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ISSN Online Edition: 2673–6136

Journal Homepage: www.karger.com/sjh

Publication Data: *Saudi Journal of Health Systems Research* is published 4 times a year. Volume 4 with 4 issues appears in 2024.

Karger

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Saudi Journal of Health Systems Research

Vol. 4, No. 2, 2024

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Cover illustration
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Karger

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Saudi Journal of Health Systems Research

Review Article

Saudi J Health Syst Res 2024;4:57–63
DOI: 10.1159/000535623

Received: August 17, 2023
Accepted: November 27, 2023
Published online: January 4, 2024

An Overview of the Medical Tourism in Qatar: Where Do We Stand?

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Keywords
Global health · Health policy · Medical tourism

Abstract

Background: Since the early 2000s, the Qatari Government has been proactively trying to provide world-class healthcare for its population free at the point of use. The Qatar National Vision 2030 advocates developing a medical tourism industry, which would continue to provide world-class healthcare for its citizens and residents, provide high status employment, and expand its sustainable economic base. ***Summary:*** Currently, the outbound medical tourism appears to be higher than the inbound tourism in Qatar, but this trend may be reversed in the future given the publicity generated by the recent FIFA World Cup and the large number of people who visited and learned about Qatar as a safe and developed destination in the Middle East. In this review, an in-depth understanding of the complexity of medical tourism per se and, in particular, the complexity of medical tourism as a distinct niche market within the Qatari context is described. ***Key Message:*** Considering the tangible and intangible infrastructure, Qatar boasts a very high potential to place itself among the top medical tourism destinations in the region.

Introduction

Medical tourism is a growing niche market within the tourism sector which has expanded significantly since the start of the 21st century [1]. Medical tourism can generally be described as patients traveling far away from the area where they live and even overseas with the aim of receiving critical or optional medical treatment [2, 3]. The expression – medical tourism – has evolved from the tradition of citizens from developed countries traveling to developing parts of the world to buy a range of cheaper, potentially better medical services than those they can obtain in their home country.

A study by Radzi showed that medical tourism is frequently classified under three main categories from a country's perspective [4]. The first category is inbound, which means foreign individuals visiting or coming into a particular country seeking medical help based on the origin of travel. The second one is outbound, which refers to natives of a country traveling to a different country outside their environment seeking medical help. The third category is known as intra-bound, which represents a developed form of domestic tourism whereby natives visit different regions or cities of their country. Connell identified financial cost of care provided, value of treatment, application of medical technology, faster treatment, and confidentiality of the personal data of potential patients as key factors that

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affect the nature of medical tourism [3]. However, Hodges noted that although medical tourism offers a number of advantages for the travelers, there are hazards involved with seeking medical help overseas [5]. These include the varying standards of hospitals and physicians and the follow-up process after completing the medical process, as patients tend to leave soon after treatment to return to their home country. Hall reports that many countries are currently creating pragmatic arrangements to service medical tourism [2]. Haseltine concurred stating that low-cost transportation, advanced incomes, information and technology improvements, and high-quality services all support the concept of travel to faraway countries for medical treatments [6].

On the other hand, various factors could be associated with patients' choice of destination for medical tourism. Personal traits including status of health insurance, income level, and age affect the decision of the patient to choose health services and destinations [7]. Other traits such as gender, income, education, insurance, and perceived risks have been noted as influencers of the relationship between loyalty and satisfaction of the customers based on their influence of customer perceptions of a service or product [8]. For example, a study by Klein et al. [7] contended that a tourist's income level is a crucial determinant of his/her choice of destination. Often, patients in the higher income bracket seek high-quality medical service and are keen on being offered the best quality care and service. Jun and Oh [9] found that tourists in the low-income bracket overlook service level but are keener on the cost of medical tourism. As for perceived risks, a study by Khan et al. [10] identified five major perceived risks in international medical travel such as risks concerning health at medical tourism destination, long flight risks, risks of medico-legal nature, recuperation and preoperative risks, and other risks related to the destination such as crime, racism, crime, and sexual assaults.

Healthcare Ecosystem in Qatar

Qatar is a fast-developing country and has one of the most stable and flourishing of the global economies. With Qatar's political stability and saving rate being higher than that of other countries within the Middle East, it has adopted one of the greatest sustainable development plans in the Middle East region [11]. Since 2003, Qatar started to focus on national savings in order to achieve sustainable development. Consequently, investments that ensure a high level of economic change, enlarge integration capability, and support private investments are widely encouraged by the Government of Qatar to assist in progressing the long-term aims of its economy [12].

The two Qatari national health strategies for 2011–2016 and 2016–2022 aimed to establish the pillars of the future of health in the State of Qatar [13, 14]. These plans required the development of a competitive and diversified economy, which can ensure a high living standard for all people in Qatar through the future [15]. The plans focused on maintaining a prosperous healthcare network, building a caring society that is founded on high ethical standards, and the ability to perform an important role in worldwide partnerships for development.

A study by Ram [16] stated that Qatar was the top developing healthcare market in the Gulf Cooperation Council (GCC) from 2008 to 2013 with a high compound annual growth rate (CAGR) of nearly 23% annually during that period. According to the International Business Publication in 2012, Qatari hospitals provided world-class treatment at 10–20% less than the cost of American hospitals. As a result, a rising number of patients around the world are making Qatar their preferred medical destination [17].

A landmark achievement for the medical care in Qatar was the establishment of the Extra Corporeal Membrane Oxygenation (ECMO) program in 2014 [18]. This was a strategic investment by the senior leadership of the health sector that proved successful by dropping the mortality rate for severe respiratory failure patients significantly, thereby increasing chances of patient survival [19]. In addition to that, robotic surgery in Qatar has developed over the past few years with more doctors meeting the skills criteria to carry out robotic surgery besides performing more conventional surgery using the most up-to-date technologies [20]. As a result, more people were encouraged to come and visit Qatar in pursuit of high-quality medical services [21]. Smith and Puczko [22] noted that Qatar is listed as an elective medical tourism destination and is identified as a center for cosmetic surgery for many travelers including obesity-related operations. With these huge investments into world-class healthcare facilities and medical services that the Qatari Government has made for its people, it is now considering how to best expand its nascent medical tourism industry as part of the government's plans to develop new, sustainable industries.

Most Qatari medical centers and hospitals are accredited by internationally recognized accrediting agencies. This is part of Qatar's rules that hospitals must be accredited by both the Qatari Ministry of Public Health and at least one international accreditation body. The Joint Commission International (JCI) is the main accreditation agency with the authority to accredit medical centers outside the USA [23]. The JCI has given accreditation to the Hamad Medical Corporation (HMC) in Qatar, which includes all HMC hospitals and other private hospitals in Qatar [24].

In developing countries, medical tourism is rising as a profitable sector of the economy. A report published by Market Research Future about the Global Medical Tourism Market showed an impressive CAGR of 21.4 percent for the medical tourism industry between 2018 and 2023 [25]. The forecast indicated that the Global Medical Tourism Market would reach USD 226,762.70 million by the end of 2023. The report also showed that Asia Pacific accounted for a 43.7 percent global market share. Investment in this business field is a way of generating income, getting better services, creating foreign exchange, generating an extra stability of trade, and improving tourism in general [26].

Although the medical tourism industry has been described as lacking "authoritative data on the number and flow of medical tourists between countries" [27], the International Healthcare Research Center estimated that the global medical tourist and patient flow was about 11 million individuals per year [28]. According to Hall, many countries have taken up the unique business opportunities that medical tourism offers [2]. Countries such as the UAE, India, and Thailand are considered to be new centers in comparison to the UK and USA which both are old centers in welcoming medical tourism [29]. An example of the rapidly developing medical tourism sector is India, where in 2015 it was valued at about USD 3 billion with a very optimistic forecast [30].

Since the beginning of the 21st century, Qatar started transforming into an international center for medical tourism with a broad variety of healthcare centers providing a range of medical services [22]. Although Qatar is a developing country, Cohen [31] and Smith and Puczko [22] argue that it is protected against many of the negative factors which most of the developing countries are suffering from. Such factors include inefficient power supply, lack of water, and infrastructure limitations, all of which impact upon the potential for creating a positive image favorable for the development of medical tourism. This is because these factors influence both the quality of services offered and customers' satisfaction. However, there are some other factors which might impact the performance of the medical tourism sector in Qatar. Some of these challenges identified back in 2011 include lack of coordination, concerns about possible complaints related to bad results of medical care, lack of strong and efficient human resource management, lack of staff training, complications within the customer services department, and lack of effective marketing schemes [32]. In a competitive market such as medical tourism, marketing is critical to the development of the sector. However, Qatar has come a long way since then with drastic reforms to the labor laws [33] and overall progress in the healthcare sector [34]. For example, primary healthcare is provided by health centers governed by Primary Health Care Corporation (PHCC). These centers have been accredited by Accreditation Canada International (ACI) and focus on providing high-quality services to all patients [35]. The number of centers increased from 22 centers in 2012 to 31 centers in 2023, providing care to more than 1.7 million registered patients covering the whole of Qatar [36]. The tertiary care delivered through HMC has also seen an exponential rise in the infrastructure and level of services provided from eight hospitals in 2015 [37] to fourteen hospitals in 2021 [38].

The Qatar Health Facilities Master Plan

The Qatar Health Facilities Master Plan (QHFMP) 2013–2033 is a 20-year road map, directing the improvement in the healthcare division in Qatar that illustrates how Qatar might build and sustain a world-class health structure via pioneering buildings and services and through the intelligent deployment of its resources [13]. While this plan might appear to be focused on construction and equipment, it is intended to improve the health of the people because designing a clear and efficient plan to develop the infrastructure is necessary to support a more effective healthcare system. Qatar's investment in the development of the healthcare sector is expected to contribute to the advancement of the healthcare market in the GCC. According to a report, Qatar's arrangement to enhance infrastructure expenditure reflected similar proposals in neighboring countries, mainly the UAE and Saudi Arabia [39]. These countries are central to the rapid development of globally competitive healthcare facilities in the Gulf Region especially in the UAE after the construction of their Health Care City, which has attracted people seeking medical interventions from different areas in the world [40]. Similarly, Qatar could attract medical tourists through

partnerships with international healthcare associations in starting innovative services in Qatar, which could further catalyze the development of medical tourism in the country.

Hamad Medical Corporation

Hamad Medical Corporation (HMC) is the leading public tertiary healthcare provider for Qatar, established in Qatar since 1979 [41]. To meet the healthcare needs of Qatar's rising population, HMC has evolved into a flourishing and integrated holistic pre-hospital and tertiary healthcare provider which is able to provide effective diagnosis and treatment of diseases, many of which used to be treated in oversees medical centers, as well as medical education and research [24]. Currently, the health system in Qatar is considered to be one of the best within the Middle East according to the 2018 Legatum Prosperity Index [42].

HMC operates 13 hospitals and centers in addition to running the national ambulance service, a residential healthcare service, trauma system, continuing care, and an international medical affairs office [24]. Healthcare services are available to everyone residing in Qatar. While citizens can access all standard care in public hospitals such as HMC free of charge, they are required to pay 10 percent of the cost of treatment and their insurance pays the rest when they opt for private medical facilities [37]. For anyone who is permitted to reside in Qatar legally and have a valid health card, they pay between 10 and 20 percent of the total cost while receiving treatment at HMC. Any resident with a valid long-term visa but with no valid health card must pay for healthcare services in full [43].

As a part of its mission to provide quality care to all patients, HMC invites visiting consultants from multi-specialties throughout the year to provide consultancy and/or perform surgical procedures locally [44]. These visiting consultants are internationally renowned experts in their medical or surgical specialties and usually patients from the Gulf or Middle East travel longer distances to seek treatment by them. Hence by inviting them to HMC, Qatar also indirectly attracts regional patients and families to opt traveling to Qatar for accessing treatment, making it more convenient and reliable. The names of these international experts are usually announced ahead to the public through HMCs website and local media with guidance on how to book an appointment. Although the complete figures are not compiled in an official report, a quick Google search of previous announcements in the local media provides an estimated figure of around 50–60 experts invited annually to Qatar.

Qatar and the Growth in Healthcare Sector

According to the most recent data from the World Bank Group [45], Qatar had the highest per capita spend in healthcare in the Middle East at US USD1,807.15 and it was the fastest rising healthcare market in the GCC within the 6-year period 2013–2018. The 2012 GCC Health Care Industry Report identified that Qatar had one of the maximum growth rates of healthcare expenditures because of the development of innovative medical technologies and improved healthcare services [46]. The report also mentioned that healthcare sector employees in Qatar are paid the highest wages in the GCC region, which aids in staff recruitment and retention. This is particularly important in attracting those with a very high level of expertise to work in Qatar since the World Health Organization (WHO) predicted that the healthcare labor force scarcity will increase to 12.9 million employees worldwide by 2035 [47].

