assertive communication occurs with the patient based on the imaging report alone[3]. The trend toward direct communication between the radiology team and patients should also be viewed from physicians' perspectives[5]. Therefore, it is vital to study physicians' perspectives on direct communication from radiologist to patient. Moreover, it is beneficial to emphasize the development of patient portals by hospital administrations and the facilitation of patient communication by departments[5]. They must also ensure guidelines are established to avoid disputes among health care providers in case of legal issues raised by patients in this regard.

Limitations

There were few limitations to the present study. This being a cross-sectional survey, causal associations between dependent variables and outcomes should be assumed with caution. Few known determinants, such as education, occupation, affordability, and chronicity of health ailments, were collected. They could have further enhanced the strength of the recommending policies.

Conclusions

Patients are said to be one of the team members making informed decisions for their health issues. The policy to promptly provide them with reports of examinations by the investigating team can work as a double-edged sword because it has both benefits and disadvantages. All stakeholders should discuss, lay out protocols, and periodically review the policy of providing reports to patients before the attending physician has access to them. The attending physician should have time to correlate radiological results with previously collect-

ed clinical findings or to plan to collect them after the imaging report is reviewed. Such a survey is one positive step in the direction of patient-centered policies for health care in the Qassim Region and for other Arab populations with similar expectations and attitudes toward health services.

Authors' Contribution
All the authors take complete responsibility for the content of the manuscript. All the authors have read and approved final version of the manuscript.

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Conflict of Interests
The authors declared no conflict of interest.

Ethics Approval
The authors have received prior approval from the Ethical Research Committee at Qassim University Saudi Arabia and from the Regional Research Ethics Committee Ministry of Health Saudi Arabia (approval code: 6.7-43-5477).

Data Availability Statement
The data is available and could be shared upon request.

Informed Consent
Informed consent in the local language was taken from the participants before the start of the study.

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