The Qatari State of Health and Regional Medical Tourism

The Qatar Foundation [48] works in cooperation with the Ministry of Public Health to help identify how incidences of preventable damage to patients could be decreased [49]. The 2016 GCC Health Care Industry Report [50] anticipated an increase in the healthcare market of each Gulf Cooperation Council country between 11 and 13 percent by 2020. The next report that was issued in 2020 highlighted the steady growth of the GCC medical tourism market within the healthcare industry since 2018 expecting to reach a value of USD 28 billion within less than 5 years [51].

Reviews of Qatar's medical tourism largely portray it as a source or origin of medical tourists more than a destination for medical tourism suggesting a lack of attention dedicated towards developing medical tourism. For example, neither medical nor health tourism is mentioned in key government tourism and health ministry documents nor are the terms health and medical captured anywhere in the annual tourism reports. Despite the lack of explicit attention that has been accorded to medical tourism, the Medical Tourism Index (MTI) ranked Qatar 30th globally in terms of appeal as a medical tourism

destination with an overall score of 60.07, while Canada topped the list with an overall score of 76.62 [52]. Within the Arab nations, Qatar was ranked 4th out of the 13 countries considered.

The MTI computes the scores based on the three dimensions of destination environment, medical tourism industry, and quality of facilities and services. The environmental dimension was high, and this was attributed to Qatar's reputation, overall economic conditions, and political stability, thereby aiding in balancing out the lower scores that were recorded for the country with respect to culture similarity. With respect to medical tourism industry, Qatar was ranked sixth with notable efforts in continuous progress in building the country into a reputable, tourism-friendly country with proper infrastructure and numerous attractions. However, the absence of a proper cost structure was also noted and that developing one would enable Qatar to compete for patients better against rival medical tourist destinations. As for MTI's third dimension about facility and service quality among Arabic countries, Qatar ranked third and this was mainly attributed to international accreditations, medical staff recognition, and superior overall experience for patients.

FIFA World Cup 2022 and Medical Tourism in Qatar

Qatar had recently hosted a successful international sporting event, the FIFA World Cup 2022. It is considered the largest sporting event in the world that draws global attention and huge inflow of football fans [53]. To prepare for this event, Qatar maintained a steady rate of around 1–2% of the General Government Expenditure (GGE) for healthcare development [54]. This included providing medical professionals, building and commissioning new hospitals to increase the total number of available facilities, and pre-hospital health services to provide state-of-the-art facilities to patients inside Qatar and the expected fans for the FIFA event [55]. The event also drew extensive media coverage about the nation on both mainstream media and other major social media platforms [56, 57]. Qatari healthcare sector provided medical services to more than 61,000 fans during the tournament and the ambulance service responded to around 4,000 related calls [58]. This was in addition to the immaculate planning that was focused on pre-hospital services that would cover most of the expected medical events that do not require medical attention including mobile clinics around the stadiums and fan zone, mobile paramedics, and modern equipment to ensure easy and early access to all individuals [59]. Eventually, the event was concluded successfully without any major adverse medical events, thanks to the cumulative efforts of the healthcare sector [60]. These remarkable achievements in healthcare, in addition to the fan experience during the tournament, create a positive image about Qatar's ability to be a potential medical tourism destination. According to a recent evaluation study, five Qatari hospitals were among the top 250 academic medical centers in the world, which is the highest among the GCC states [61]. This, along with the economic boost and cultural publicity created by the FIFA World Cup, leverages Qatar as the first destination of choice for patients seeking medical treatment regionally and internationally.

Conclusion

The discussion above sheds light on Qatar's vision in its pursuit of sustainable development among all sectors. It shows that Qatar is a politically stable nation with impressive growth in its economy. The excellent HDI scores show that Qatar has been able to develop its human capital and invest in human capital. This, in the context of this topic, means that Qatar has been able to dedicate adequate resources for its residents and could be able to extend the same to the development of medical tourism. The economic prowess of Qatar means that the living standards are fit for medical tourists from different countries including developed nations and continents such as Europe and North America. Thus, Qatar would be able to compete with other renowned medical tourism destinations around the world in terms of investments in healthcare and supportive packages for medical tourism such as good hotels and infrastructure. Although Qatar has made significant developments politically, environmentally, economically, and in terms of tourism and healthcare sectors, there are evident gaps into addressing and growing medical tourism in line with the Qatar National Vision (QNV) such as lack of a clear regulatory and implementation framework for the development of medical tourism, infrastructural capacity to support medical tourism, and proper marketing to ensure competitiveness in the global market. The lack of clarity about the kind of medical tourism that Qatar should pursue in the six integral elements of National Health Strategy (NHS) and the QNV would also limit the development of medical tourism in Qatar. Despite this, evidence from external medical tourism rankings shows that Qatar has the potential to become a competitive medical tourism destination both globally and regionally among Arabic countries. One of the most outstanding challenges mentioned in such rankings is the absence of a proper cost structure to cater especially for medical tourists and a

comprehensive understanding of the full scope of medical tourism. Overall, though, Qatar has the potential to grow its reputation as a tourist destination and a world-class provider of quality healthcare services.

Conflict of Interest Statement

The author has no conflicts of interest to declare.

Funding Sources

No funding was received for conducting this review.

Author Contributions

This work was conceptualized and completed solely by the author of this article.

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Saudi Journal of Health Systems Research

Research Article

Saudi J Health Syst Res 2024;4:64–73
DOI: 10.1159/000534870

Received: January 3, 2023
Accepted: October 24, 2023
Published online: December 4, 2023

Experience of Conducting a Group Patient Education Program at a Tertiary Hospital in Riyadh

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Keywords
Health education · Health promotion · Patient satisfaction · Staff satisfaction · Outpatient department

Abstract
Introduction: Patient education plays an essential role in improving patient compliance with treatment. Therefore, the study aimed to assess the healthcare educators' and the patients' and their companions' satisfaction and experience with regard to the health education program conducted during their waiting period in the outpatient department (OPD) at King Fahad Medical City. Moreover, compliance with planned educational topics was also assessed. ***Methods:*** A pre-post interventional study, including patients and their companions as well as health educators in the waiting rooms of the various OPDs, was conducted. The pre-intervention phase involved group teaching sessions, followed by a survey that assessed patient and educator satisfaction and experience as well as compliance rate. Then, a loophole identification survey was conducted to determine the drawbacks based on which group teaching procedure was modified. Post-intervention, a modified teaching session was completed. ***Results:*** A total of 4,362 patients and their companions participated in this study, along with 22 health educators. During the pre-intervention phase, the patient and their companions reported a 78% satisfaction rate for the conducted patient and family educational activities. While, after improving the group teaching process, the satisfaction rates increased to 90% in the post-intervention phase. The health educators' satisfaction rate improved remarkably from 27.3% to 86.4%. ***Discussion/Conclusion:*** By incorporating simple modifications in the educational activities, a higher satisfaction rate might be achieved among the participants and the health educators.

Introduction

According to the World Health Organization, "Health promotion is the process of enabling people to increase control and improve their health" [1]. It motivates individuals to take initiatives in health literacy and multisectoral intervention to improve healthy habits [2]. Patient education plays an essential role in improving patient compliance with treatment, which favorably influences patients' satisfaction and treatment outcomes [3].

Hospitals play a critical part in health promotion and education, advancing well-being, anticipating illness, and providing rehabilitation services [4]. Nurses and clinical health educators are in the best place to meet patients and

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their families' health promotion requirements [5]. As per the Joint Commission International (JCI) Accreditation Standards for Hospitals, a hospital contributes significantly to providing patient education to help involve patients and their families in care decisions and care procedures [6].

Patient education during the waiting period involves verbal communication between the healthcare professional (mostly a nurse) and the patients plays an essential role in meeting patients' learning requirements and can influence patient satisfaction rates [3, 7]. Moreover, educational activities in a hospital setting also benefit the patient's families and society [8]. Numerous studies have highlighted the benefits of patient education activities in a hospital setting [9, 10].

Saudi Arabia's population reached more than 33 million in 2018 [11]. With this rising trend, the healthcare burden has also increased and the government of Saudi Arabia has made tremendous efforts to improve healthcare through health education [12]. King Fahad Medical City (KFMC) is a tertiary referral hospital located in Riyadh, Saudi Arabia. Under its Strategic Plans 2015–2020, key strategies were adopted to provide excellence in health management and patient experience. Accordingly, the hospital's healthcare professionals (mainly nurses) participated in group teaching activities in the outpatient department (OPD) [13].

Previous studies have indicated that assessing patient satisfaction is crucial to health educators, doctors, hospital administrators, and patients themselves to guarantee that healthcare requirements are met and preserved [14]. A study conducted by Asiri et al. [14] in 2013 to evaluate patient satisfaction with various health educational services provided in primary healthcare centers reported the group teaching method as the most satisfactory method of patient education with a satisfaction rate of 87.2%. Moreover, it has been suggested that the absence of a national competency framework makes it all the more crucial to examine the current practices in health education across different settings and groups in Saudi Arabia [15].

Thus, the present quality improvement study aimed at assessing the satisfaction and experience of health educators, patients, and their companions regarding the health education program provided during their waiting period in the OPD at King Fahad Medical City both before and after the intervention. Moreover, compliance with the planned educational topics in the OPD was also examined. This study will provide useful real-world insights to program managers and healthcare administrators for conducting health education programs in similar settings. The study included both patients/companions and health educators to gain the perspectives of multiple stakeholders while conducting a health education program and can ensure its successful implementation.

Methods

Health Education Program

The health education program was conducted for patients and their companions during their waiting period in the OPD at King Fahad Medical City. The departments included Women's Specialized Nursing OPD, King Salman Nursing OPD, Comprehensive Cancer Center OPD, Neuroscience Nursing OPD, Children's Specialized Nursing OPD, Surgical Specialties Nursing OPD, Medical Specialties Nursing OPD, and Obesity, Endocrine and Metabolic Nursing OPD section. A wide range of topics were covered under this program based on the specific department with a new topic initiated every month. The topics were developed by the health education and health promotion department as per patient needs. The program was delivered by health educators and nurses in Arabic language, and each session lasted a maximum of 15 min.

Study Design and Setting

A pre-post intervention assessment of the health education program was performed in terms of the experience and satisfaction of the patients, their companions, and the health educators in the OPD at King Fahad Medical City (KFMC), Riyadh, Saudi Arabia between July 2017 and December 2018. KFMC is one of the tertiary hospitals that provides outpatient specialized clinical care.

Study Population

The participants included in the study consisted of all adult patients and their companions with booked appointments and a registration number present in the waiting areas of various OPDs of KFMC. Patients who were unwilling to participate and did not have a registration number were excluded from this study. Additionally, the study included all health educators.

Recruitment

Using the convenience sampling technique, the study participants were invited to participate in the health education program in the waiting area of the OPD. The aim of the study was explained to them and their participation was voluntary. According to the KFMC hospital's target through a focus group method, the study aimed to target 2% of the total patients and their companions who visited the OPD per month.

Sample Size Estimate

While presuming 50% of the healthcare educators as well as patients and their companions' satisfaction and experience during their waiting period, a sample size of 1,570 produces a two-sided 95% confidence interval with a width equal to 0.05 (margin of error equivalent to 5% on either side of the presumed prevalence 50%) when the sample proportion is 0.50. Bearing the heterogeneous population structure and its intraclass variance, the number (1,570) was multiplied by the design effect of 3.0, which determined the requisite sample size of 4,610.

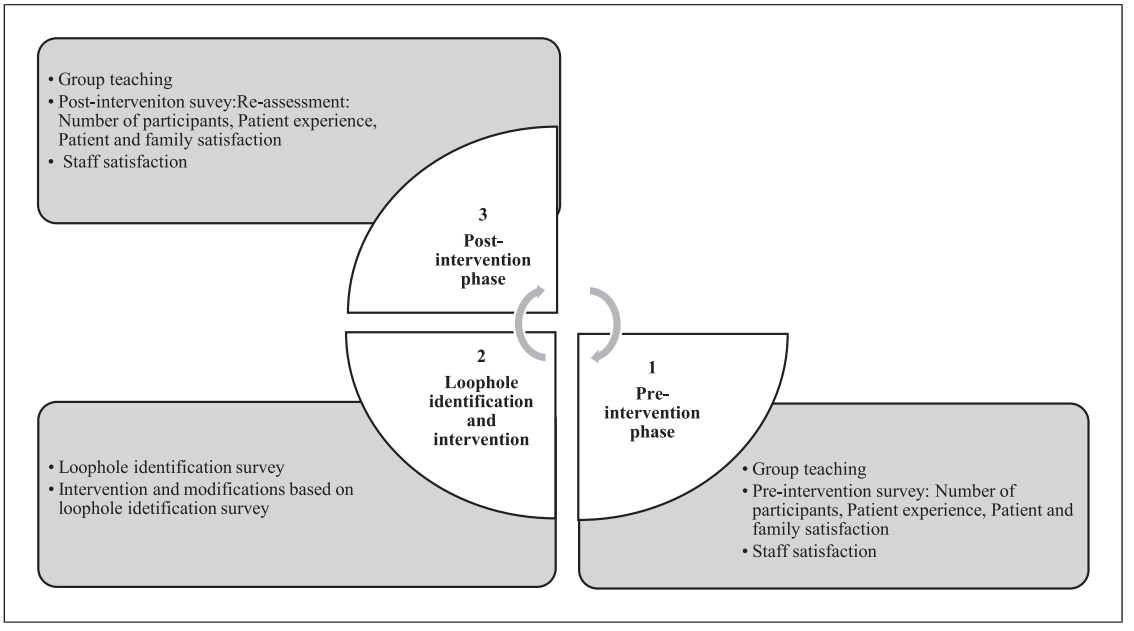

Fig. 1. Three phases of the study.

Study Procedure

The study procedure consisted of three stages: (1) the pre-intervention phase, (2) the loophole identification and intervention phase, and (3) the post-intervention phase. Details related to each stage have been summarized in Figure 1.

1. The pre-intervention phase took place between July 2017 and December 2017. In this phase, after the completion of the health education program in the OPD, questionnaires were distributed to patients/companions and health educators. Once the questionnaires were filled, they were collected. These questionnaires were used to assess the experience and satisfaction of the study participants with regard to the delivery of the health education program.
2. Following the pre-intervention phase, from January 2018 to May 2018, a loophole identification survey was conducted involving 20 staff nurses/healthcare assistants and 104 patients to identify the factors, if any, responsible for the low satisfaction rate observed after the assessment of patients and staff experience. These surveys are conducted to achieve an enhanced understanding of the potentials and weaknesses of the study and guide project development [16, 17]. The challenges faced by the nurses and patients have been presented as a fishbone diagram (Fig. 2) and the Pareto chart (Fig. 3).

Based on the loopholes identified related to presentation skills, availability of education material, environment, language barrier, and time of the lecture, interventions, and modifications were made by nursing and health education departments in the delivery of the health education program and were applied to the patients, their companions as well as the health educators. Table 1 shows the shortcomings of the pre-intervention phase of the health education program and the interventions and modifications made to resolve them.

3. In the post-intervention phase (from June 2018 to December 2018), the patients'/health educators' experience and satisfaction were determined again after conducting the modified health education program using the same questionnaires but were filled electronically using the KFMC hospital's iPad.

Study Tools

The study tools consisted of questionnaires which were developed by the study team based on their experience and a review of the literature and were pretested before the study commenced.

Questionnaire Used for Patients and Their Companions

An Arabic language questionnaire consisting of 14 questions was prepared to evaluate the patient experience and satisfaction. Closed-ended questions were included with response options on a 5-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." Moreover, demographic information including sex, educational level and age group was also asked.

- Patient experience: question 1–question 8 were used to assess patient experience.
- Patient and family satisfaction: question 9–question 14 were used to assess patient satisfaction.
- Compliance with planned educational topics: data were collected from the questionnaires to determine compliance with planned educational topics for lectures.

The Questionnaire Used for Health Educators

With regard to health educators, a questionnaire in the English language consisting of 12 questions was prepared and distributed to determine their satisfaction and experience. The first 11 questions were closed-ended and included response

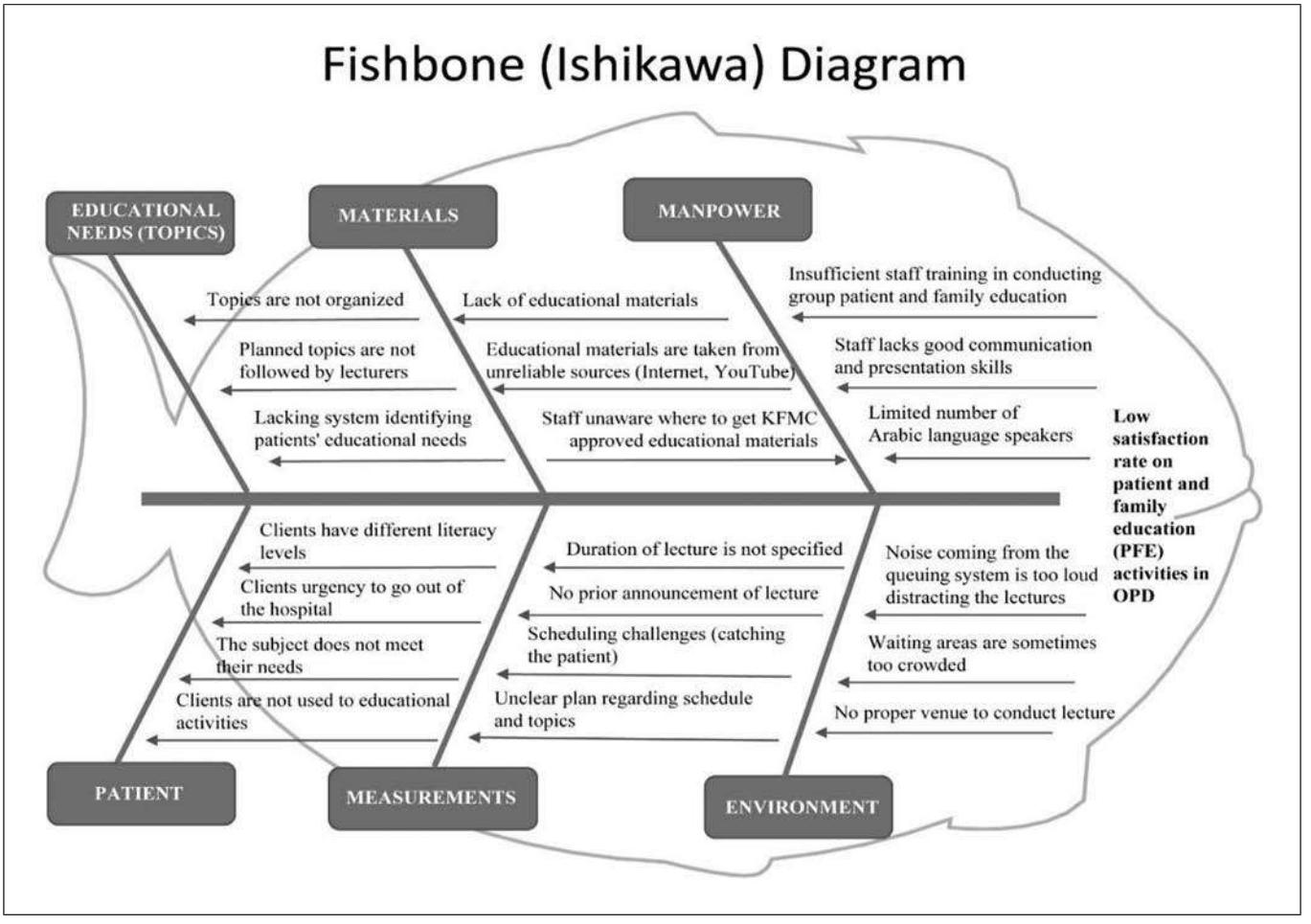

Fig. 2. Fishbone diagram representing the loopholes observed during the pre-intervention phase.

options on a 5-point Likert scale ranging from "Very Satisfied" to "Not Satisfied Completely." Question 12 was an open-ended question where respondents were asked to write any comments that they had.

Study Endpoints

The study endpoints were to determine the increase in the number of patients and their companions, improvement in patient experience, patient and family satisfaction rate, staff and nurse satisfaction rate, and compliance rate to planned educational topics after modifying the group teaching procedure. Loopholes associated with the teaching process after intervention were also assessed.

Data Management and Analysis

The data collected were stored electronically and were accessible only to the researchers. Data were analyzed descriptively and were presented as numbers and percentages using SPSS version 21.0 statistical software (IBM Corp., Armonk, NY, USA).

Results

Study Population

Overall, a total of 4,362 patients and their companions participated in this study. Of them, males made up the majority (65.2%), and the mean age of the participants was 48.2 ± 5.3 years. Additionally, a total of 22 health educators participated in this study.

Pre-Intervention versus Post-intervention Phase: Improvement in the Patient Experience

During the pre-intervention phase, 49.7% (n = 2,166/4,362) reported a positive patient experience of the conducted health education activities. The post-intervention survey results revealed an improvement in the patient experience of 67.2% (n = 2,933/4,362) (Table 2). The participants' believe that the educational sessions influence the patient, and society

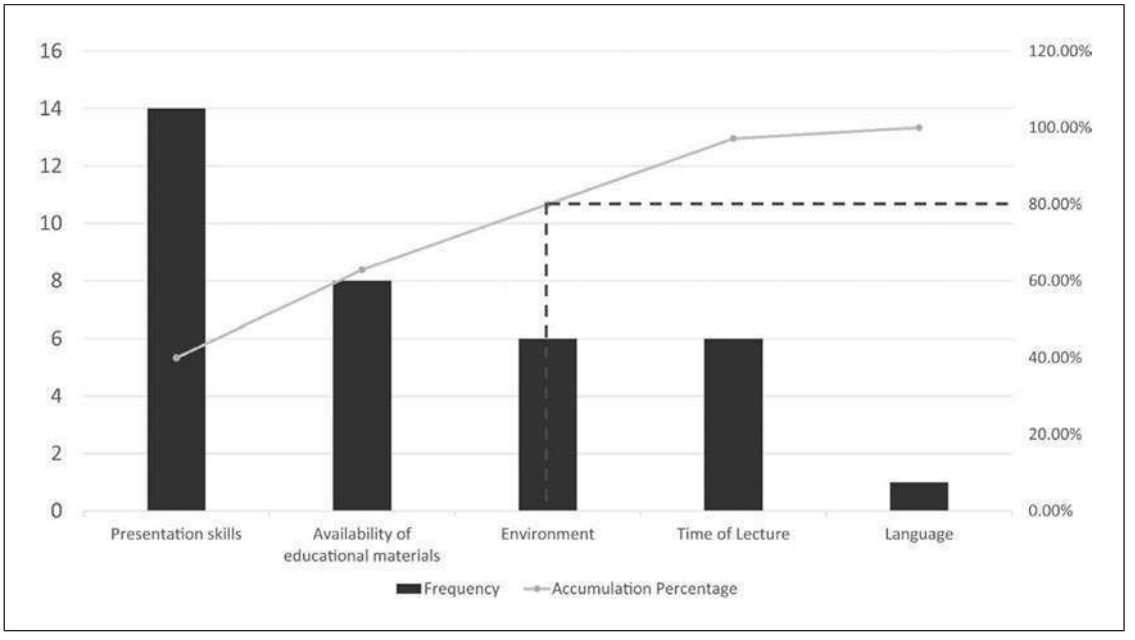

Fig. 3. Pareto chart representing the loopholes observed during the pre-intervention phase.

Table 1. Shortcomings of the pre-intervention phase and interventions made to resolve them

Shortcomings	Modification and interventions
Unavailability of patient and family education materials	New health education materials were prepared by the OPD nursing team The topics with unavailable material were not modified/replaced with the other. However, approved educational material related to that topic was downloaded from the hospital's intranet
Low staff satisfaction with regards to the current process of PFE; the inability of staff to answer specific patient queries	Monthly meetings were conducted and attended by the multidisciplinary team Structured group teaching activities were organized The efficacy of the group teaching activities was monitored through surveys. Electronic surveys were also uploaded on the iPad to expedite and receive prompt feedback from patients in response to the group teaching sessions The session was only conducted if the number of participants was more than four or about 4–10 On completion, the staff instructed the participants on how to fill the feedback forms through the iPad
Disturbances during the PFE lectures (Queuing system, noise, etc.)	–
The improper venue of the PFE lecture (overcrowded waiting areas)	–
Unclear time and schedule for the PFE lecture	The staff introduced themselves, the topic, and the duration of the session to the participants before conducting the session

Table 1 (continued)

Shortcomings	Modification and interventions
Patient gender	–
Insufficient training and poor presentation skills for the staff nurse	Approved new health education materials were uploaded on the hospital iPad for the accessibility of resources to all staff and participants
The limited number of Arabic language speakers	Two workshops were conducted for Arabic health educators to increase their competence in the delivery of PFE sessions

Table 2. Assessment of patient experience (n = 4,362)

Sr. No	Questions	Satisfaction rate* (%)	
		pre-intervention	post-intervention
1	Do you know that there are educational lectures by nurses while coming to the OPD?	1,478 (33.9)	1,552 (35.6)
2	Have you been invited before to attend an educational lecture on visiting the OPD?	1,343 (30.8)	1,552 (35.6)
3	Is there any announcement of the educational campaign?	1,310 (30.0)	1,804 (41.4)
4	Do you think that the educational sessions will have an influential effect on the patient and society?	2,788 (63.9)	3,817 (87.5)
5	Can the health practitioner (nurse) answer your questions?	2,586 (59.3)	3,859 (88.5)
6	Do the nurses give you useful teaching materials?	2,150 (49.3)	3,020 (69.2)
7	Can you learn and gain new information when you visit the clinic?	2,687 (61.6)	3,565 (81.7)
8	Do you share the information with your family and community?	2,922 (67.0)	4,027 (92.3)
9	Are you satisfied with the current method for health education?	2,217 (50.8)	2,726 (62.5)
10	Do you get health information through social media like WhatsApp, Twitter, YouTube, Snapchat, Instagram?	2,653 (60.8)	3,146 (72.1)
11	Do you get health information through television?	2,317 (53.1)	2,852 (65.4)
12	Do you get health information during your visit to the OPD or hospital?	2,452 (56.2)	3,565 (81.7)
13	Do you get health information through the newspaper?	1,545 (35.4)	1,971 (45.2)
14	Do you get health information through relatives and other patients?	1,881 (43.1)	3,607 (82.7)

OPD, outpatient department. *Number of patients giving a favorable response.

increased from 63.9% (n = 2,788) to 87.5% (n = 3,817) after the intervention. The percentage of health practitioners answering participants' queries also increased from 59.3% (n = 2,586) to 88.5% (n = 3,859). Table 2 compares the results of the pre-intervention survey with a post-intervention survey for patient experience.

Pre-Intervention versus Post-intervention Phase: Improvement in the Patient and Family Satisfaction Rate

During the pre-intervention phase, the patient and their companions reported a 78% satisfaction rate for the conducted patient and family educational activities. However, after improving the group teaching process by making interventions and modifications, the satisfaction rates increased to 90% in the post-intervention phase. There was an increase in the percentage of patients getting an answer to their queries (89.4% vs. 60.8%). Approximately 93% (n = 4,057) and 61% (n = 2,656) of participants reported being very satisfied with the educational sessions in terms of duration as per the results of pre-intervention and post-intervention surveys, respectively (Table 3). Figure 4 represents the patient and family satisfaction rate in terms of various departments.

Table 3. Assessment of patient and family satisfaction (n = 4,362)

Sr. No	Questions	Not satisfied		Satisfied		Strongly unsatisfied		Very satisfied	
		pre, *n* (%)	post, *n* (%)	pre, *n* (%)	post, *n* (%)	pre, *n* (%)	post, *n* (%)	pre, *n* (%)	post, *n* (%)
1	Did we answer your questions?	398 (9.1)	2 (0.04)	346 (7.9)	454 (10.40)	2 (0.05)	6 (0.1)	2,653 (60.8)	3,900 (89.4)
2	Was it too long for you?	398 (9.1)	1 (0.02)	352 (8.1)	304 (7.0)	1 (0.02)	0 (0)	2,656 (60.9)	4,057 (93.0)
3	Were our message and goal clear to you?	377 (8.6)	7 (0.7)	350 (8.0)	333 (7.6)	7 (0.20)	5 (0.1)	2,652 (60.8)	4,017 (92.1)
4	Would you recommend us to others?	378 (8.7)	3 (0.7)	347 (8.0)	336 (7.7)	3 (0.07)	1 (0.02)	2,646 (60.7)	4,022 (92.2)

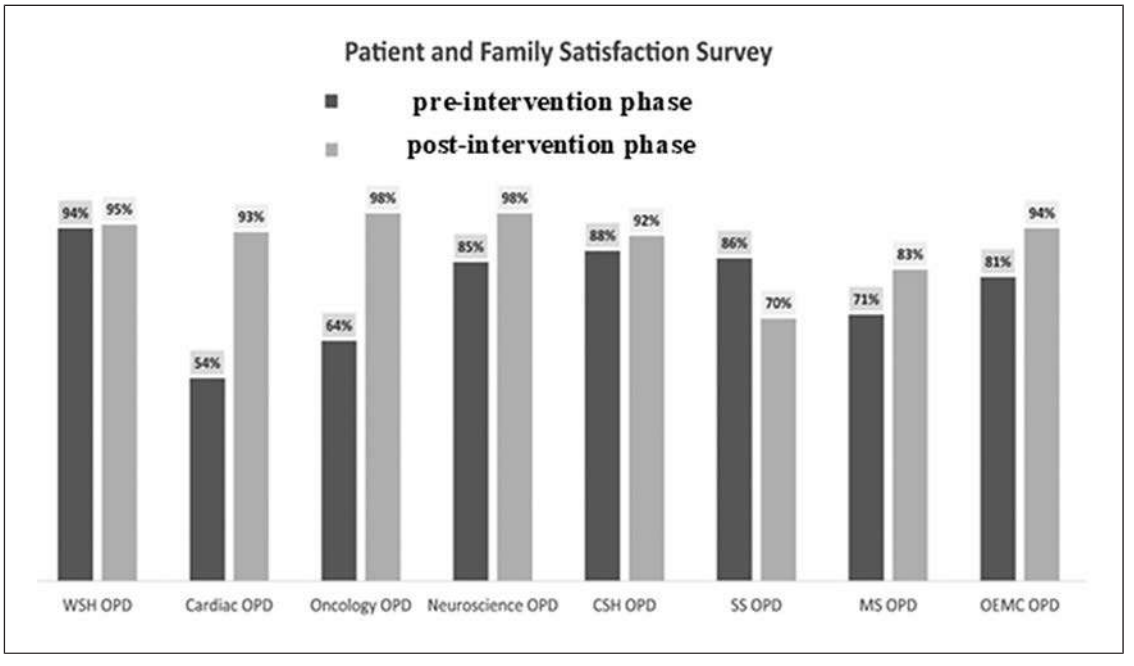

Fig. 4. Patient and family satisfaction rate in various departments of the hospital. CSH, Children's Specialized Hospital; MS, medical specialties; OEMC, Obesity, Endocrine, and Metabolism Center; OPD, outpatient department; SS, surgical specialties; WSH, Women's Specialized Hospital.

Pre-Intervention versus Post-intervention Phase: Improvement in Health Educators' Satisfaction Rate

The significant barriers owing to the lower health educators satisfaction rate was related to lecture timings (59.1%), availability of educational materials (54.5%), venue (40.9%), gender preferences of the participants (36.4%), presentation skills (31.8%), and language (9.1%). With the improvisation in the patients and family educational methods, the staff satisfaction rate improved remarkably from 27.3% to 86.4% satisfaction rate (Table 4).

Pre-Intervention versus Post-intervention Phase: Improvement in Compliance with Planned Educational Topics

During the pre-intervention phase, the average compliance rate of the planned educational activities observed was 61.3%. However, with the availability of patient education materials, compliance with planned educational topics in the OPD increased by 38.8%, thereby strengthening the project structure.

Table 4. Assessment of staff satisfaction (n = 22)

Sr. No	Questions	Satisfaction rate* (%)	
		pre-intervention	post-intervention
1	Are you satisfied with the current method of patient and family education?	6 (27.3)	19 (86.4)
2	Is it easy to get educational materials for the patients?	8 (36.4)	19 (86.4)
3	Are you able to answer the patient's questions and queries?	2 (9.1)	19 (86.4)
4	Do the patient's response to your call for the educational lecture?	8 (36.4)	18 (81.8)
5	Do you distribute the educational materials before and after each lecture?	7 (31.9)	19 (86.4)
6	Is language a barrier?	2 (9.1)	21 (95.5)
7	Is the place of lecture a barrier?	9 (40.9)	13 (59.1)
8	Is the time of lecture a barrier?	13 (59.1)	17 (77.3)
9	Is the availability of educational materials a barrier?	12 (54.5)	20 (90.9)
10	Is the gender of the patient a barrier?	8 (36.4)	18 (81.8)
11	Is your ability to explain and presentation skills a barrier?	7 (31.8)	20 (90.9)

*Number of nurses giving a favorable response.

Discussion

The KFMC hospital adopted some key strategies to initiate a group teaching project in the OPD. Group patient education activities have various benefits over individualized patient education methods in terms of cost-effectiveness, lesser workload, patients' preference for discussing topics during group sessions, and reduced repetition from individualized sessions [18–20]. The results of our study are consistent with the results of Asiri et al. [14], 2013 reporting a satisfaction rate of 78% (pre-intervention phase) and 90% (post-intervention phase). The previous study conducted by Merakou et al. [8], 2015 has also reported that group teaching methods are superior to individualized teaching methods. However, the study by Rickheim et al. [19], 2002 depicts no difference in either of the teaching methods.

Facilitating patients with health education during the waiting period for an OPD is a well-recognized way of utilizing time and improving patients' understanding and satisfaction regarding their health and management of their health issues [3]. The loophole survey reported unorganized topics, schedules, unavailability of educational materials, communication gaps, lack of presentation skills, and improper venue as significant shortcomings. Therefore, suitable modifications and interventions were adopted in the health education activities to improve the previously observed low satisfaction rates. The interventions included implementing electronic surveys, producing additional health education materials, staff training, organizing structured group education sessions, etc.

High patient satisfaction is associated with efficient communication, personalization of care, patient education, and continuity of care [21, 22], whereas a low rating in patient education disrupts the delivery of care and lowers care outcomes [23]. As patient satisfaction is mostly subjective, it is measured with the help of surveys. The patient satisfaction survey captures self-reported patient evaluations of various points of contact during their medical experience, such as the responsiveness of staff, clinician communication, technical skill, hospital environment, etc [24, 25]. A study by Tung et al. [26], 2009 demonstrates a positive association of patient education and patient satisfaction with the recommendation of a primary care provider to others. These results are consistent with our study, wherein 92.20% of the participants reported being very satisfied with the health education activities (post-intervention) conducted and would recommend the hospital to others.

As per the loophole identification survey results, many barriers faced by staff educators in delivering quality health education were highlighted, which included language, place, time of the session, gender, educational material, and presentation skills. A study by Livne et al., 2017 addressed various barriers to patient education experienced by the nurses. The study hypothesized that nurses' perceptions of patient education climate (importance of patient education, based on their daily experience) were related to the barriers of work overload, lack of policies and guidelines, and low priority to patient education, whereas the nurses' role perceptions as patient

educators were related to the barriers of difficulty in communicating with patients, insufficient professional knowledge and skills, and the belief that educating patients is not their responsibility. The solutions suggested for reducing barriers included prioritizing patient education, offering a supportive work environment, enabling time for teaching, offering clear guidelines and teaching resources, developing education skills for nurses, etc. In the present study, the FOCUS-PDCA quality model was selected to analyze and improve the drawbacks reported during the loophole identification survey [27, 28]. Root cause analysis and rigorous brainstorming were performed to identify the drawbacks/challenges associated with the pre-intervention survey [29].

In this study, the group teaching procedure was effectively modified based on the results of the loophole identification survey. These included conducting workshops, providing new health education materials, initiating monthly group teaching activities, and improvising abilities for health educators, thereby enabling a higher staff satisfaction rate (86.4%). With the interventions and modifications, a 100% compliance rate to the educational topics was also achieved compared to a 61.25% compliance rate reported from the pre-intervention phase due to the unavailability of health education materials.

The limitation of this study is that the research was conducted in a single tertiary care hospital and it cannot be generalizable to other hospitals. The study recommends continuous monitoring and evaluation of health education activities that might provide adequate services to the patients, their families, and the healthcare providers. Continuous monitoring of patient satisfaction is done. An organized action plan and strategy need to be prepared to utilize the waiting period appropriately. Moreover, loophole assessment surveys should be conducted regularly to assess the shortcomings, and they should be resolved by taking necessary measures. More studies are needed in this area in different clinical settings to enhance patient and healthcare providers' satisfaction.

Conclusion

Effective health education is a collaborative effort made by the participants and health educators to attain satisfaction. Health educators play an essential role in assisting people to achieve their health goals consistent with their lifestyles, values, and beliefs. Patients and healthcare providers should be surveyed to assess their experience, satisfaction, and drawbacks associated with them, thereby facilitating improvisation as and when necessary. By incorporating simple modifications in the educational activities, a higher satisfaction rate can be achieved among the participants and the health educators. This article was previously posted to the medRxiv preprint server on October 22, 2019 [30].

Acknowledgments

The authors would like to thank the Research Center, King Fahad Medical City, Riyadh Second Health Cluster, Riyadh, Saudi Arabia for the support in preparing the manuscript.

Statement of Ethics

This study was approved by the King Fahad Medical City (KFMC) IRB, approval number 19-352Q, which is following the principles of the Helsinki Declaration and good clinical practice guidelines. Written informed consent was obtained for participation in the study.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This study was not supported by any sponsor or funder.

Author Contributions

Mahmoud Ibrahim Almahameed carried out the study, participated in the study design, and wrote the final manuscript. Shadi F. Kakish participated in the study design, in the interpretation of data, and drafting the manuscript. Amani Abu-Shaheen conceived the study, participated in its design, and drafted the manuscript. Additionally, all authors read and approved the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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Saudi Journal of Health Systems Research

Research Article

Saudi J Health Syst Res 2024;4:74–82
DOI: 10.1159/000536230

Received: November 14, 2023
Accepted: January 9, 2024
Published online: March 1, 2024

Family Adherence to Their Child's Health Issue Follow-Up and Its Associated Factors: A Cross-Sectional Study

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Keywords
Adherence · Follow-up · Health services · Referral · Screening

Abstract

Introduction: This study aimed to measure the adherence rate among families of referred cases from school health screening clinics to diagnostic clinics and to examine the associated factors. ***Materials and Methods:*** A cross-sectional study was conducted among families of cases referred from school health screening clinics to diagnostic clinics in Saudi Arabia. Data collectors contacted the guardians of the cases to fill out the interview questionnaire regarding their visit to the school health clinic and adherence to referral. ***Results:*** Among 698 families who participated in the study, 57.6% reported adherence to diagnostic clinics. Families of dental caries and myopia cases were more likely to adhere than families of obesity cases (aOR: 8.36 and 5.41, $p < 0.001$). The chance of adherence was about two-fold among families of cases referred to hospitals and specialized clinics compared to families of cases referred to primary healthcare centers (PHCCs) (aOR: 1.80, $p = 0.042$). ***Conclusion:*** This study revealed a low family adherence rate among cases referred to diagnostic clinics. Additionally, the study documented that referral to PHCCs and screening positive for obesity were the main factors associated with non-adherence. Taking care of children's health is one of their rights, and increasing the family's adherence by raising families' awareness and designing a referral reminder system are recommended. In addition, the services of PHCCs should be strengthened.

Introduction

Screening programs aim to detect health problems and prevent their aggravation and negative impact on society. Subsequently, the screening physician refers the detected health problems to more specialized clinic for further assessment and management [1]. While referral is the link between primary and specialty care, adherence to the referral system is an essential indicator of its effectiveness [2, 3]. Likewise, referrals from primary healthcare rely on the adherence of referred patients and not merely on the physician's judgment [4].

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Several studies have reported barriers to adherence to referral. These barriers included physical, economic, and attitudinal factors. Physical and economic reasons included the distance to the referred healthcare facility, method of referral (such as giving a referral slip), availability of transportation, and social status of families [5–8]. Attitudinal reasons included misconceptions regarding detected health issues or mistrust in healthcare facilities based on previous experience [5, 9].

In Saudi Arabia, the Ministry of Health (MOH) has established a school-based screening program to detect various health problems among students. However, during the lockdown of schools and virtual learning during the COVID-19 pandemic, screening program was delivered through screening clinics in primary healthcare centers (PHCCs). The screening team, including a trained physician, dentist, and nurse, conducts screening among students for different health problems every 3 years, during the first and fourth primary, first intermediate, and first secondary grades. The team refers the detected cases to diagnostic clinics to confirm the diagnosis and receive adequate management. The type of referral healthcare facility depends on the cases, capabilities, and organization of each health region. The team could refer cases to clinics in PHCCs, while referring other cases to hospitals and specialized clinics [1]. The literature has emphasized the need for tools and methods to examine the impact of screenings, how to manage and transfer cases in the healthcare system, and to understand the factors contributing to adherence due to its dependence on several parties and different reasons [4, 10]. Therefore, this study aimed to measure the adherence rate among families of referred cases from school health screening clinics to diagnostic clinics during 2020–2021 in Saudi Arabia and to examine the associated factors.

Methods

Design and Participants

A cross-sectional study was conducted from December 2020 to June 2021 throughout the health regions of Saudi Arabia. The study included families of students with different health problems detected through school health screening clinics in PHCCs, namely, obesity, myopia, and dental caries, who were referred for follow-ups. Families of students without health problems and those who had been previously diagnosed were excluded from the study.

Sample Size and Sampling Technique

We assumed an adherence rate of 50% with an alpha level of 0.05, and power of 80%, taking into account a design effect of 1.5 to adjust for cluster sampling, yielding a minimum sample size of 576. A cluster-sampling technique was used in this study. The chosen sample was proportional to all 22 health regions according to the number of referred cases from school health clinics, as obtained from the school health records. Systematic sampling was used to select the participants within each cluster. The data collectors contacted the guardians of the cases to fill out the interview questionnaire. The data collectors contacted each participant up to three times on different days and times to complete the calls. After failing to respond to the third attempt, we selected the following case from the record as an alternative for inclusion in the sample.

Instrumentation and Procedures

Well-trained data collectors contacted the guardians of the selected cases by phone to fill out a questionnaire at least 1 month after visiting the school health clinic. The questionnaire included a sociodemographic section containing the case's age, grade, nationality, parents' age, parental educational attainment, parental occupation, parents' marital status, family income, number of dependent children (children living in the same house and under the guardian's responsibility), healthcare eligibility, and transportation availability. The second section focused on the screening visit, which included the guardian accompanying the student to the school health clinic, detected health problems (e.g., obesity, myopia, and dental caries), receiving health education regarding the detected health problem, and overall satisfaction with the school health clinic. The last section was related to the referral method (e.g., verbal, short message service [SMS], or referral slip), type of referral healthcare facility (PHCC or hospital and specialized clinic), waiting days between the school health clinic visit and referral appointment, timing of referral appointment, driving distance from home to the referral health clinic, and adherence to referral.

The dependent variable "family's adherence to the diagnostic clinic": self-reported adherence as the family was considered adhered when the student's guardian declared that his/her child had been seen and/or received any management (medical, surgical, physical, or educational) for the detected health problem, whether it was the same clinic referred to or another clinic. Figure 1 shows the pathways of the cases from the school health clinic.

Data Analysis

Data entry and analysis were executed using the Software Package for Social Science (SPSS) version 22. Descriptive data were reported as frequencies and percentages when they were categorical, while the investigators described continuous data as medians and interquartile ranges due to the non-normality of the data. Logistic regression was performed to predict significant risk factors influencing adherence to referral to a diagnostic clinic. The results were considered statistically significant at $p < 0.05$, with a 95% confidence interval.

Results

The response rate was 84.5%. The overall family adherence rate for the 698 cases included in the study was 57.6%. However, adherence rates differed for each health problem, being highest for dental caries (64%), followed

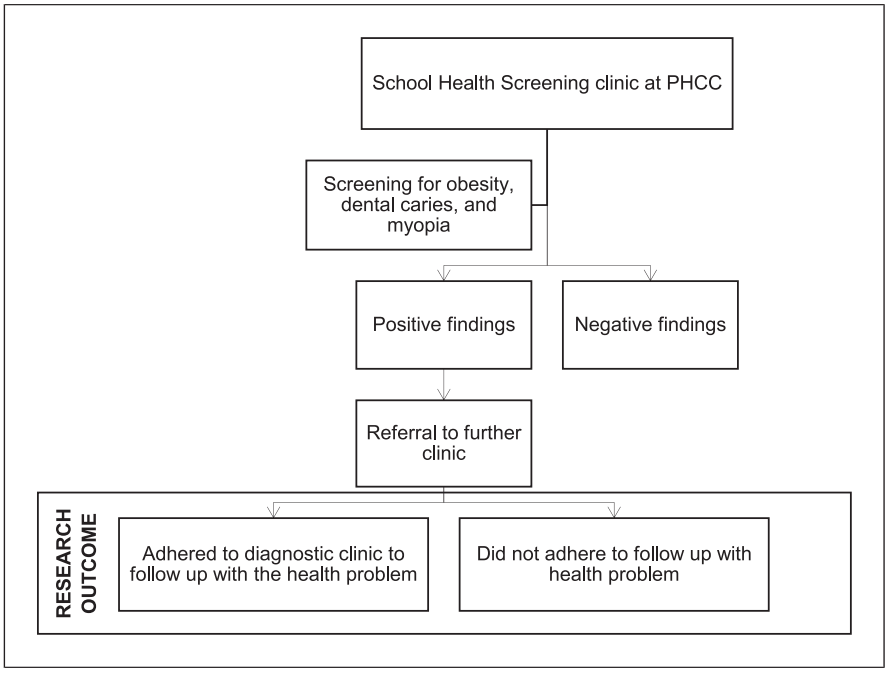

Fig. 1. Pathway of referred cases from school health clinic. When student was positive during school health screening, he/she was referred to a clinic for diagnosis confirmation and receiving management.

by myopia (63.1%) and obesity (34.7%). Table 1 presents the sociodemographic characteristics of the adherent and non-adherent groups. The significant differences in characteristics between the adherent and non-adherent groups were student age (p = 0.000), grade (p = 0.000), mother's age (p = 0.000), father's age (p = 0.006), and the number of dependent children (p = 0.017). Other characteristics, including sex, nationality, fathers' and mothers' education levels, and eligibility for healthcare, were not significantly different between the two groups.

Table 2 describes the characteristics of school health clinic visits and referral clinics. In most families that adhered to the diagnostic clinic, their children were accompanied by at least one parent during school health clinic visits (91.5%), received health education regarding their health problems (75.4%), and were satisfied with school health clinic visits (84.8%). The recorded significant variables affecting the family's adherence were the type of detected health problem (p = 0.000), guardian accompanying the child to the school health clinic (p = 0.011), method and timing of referral appointment (p = 0.005 and 0.000, respectively), and driving distance from home to the referral clinic (p = 0.000).

Multivariate analysis revealed that the only significant variables were the type of detected health problem and the type of referral healthcare facility. Families of cases who had dental caries or myopia when screened were more likely to adhere to and follow up with their child's health problems than those whose children had obesity (aOR = 8.36, 4.34–16.10, and aOR = 5.41, 2.64–11.08, respectively). Additionally, families of cases referred to hospitals and specialized clinics were nearly two times more likely to adhere and follow up with their child's health problem compared to families with their child referred to PHCCs (OR = 1.80, 1.02–3.17). Other variables were not significantly associated with adherence in multivariate logistic regression analysis (Table 3).

Discussion

School health screening in Saudi Arabia aims to detect various health problems among students, including obesity, dental caries, and myopia. Subsequently, the detected cases were referred for further assessment. Although referral is essential, adherence to referral to confirm the diagnosis and establish a management plan is needed to complete the journey. In the USA, the role of school nurses includes screening students, referring to detected cases, and follow up with them [11]. Moreover, the existence of school nurses is an effective method to ensure that students follow up on their health problems [12]. School nurses can arrange with students and families and refer them to suitable healthcare professionals [13]. This study was conducted to measure the

Table 1. Sociodemographic characteristics of adherent and non-adherent groups

Sociodemographic characteristics	Adherent (*n* = 402) (57.6%)	Non-adherent (*n* = 296) (42.4%)	*p* value
Age (*n* = 696): median, IQR, years	10.0 (9.0–13.0)	12.0 (9.0–15.0)	0.000*
Grade (*n* = 696)			
Primary: 1st	97 (24.2)	39 (13.2)	0.000[a]
Primary: 4th	113 (28.2)	77 (26.1)	
Intermediate: 1st	119 (29.7)	100 (33.9)	
Secondary: 1st	72 (17.9)	79 (26.8)	
Nationality (*n* = 696)			
Saudi	378 (94.3)	282 (95.6)	0.434[a]
Non-Saudi	23 (5.7)	13 (4.4)	
Sex (*n* = 696)			
Male	145 (36.2)	101 (34.2)	0.600[a]
Female	256 (63.8)	194 (65.8)	
Mother's age (*n* = 673): median, IQR	38.0 (34.0–43.0)	40.0 (37.0–44.0)	0.000*
Mother's educational level (*n* = 662)			
Primary school or lower	43 (11.1)	28 (10.2)	0.928[a]
Intermediate or secondary school	158 (40.7)	111 (40.5)	
Diploma, university, or higher education	187 (48.2)	135 (49.3)	
Mother's occupation (*n* = 667)			
Working	107 (27.5)	87 (31.3)	0.288[a]
Housewife	282 (72.5)	191 (68.7)	
Father's age (*n* = 670): median, IQR	43 (39–50)	45 (41–51)	0.006*
Father's educational level (*n* = 662)			
Primary school or lower	31 (8.0)	22 (8.0)	0.299[a]
Intermediate or secondary school	139 (35.8)	114 (41.6)	
Diploma, university, or higher education	218 (56.2)	138 (50.4)	
Father's occupation (*n* = 668)			
Employed	310 (79.5)	203 (73.0)	0.049[a]
Unemployed	29 (7.4)	19 (6.8)	
Retired	51 (13.1)	56 (20.2)	
Marital status of the parents (*n* = 667)			
Married	367 (93.9)	259 (90.6)	0.274[a]
Divorced	18 (4.6)	20 (7.0)	
One or both of them is deceased	6 (1.5)	7 (2.4)	
Dependent children (*n* = 680)			
1–3 children	153 (38.5)	84 (29.7)	0.017[a]
≥4 children	244 (61.5)	199 (70.3)	
Family monthly income (*n* = 649)			
<5,000 SR	87 (22.3)	54 (20.9)	0.499[a]
5,000–9,999 SR	144 (36.8)	83 (32.2)	
10,000 to less than 19,999 SR	119 (30.4)	90 (34.9)	
≥20,000 SR	41 (10.5)	31 (12.0)	
Healthcare access eligibility (*n* = 694)			
Insurance	58 (14.5)	51 (17.4)	0.266[a]
Out of pocket to the private sector	62 (15.5)	52 (17.8)	
Eligible to other government healthcare facilities[b]	31 (7.7)	29 (9.9)	
Only MOH healthcare facilities	250 (62.3)	161 (54.9)	

Table 1 (continued)

Sociodemographic characteristics	Adherent (n = 402) (57.6%)	Non-adherent (n = 296) (42.4%)	p value
Transportation availability (n = 664)			
Yes	379 (96.7)	262 (96.3)	0.803[a]
No	13 (3.3)	10 (3.7)	

IQR, interquartile range; MOH, Ministry of Health; SR, Saudi Riyal. *Mann-Whitney U test. [a]χ^2 test. [b]Includes national guard, military, or university facilities.

adherence rate among families of referred cases from school health clinics to diagnostic clinics and to evaluate the associated factors.

The overall adherence rate to the diagnostic clinics among the studied samples was 57.6%. Studies addressing adherence to school health screening referrals in general have not been identified in the literature review. However, different studies have reported adherence rate to referral for single health problem. Considering obesity, the family adherence rate in the current study was slightly higher (34.7%) than that reported by Tatum et al. [14] (2021). The pooled estimate of parental responses to school-based body mass index screening programs ranged from 16% to 34%. However, Halvorson et al. [15] (2011) reported that the first-appointment adherence rate was higher (43.3%) when physicians referred children to a pediatric weight management clinic. The variation in the adherence rate compared to our study could be due to different sample characteristics as the aforementioned study was conducted among families of children aged 2–18 years with obesity and one or more comorbidities in the USA [15].

In addition, the adherence rate of families of myopia cases to the diagnostic clinics in our sample (63.1%) was within the range of previous studies (25.1–70.0%), which were among families of students in South Africa, the USA, and Norway [12, 16–18]. Meanwhile, when screened before school entry, 78.3% of the families of students who failed during visual acuity screening adhered to the diagnostic clinic [19]. Nevertheless, the current study's sample did not include students screened before entering school.

In the present study, the adherence rate among families of dental caries cases was 64.0%, which was much higher than the reported adherence rate of 36.1% in a systematic review of school dental screening programs for oral health [20]. In contrast, a lower figure (52.5%) was documented in a study conducted among primary school students in Riyadh, Saudi Arabia [21]. This difference could be attributed to the efforts of the MOH's oral health initiative to promote school students' oral health and encourage follow-up. Additionally, a wider geographical area was included in this study.

Comparing adherence rates among different screened health problems in our study, the odds of adherence among families of dental caries and myopia cases were significantly higher when compared to families of obese cases, which might be explained by the chronicity and longer duration needed to manage obesity [14]. In addition to the necessity of further efforts from the student and family to change the lifestyle, the management of myopia and dental caries depends mostly on healthcare provider management [14].

Concerning referral characteristics, the present study revealed that the chance of adherence among families whose children were referred to hospitals or specialized clinics was approximately two-fold compared to those referred to PHCCs. This was in line with a previous study in South Africa as adherence to referrals for non-acute child health conditions was higher in hospitals than in PHCCs (56.6% vs. 54.5) [3]. This could be explained by the increased satisfaction of families with services provided in hospitals than in PHCCs, given the diverse and specialized care offered in hospitals. Furthermore, adherence was higher among cases of dental caries and myopia in our study, which were mostly referred to specialized clinics and hospitals, compared with obesity cases that are frequently referred to family physicians in PHCCs.

The current study revealed no significant association between family adherence rate and different referral methods. This was inconsistent with Ilboudo et al. [8] (2011) who reported that families of children referred without a referral slip were less likely to adhere. However, the former study evaluated the referral slip method only, whereas the current study evaluated four different referral methods: verbal referral, referral slip, SMS, or both referral slip and SMS. Moreover, the present study revealed no significant association between adherence rate and waiting days from the visit to the school health clinic to the referral appointment, timing of appointment, or driving distance from home to the diagnostic clinic. This is in agreement with Daye et al. [22] (2018) and contrary to Shrestha et al. (2017)

Table 2. Characteristics of school health clinic visit and referral clinic

Variables	Adherent (*n* = 402) (57.6%)	Non-adherent (*n* = 296) (42.4%)	*p* value
Detected health problem			
Obesity	51 (12.7)	96 (32.4)	**0.000**[a]
Dental caries	240 (59.7)	135 (45.6)	
Myopia	111 (27.6)	65 (22.0)	
Guardian accompanied the case to school health clinic (*n* = 694)			
One of the parents	327 (81.5)	232 (79.2)	**0.011**[a]
Both parents	40 (10.0)	18 (6.1)	
Other than parents	34 (8.5)	43 (14.7)	
Health education regarding the detected health problem (*n* = 698)			
Yes	303 (75.4)	218 (73.6)	0.672
No	53 (13.2)	46 (15.6)	
I do not know	46 (11.4)	32 (10.8)	
Method of referral (*n* = 698)			
Verbal	151 (37.6)	131 (44.3)	**0.005**
SMS or referral slip	228 (56.7)	161 (54.4)	
SMS + referral slip	23 (5.7)	4 (1.3)	
Type of referral health facility (*n* = 698)			
PHCC	263 (65.4)	243 (82.1)	**0.000**
Hospital or specialized clinic	139 (34.6)	53 (17.9)	
Waiting days between school health clinic visit and referral appointment (*n* = 652)			
<1 week	33 (8.8)	12 (4.3)	**0.000**
1 week–<1 month	129 (34.3)	83 (30.1)	
≥1 month	97 (25.8)	19 (6.9)	
No appointment in referral clinic*	117 (31.1)	162 (58.7)	
Driving distance from home to referral clinic (*n*= 562)			
Less than 15 min	121 (34.4)	23 (11.0)	**0.000**
15–29 min	77 (21.9)	16 (7.6)	
30 min or more	37 (10.5)	9 (4.3)	
No appointment in referral clinic*	117 (33.2)	162 (77.1)	
Timing of referral appointment (*n* = 678)			
a.m.	163 (41.2)	87 (30.9)	**0.000**
p.m.	116 (29.3)	33 (11.7)	
No appointment in referral clinic*	117 (29.5)	162 (57.4)	
Satisfaction toward school health clinic (*n* = 698)			
Not satisfied	18 (4.5)	19 (6.4)	0.527
Neutral	43 (10.7)	31 (10.5)	
Satisfied	341 (84.8)	246 (83.1)	

a.m., before noon; p.m., afternoon; PHCC, primary health care center; SMS, short message service. *Either did not book at all or booked in a facility other than referral clinic. [a]χ^2 test.

[22, 23]. However, the sample in the later study included all age-groups, whereas children were reported to be less likely to adhere.

The present study highlighted the adherence rate among families of cases referred from school health clinics to diagnostic clinics and factors associated with it at a national level, including all regions of Saudi Arabia. Nonetheless, it only addressed adherence rates of limited health problems in specific school grades. In addition, this study utilized a cross-sectional design in which recall bias was faced when families were asked about their previous visit to the school health clinic after 1 month. Furthermore, the family's adherence to the diagnostic clinic was self-reported, which might have introduced social desirability bias.

Table 3. Factors associated with families' adherence to diagnostic clinic

Variable	Multivariate analysis	
	aOR (95% CI)	*p* value
Case's age	1.24 (0.94–1.65)	0.129
Case's grade (reference: 1st primary grade)		
4th primary grade	0.49 (0.17–1.13)	0.191
1st intermediate grade	0.23 (0.04–1.35)	0.103
1st secondary grade	0.15 (0.01–2.04)	0.154
Father's age	0.99 (0.95–1.04)	0.908
Father's occupation status (reference: employee)		
Unemployed	0.56 (0.23–1.34)	0.189
Retired	0.70 (0.33–1.47)	0.344
Mother's age	0.96 (0.91–1.01)	0.116
Dependent children (references category: 1–3 children)		
≥4 children	0.59 (0.35–1.01)	0.052
Accompany in school health clinic (reference: one of the parents)		
Both parents	1.22 (0.53–2.80)	0.641
Other than parents	1.28 (0.59–2.80)	0.532
Detected health problem (reference: obesity)		
Dental caries	8.36 (4.34–16.10)	0.000
Myopia	5.41 (2.64–11.08)	0.000
Method of referral (reference: SMS + referral slip)		
Verbal	0.28 (0.05–1.64)	0.159
SMS	0.26 (0.04–1.68)	0.158
Referral slip	0.19 (0.03–1.12)	0.066
Type of referral health facility (reference: PHCC)		
Hospital or specialized clinic	1.80 (1.02–3.17)	0.042
Waiting days between school health clinic and referral appointment (reference: more than 1 month)		
No appointment in referral clinic*	0.09 (0.02–0.35)	0.001
Less than week	5.81 (0.63–53.61)	0.121
1 week – less than 1 mo	0.65 (0.27–1.61)	0.354
Timing of referral appointment (reference: p.m.)		
No appointment in referral clinic*	0.09 (0.02–0.35)	0.001
a.m.	0.60 (0.25–1.43)	0.244
Driving distance from home to referral health appointment (reference: 30 min or more)		
No appointment in referral clinic*	0.09 (0.02–0.35)	0.001
Less than 15 min	1.45 (0.45–4.65)	0.532
15–29 min	1.84 (0.53–6.44)	0.340

SMS, short message service; PHCC, primary health care center; a.m., before noon; p.m., afternoon. *Either did not book at all or booked in a facility other than referral clinic.

Conclusion

Overall, the study revealed a low adherence rate among families of cases referred to diagnostic clinics. Additionally, the study documented that referral to PHCCs and screening positive for obesity were the main factors associated with non-adherence. As caring for children health is one of their rights, interventions to improve adherence among families of referred cases are recommended. These interventions may include increasing awareness among families regarding the significance of adherence to referral and encouraging them to follow-up. Additionally, developing and designing a reminder system for follow-up through school health nurses, telephone calls, or digitalized reminders could increase adherence rates. Additionally, school health programs should not merely include screening and referral, but

follow-up with students and families is necessary to ensure that students receive appropriate healthcare. Moreover, the role and importance of PHCCs should be strengthened by providing substantial services, offering a variety of specialties in clinics, increasing accessibility to clinics, and familiarizing the public with the services offered, which will encourage communities to visit and return for sustainable service delivery.

Acknowledgments

The authors are grateful for the guardians of the students for their participating in the data collection. Data collectors are acknowledged for their hard work and patience while contacting the sample.

Statement of Ethics

This study protocol was reviewed and approved by the central Institutional Review Board in the Ministry of Health [21-14M], approval number [1442-1437213]. Informed consent to participate was not directly obtained but inferred by the completion of the questionnaire with voluntary participation from the participants' parent/legal guardian/next of kin to participate in the study.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This study was not supported by any sponsor or funder.

Author Contributions

A.A.A., D.M.A., and M.A.A. conceived and designed the study, conducted research, and collected and organized data. A.A.A. and D.M.A. analyzed and interpreted data. A.A.A., D.M.A., and M.A.A. wrote initial and final draft of article. A.F.A. and K.I.A. provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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Saudi Journal of Health Systems Research

Research Article

Saudi J Health Syst Res 2024;4:83–91
DOI: 10.1159/000537991

Received: November 26, 2023
Accepted: January 31, 2024
Published online: March 22, 2024

Impact of Telephone Medical Consultation Service (937) on Users' Outcomes in Saudi Arabia: A National Study

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Keywords
Compliance · Enablement · Satisfaction · Saudi Arabia · Telehealth

Abstract

Introduction: One of the telehealth tools is the telephone, which has been used to deliver healthcare in many settings in response to increase demand and pressures on existing health services. This study aimed to explore the impact of telephone medical consultation service (937) on users' outcomes in Saudi Arabia. ***Methods:*** This is a cross-sectional study conducted in Saudi Arabia. Telephone interviews were used to collect data. Study participants were selected randomly from the list of medical consultation users in December 2021. Users' outcome was defined as service accessibility, utilization, user compliance, satisfaction, and enablement. Trained data collectors conducted the interviews between February and September 2022. All ethical issues were considered during the research, and the Statistical Package for Social Sciences (SPSS) v.25 program was used to analyze the data. ***Results:*** A total of 2,534 telephone interviews were completed and analyzed from 5,052 trials with a response rate of 50.2%. Most participants were Saudis (92.7%, 2,348), and (54.4%, 1,379) were females. Study participants used the call either for personal help or to help another family member, and more than one-third (38.8%, 983) had inquiries about COVID-19. Most (91%, 2,306) participants were satisfied with the provided service. Users who had answers to their inquiries and those who followed the provided advice were more likely to be satisfied. However, a positive medical history increases the likelihood of dissatisfaction (p value = 0.027). Users had better enablement after calling the 937 telephone medical consultation center. ***Conclusion:*** Most 937 telephone consultation calls were handled without needing face-to-face visits. Most 937 telehealth service users were satisfied and complied with the health advice.

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Introduction

Telehealth refers to all activities used to provide healthcare at a distance without direct physical contact between the patient and the healthcare provider (HCP). Telehealth includes synchronous (phone and video) and asynchronous (short messaging service, e-consults) communications [1]. Telehealth aims to provide safe, better quality, and cost-effective healthcare in response to the increasing demand and pressures on the existing healthcare system [2, 3]. One of the telehealth tools is the telephone, which used to deliver medical consultations in many settings including routine and emergency care, managing acute and chronic conditions, and provision of health education [4].

Telephone triage and consultation services involve people with a health problem receiving assessment and advice over the telephone. This advice may include a recommendation to visit an emergency department (ED) and make an appointment with an HCP or the administration of certain medication with self-care. As a result, the telephone health services may reduce unnecessary demands on face-to-face healthcare services [5, 6].

Internationally, in 2007, the Australian National Health Call Center Network started the triple zero number (000) to seek help and instructions for non-emergency situations. Expert nurses run this service which is accessible from anywhere within Australia and available over 24 h a day, 7 days a week [7]. Additionally, telemedicine is used by many other countries like the USA and the UK to reduce nonurgent ED visits [8, 9]. A systematic review of articles from several countries focused on crucial governance, quality, and safety findings related to telephone-based health triage and advice services concluded that current evidence does not provide definitive answers to questions about the quality of care provided, access, equity of the service, costs, and outcomes [10].

Saudi Arabia has launched the 937 Call Center telephone health services since 2013; the service includes medical consultation, appointment reservations at primary healthcare centers (PHCCs), anti-smoking clinic appointments, and technical support for Ministry of Health (MoH) e-applications [11]. Two previous studies on the 937 services were recently conducted and published in Saudi Arabia. The first study assessed the population's awareness of the service and showed that the level of awareness and utilization are still low [12]. The other study evaluated the satisfaction of the service users and HCPs with the service, which found a high satisfaction levels among the users and the HCPs [13]. However, the impact of 937 services on the users' outcome has yet to be studied, and it is vital to know its effectiveness and efforts to clarify what benefits are sought. So, this study aimed to explore the impact of telephone medical consultation services (937) on users' outcomes in Saudi Arabia.

Significance of the Study

Although the literature showed the level of utilization and overall satisfaction of 937 medical consultation calling center, no previous study has measured the outcome of the medical consultation service. Our findings are relevant to health policymakers interested in understanding the five integrated users' outcome domains (accessibility, health service utilization, user compliance, satisfaction, and patients' enablement) and the factors affecting them.

Outcomes

The first four study outcomes (accessibility, health service utilization, user compliance, and user satisfaction) were identified in reference to Lake et al. [14] systematic review, while patient enablement was identified in reference to Tolvanen et al. [15].

1. Accessibility: Expanding healthcare access to marginalized populations is a common reason for introducing or expanding telephone triage and advice services. Accessibility will be assessed by exploring the sociodemographic characteristics of 937 Call Center users.
2. Health service utilization: Reducing health service utilization is a common advantage cited for telephone triage and advice services. Therefore, we will estimate healthcare utilization indirectly by measuring patient intention if the 937 services did not exist. This was achieved by asking the participants, "what would you have done if you were not able to reach 937 consultations?"
3. User compliance: Poor health outcomes might result from noncompliance with advice to seek appropriate care. Therefore, assessing patients' willingness to adhere to the advice is essential. Compliance with the advice provided by the 937 Call Center was measured by self-report as entirely, partially, or did not follow the advice.
4. User satisfaction: It refers to the overall affective assessment of the pleasurable level of consumption-related experiences with 937 services. It will be measured by asking the participants to rate their experience as satisfied, neutral, or dissatisfied.

5. Patient enablement: The Patient Enablement Instrument is a self-report measure designed to determine patients' feelings of confidence, ability, and coping following a consultation. The Patient Enablement Instrument addresses patients' ability to understand and cope with their problem/illness after consulting the doctor and the degree to which they can keep themselves healthy, feel confident about their health, and help themselves [15].

The study endeavors to bridge the knowledge gap about these domains and will explore the related problems. The appropriateness of the consultation, safety, and clinical outcomes will not be assessed as it is outside the scope of this research.

Study Objectives

The objectives of the study were as follows:

1. To explore the demographic and medical characteristics of 937 service users.
2. To identify the utilization pattern and alternatives of calling 937 Call Center.
3. To identify the advice the 937 Call Center gave and the degree of users' compliance.
4. To explore patients' satisfaction and the associated sociodemographic characteristics.
5. To assess patient enablement after 937 calls.

Materials and Methods

Study Design

A descriptive cross-sectional phone-based interview was conducted to provide a national assessment of the impact of telephone medical consultation service (937) on users' outcomes (service accessibility, utilization, user compliance, satisfaction, and patients' enablement) in Saudi Arabia.

Sample Size

Due to the study's exploratory nature, there is no formal sample size calculation. According to the assumed response rate of 50%, confidence level of 95%, and 2% margin of error, the appropriate sample size was 2,395.

Sampling Technique

The study included participants who lived in Saudi Arabia, were Arabic speakers, and aged ≥18 years. According to 937 medical consultation center source data, the number of telephone calls during the 4th quarter of 2021 was 1,380,369, including 370,913 calls during December 2021. The study sample was selected randomly from (937) telephone medical consultation service users' list during December 2021 in all 20 health districts across the Kingdom to reach generalizable estimates. These data were the most recent available to minimize recall difficulties. A simple random sample technique (the RANDBETWEEN Function in Microsoft Excel Software) was applied to select an average of 77 subjects' phone numbers each day from the daily list of December 2021.

Data Collection

All randomly selected 937 service users over December 2021 were contacted by 22 trained research assistants and interviewed over the phone from February to September 2022. Data forms were distributed to the assigned data collectors. No names or other identifiers were registered on the answer sheet, only a unique

Table 1. Demographic and health characteristics of study participants (Telephone Medical Consultation 937 users) (*N* = 2,534)

Characteristics	Count	Percent
Gender		
Female	1,379	54.4
Male	1,155	45.6
Nationality		
Saudi	2,348	92.7
Non-Saudi	186	7.3
Age group, mean, SD, years	34.5	9.8
18:20	76	3.0
21:30	952	37.6
31:40	983	38.8
41:50	341	13.5
51:60	133	5.2
≥61	49	1.9
Marital status		
Married	1,875	74.0
Single	545	21.5
Divorced	96	3.8
Widow	18	0.7
Living area		
City	2,177	85.9
Village	357	14.1
Education level		
Bachelor's or higher education	1,705	67.3
High school	648	25.6
Intermediate school	103	4.1
Primary school	49	1.9
Illiterate	29	1.1
Profession		
Employed	1,301	51.3
Not employed	937	37.0
Student	185	7.3
Retired	111	4.4
Medical history		
Without medical history	1,711	67.5
Positive medical history	823	32.5

SD, standard deviation.

reference number for each potential participant. Verbal consent was sought from the participants before commencing the questionnaire.

Data Collection Tool

A structured phone interview questionnaire was designed by the research team to collect the data. The questionnaire was developed based on our previous evaluations of similar services involving phone consultations to assess the previously listed outcomes [14–16].

The questionnaire was reviewed by three experts, including a family medicine specialized team in the 937 medical consultation center, for both face and content validity. The questionnaire was examined on 35 subjects. The data from the pilot study were not included in the main study data. The questionnaire took less than 10 min to complete.

Data Analysis

The collected data were reviewed, coded, verified, and statistically analyzed using SPSS v.28 (IBM Statistics, Armonk, NY, USA). Frequency (*N*) and percentage (%) were used to describe categorical data; mean and standard deviation were used to describe continuous data. The χ^2 test was used for proportion comparisons, the *t* test for means between subgroups of normally distributed numerical data, or the Mann-Whitney test for skewed data. The users' satisfaction was assessed on a dichotomous scale: satisfied and neutral/unsatisfied. The statistical significance level was set at $p < 0.05$.

Results

A total of 2,534 phone interviews were conducted with 937 respondent users. The majority (92.7%, 2,348) were Saudis, and (54.4%, 1,379) were females with a mean age of 34.5 years (standard deviation: 9.8 years; range: 18–85 years). Most users were married (74%, 1,875), living in a city (85.9%, 2,177) and holding a bachelor's degree or higher education (67.3%, 1,705), (51.3%, 1,301) are employed, while (37%, 937) are not. About one-third (32.5%, 823) have a positive medical history of diseases (Table 1).

Table 2 describes the participants' responses to the questions related to the utilization of 937 services. More than half of the responders (56.3%, 1,427) used the call for personal help, and (43.7%, 1,107) called the service to help another family member. Over one-third (38.8%, 983) had inquiries about COVID-19, (20.4%, 518) about child health, and (14.8%, 374) about medication. Regarding the reasons for choosing to call 937 medical consultation center over going to the hospital, (37.8%, 957) answered that they had a simple consultation which does not require going to a health facility, (29.4%, 746) had prior utilization and satisfaction with 937 services, (25.7%, 650) to confirm the need to go to health facility, and (23.8%, 602) due to COVID-19 restrictions and fear of contracting infection.

When the study participants were asked about their alternatives to 937 medical consultation services, (35.8%, 906) would go to the ED at a governmental hospital, (27.3%, 692) to a private hospital or clinic, and (13.1%, 331) to a PHCC. Moreover, 937 Call Center users were asked about the advice they had received from the 937 call. The majority (71%, 1,798) had an answer to their inquiries, (30.7%, 777) took the advice to take the medication at home, and (16.1%, 409) took the advice to book an appointment in the PHCC.

Regarding compliance with the advice provided by 937 medical consultation center, (90.7%, 2,171) of the users ultimately complied with the advice they received; however, (6.9%, 164) did not. The main reason for noncompliance was not agreeing with the advice. The participants were also asked about their satisfaction with the service; (91%, 2,306) were satisfied (Table 3).

Table 4 shows the univariate analysis to examine the relationship between users' dissatisfaction with the service and the study variables. It revealed that a 1-year increase in age and a positive medical history could increase the likelihood of dissatisfaction. However, users who had answers to their inquiries and those who thoroughly followed the advice were more likely to be satisfied. Participants' enablement is shown in Figure 1, almost half (49.5%, 1,254) of participants were much better to understand their health problems after calling 937 telephone medical consultation, more than one-third (36.7%, 931) were much better to deal with their health problems, and (17.5%, 444) were much better to prevent their health problem.

Discussion

Telephone medical consultation services are considered a listening ear to patients' health, which helps provide medical care and consultations and improve home health services for emergency and chronic illnesses in daily life [17, 18]. The use of 937 call medical center services increased during the COVID-19 pandemic to avoid direct contact between patients and healthcare team members [19]. Therefore, telehealth has been employed as a vital tool for efficiently and effectively providing high-quality healthcare to Saudi residents [18].

This study showed that most of the 937 telephone medical consultation users are young married females ranging from 21 to 40 years old. This result is consistent

Table 2. Utilization of telephone medical consultation (937) service (*N* = 2,534)

Utilized telephone medical consultation 937 service	Count	Percent
For whom was the last 937 medical consultation		
For myself	1,427	56.3
For other family member	1,107	43.7
Users' inquiries*		
COVID-19	983	38.8
Children health	518	20.4
Medications	374	14.8
Gastrointestinal medical consultation	182	7.2
Emergency situation	181	7.1
Pregnancy care/gynecological inquiries	162	6.4
Diabetes or hypertension	150	5.9
Body symptoms (e.g., pain, inflammation, fever)	133	5.2
Allergy	55	2.2
Mental health	38	1.5
Dental medical consultation	26	1.0
Chest disease	24	0.9
Smoking cessation	18	0.7
Reasons to choose to call 937 medical consultation center over going to hospital**		
A simple consultation is not needed for health facility	957	37.8
Prior utilization satisfaction with 937 service	746	29.4
To confirm the need to go to a health facility	650	25.7
COVID-19 restrictions/fear of contracting infection	602	23.8
Far distance of health facility	206	8.1
Fast service	141	5.6
Ease of access	120	4.7
Availability at late time	81	3.2
Long waiting for a hospital appointment	45	1.8
Free of charge	12	0.5
User's alternative to 937 medical consultation service		
Go to an emergency at a governmental hospital	906	35.8
Go to a private hospital/clinic	692	27.3
Go to a PHCC	331	13.1
Calling/going to a pharmacy	162	6.4
Searching on the internet/social media	105	4.1
Requesting the ambulance service	77	3.0
Asking friends/relatives	38	1.5
Go to a COVID-19 vaccination center	35	1.4
Calling a physician	31	1.2
Trying SEHA/Sehaty app	15	0.6
Nothing	142	5.6

*Subject may have more than one user's inquiry. **Subject may have more than one reason to choose to call 937 telephone health service.

with Weber et al. [20], who found that older people (65+ years old) were less likely to use telephone-accessed healthcare compared to those aged 18–49. This could be explained that younger and middle-aged people are more familiar with technology, thus more likely to call and use the service. Meanwhile, most 937 Call Center users were Saudis, perhaps due to the false perception of non-Saudi residents that the service is only for Saudi citizens.

The study findings revealed that most users are employees. Most of the 937 Call Center users had higher education levels, mirroring the results from several other studies [21, 22]. This finding may be because educated people are more likely to use technology-based services. The majority (85.9%) of 937 Call Center users live in urban areas or large cities, matching the urban composition and distribution of the Saudi population [23].

Table 3. Users' compliance and satisfaction toward telephone medical consultations among study participants (N = 2,534)

Users' compliance and satisfaction toward telephone medical consultations 937	Count	Percent
Advise provided by 937 medical consultation service*		
Answer to my inquiry	1,798	71.0
Medication with home care	777	30.7
Booking an appointment in PHCC	409	16.1
Advise to go to an emergency	237	9.4
Requesting the ambulance service	21	0.8
User's compliance to the advice provided by 937 medical consultation service (n = 2,393)**		
I completely followed the advice	2,171	90.7
I partially followed the advice	58	2.4
I did not follow the advice	164	6.9
Reason for partial or noncompliance to the advice (n = 222)		
I do not agree with the advice	104	46.8
Inability to follow advice	61	27.5
Change in health problem	36	16.2
I did not understand the advice	21	9.5
User satisfaction with 937 medical consultation service		
Satisfied	2,306	91.0
Dissatisfied	228	9.0
Neutral	141	5.6
Not satisfied	87	3.4

*Subject may have more than one advice provided by 937 medical consultation service. **114 subjects with not applicable answer (answer for an inquiry).

Table 4. Factors associated with users' dissatisfaction with the provided telephone medical consultation service

Variables	Reference category	Univariate analysis, OR (95% CI)	p value
Gender	Male	1.26 (0.96–1.66)	0.093
Age, years	–	1.01 (1.00–1.03)	**0.048***
Nationality	Non-Saudi	1.34 (0.75–2.40)	0.322
Living area	Village	1.30 (0.85–1.99)	0.223
Education	Bachelor's or higher education	1.17 (0.88–1.56)	0.273
Marital status	Married	0.92 (0.67–1.26)	0.602
Profession	Not employed	1.29 (0.98–1.69)	0.073
Health insurance	No	0.99 (0.68–1.46)	0.974
Medical history	Negative	1.37 (1.04–1.82)	**0.027***
Had an answer to their inquiry	No	0.46 (0.35–0.60)	<**0.001***
Completely followed the advice	No	0.06 (0.05–0.09)	<**0.001***

*Statistical significance was set at $p < 0.05$.

The advice given by 937 included the user himself/herself and his/her family members. Most inquiries were about COVID-19, followed by children's health and then the use of medications.

Regarding the reasons for choosing to call 937 medical consultation center over going to a hospital, more than one-third of study participants reported having simple complaints that they did not need a health facility. This

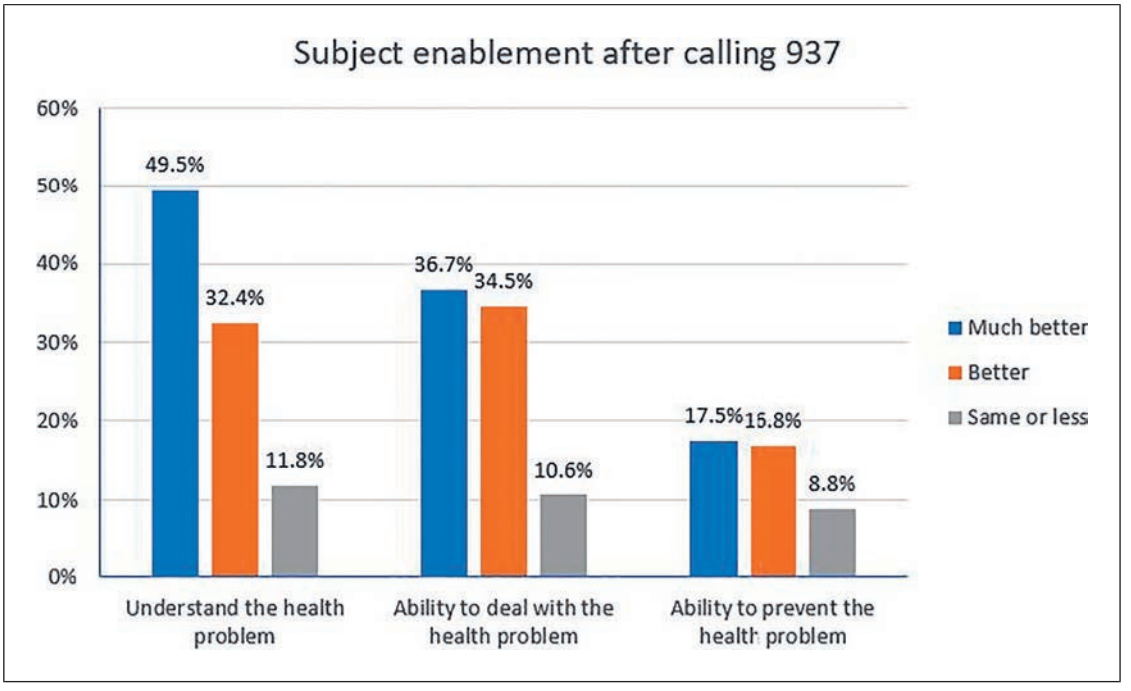

Fig. 1. Subject enablement after calling the 937 telephone medical consultation center.

finding matches that of Tran et al. [8], who confirmed that utilization and compliance with telephone triage advice are influenced by a patient's self-assessment of the needed level of care.

Furthermore, most study participants reported that their inquiries had been answered and they were advised by 937 call to take medication with self-care and to visit PHCC or go to the ED. Two systematic reviews found better compliance with telephone triage advice in patients receiving advice to self-care or to attend ED and lower compliance among those advised to visit a PHCC [24, 25].

The current study examines an important issue: what are the users' alternatives to 937 medical consultation services. Over one-third of users reported going to the ED at a governmental hospital; others reported going to a private hospital or a PHCC. As a result, telehealth services can manage and reduce unnecessary face-to-face interactions that increase the burden on healthcare services [26].

To the best of our knowledge, there is little or no information about users' compliance with the telephone medical consultation service (937) in Saudi Arabia. Indeed, patient noncompliance was associated with the type of advice the user did not agree with or follow. In the same context, compliance in healthcare depends on patient behavior (taking medication, making lifestyle changes, undergoing medical tests, or keeping doctor appointments) [27, 28].

Satisfaction is one of the most studied outcomes for telephone medical consultation services as it enhances service quality [29]. However, this study found a high satisfaction rate and explored the factors associated with users' dissatisfaction. Users who got answers to their inquiries and those who had completely followed the advice were less likely to be dissatisfied. However, patients with a history of chronic disease were more likely to be dissatisfied. This matches the results from a systematic review on telemedicine in otolaryngology, which found higher satisfaction rates among patients and HCPs [30]. Also, Alkhashan et al. [13] found the same results in Saudi Arabia [14].

Regarding patients' enablement after calling the 937 telephone medical consultation center, patients had better enablement to understand their health problems and the ability to deal with their health problems, and to prevent their health problems. Kelly et al. [31] found that consultations in treatment centers were strongly related to lower patient enablement compared to telephone guidance.

However, this is the first study to assess the impact of telephone medical consultation service on users' outcomes in Saudi Arabia, and this study had some limitations. The cross-sectional nature of the study makes causal inferences impossible. The low response rate may limit the generalizability of the study results.

Conclusion

Most of 937 telehealth service users were satisfied and complied with the service. The study predicted some significant factors that may have a negative impact on users' satisfaction, e.g., increase in age and positive medical history. Additional research into sociodemographic heterogeneity and other associated factors in compliance with telehealth advice is needed to prevent potential noncompliance to the provided advice.

Acknowledgments

The authors express sincere thanks to 937 telehealth users who agreed to participate in this research. We also thank the research assistants who accomplished the data collection.

Statement of Ethics

The research proposal has been presented to and approved by the Central IRB of the Ministry of Health, Riyadh, Saudi Arabia (IRB Ref. number: H-01-R-009). Case identities were anonymous throughout the study stages, and confidentiality of the data was maintained as well. Written informed consent to participate was not directly obtained but inferred by completion of the questionnaire. This study followed the Declaration of Helsinki and all applicable local regulations. Data were stored securely and were only accessible by the research team.

Conflict of Interest Statement

The authors have declared no conflict of interest or any competing interests.

Funding Sources

This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions

Walid A.A. Al-Shroby prepared and submitted the IRB-required dossier, validated the study questionnaire, analyzed the data, and drafted the manuscript. Maram E. Bin Dayel and Najla S. Al-Suliman searched the literature, wrote the study proposal, and supervised the data collection. Nuha S. Alhumaid analyzed the data and reviewed the manuscript. Imen S. Sohaibani and Najla J. Alhraiwil reviewed the manuscript and supervised the whole work. All authors contributed to the conception and design of the study, have critically reviewed and approved the final draft, and are responsible for the content and similarity index of the manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available due to privacy reasons but are available from the corresponding author upon reasonable request.

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Saudi Journal of Health Systems Research

Research Article

Saudi J Health Syst Res 2024;4:92–102
DOI: 10.1159/000538617

Received: October 17, 2023
Accepted: March 26, 2024
Published online: April 29, 2024

Healthcare Professional's Knowledge, Awareness, and Attitude toward Patients' Data Privacy and Security in Clinical Research

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Keywords
Health Insurance Portability and Accountability · National Committee of Bioethics · Privacy · Security

Abstract

Introduction: The privacy and security of healthcare information are essential to maintaining good patient-physician relationships, protecting individuals' interests, and respecting their dignity and worth. This study assessed healthcare professionals' (HCPs) knowledge, awareness, and attitudes toward patients' data privacy and security in clinical research. ***Methods:*** The study consisted of a cross-sectional survey in which 108 HCPs' awareness and knowledge of HIPAA and NCBE rules and regulations were measured, followed by an in-depth semistructured interview to explore HCPs' attitudes and perspectives. The study was conducted between January and May 2022. ***Results:*** Most participants agreed that the IRB/REC rules and regulations strengthened participants' trust in the researchers, enhanced confidentiality, and improved the privacy and security of patients' information. HIPPA knowledge was affected by prior participation in research (β: 1.16; $p = 0.001$) and NCBE knowledge by working on a research project (β: 0.87; $p = 0.001$), years of work experience (β: 0.35; $p = 0.003$), and age (β: −0.28; $p = 0.04$). Participants believed that the nature of research, involvement of inexperienced persons, and human errors could affect patients' privacy and security in clinical research, which could be improved by limiting the number of personnel who access the data, continuous education, and sending reminders about the rules and regulations. ***Conclusions:*** Patients' data privacy and security remain vital to clinical research. HCPs realize the role of IRB/REC to maintain data privacy and security. Enrollment of HCPs in clinical research and continuous education could improve HCP knowledge of regulatory rules.

Introduction

For effective medical treatment, sensitive and private information must be shared between patients and healthcare professionals (HCPs). This information is recorded and kept in medical records and databases at all times, which patients assume to be private and secure [1]. Privacy is defined as "a state or condition of physical or informational accessibility that will determine the type, nature, and, to what extent, patient information can be

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communicated to others" [2]. Furthermore, security can be defined as "the procedural and technical measures required to prevent unauthorized access, modification, use of data stored or processed in a computer system, to prevent any deliberate denial of service." It helps keep health records safe from unauthorized use [3, 4]. In this information age, privacy is a valuable commodity and an important security component. It protects the interests of individuals and respects their dignity and worth as human beings.

In Saudi Arabia, maintaining the privacy of healthcare information is of utmost importance. It is a culturally sensitive environment; patients are less likely to seek medical care in cases of substance abuse and reproductive or sexual health matters for fear that their health information will be shared or will not be securely maintained. In some cases, patients suffering from psychiatric disorders may refuse to reveal vital information affecting their treatment plan since divulgence will lead to discrimination or social stigmatization [5]. That fear will not only affect the patient-physician relationship; it will most definitely prevent such patients from consenting to enroll in research studies covering sensitive subjects.

There are a variety of rules and policies that regulate the use of patients' health information in research [6]. In the USA, for instance, the Health Insurance Portability and Accountability (HIPAA) Act of 1996 is very well established and is followed by HCPs to protect the privacy and security of patients' health information [7, 8]. HIPAA rules and regulations are federal laws protecting who and how health information is handled [6, 8].

Moreover, in Saudi Arabia, in 2001, royal decree No. 7/B/9512 ordered the creation of a National Committee of Bioethics (NCBE). The committee's responsibilities included establishing and monitoring compliance with biomedical research ethics and requirements in a way consistent with the Islamic Sharia Law and the traditions and essence of the culture of Saudi Arabia [9].

A few HCPs consider security and privacy measures interchangeable; however, they are dissimilar. The term "privacy," as mentioned before, is more focused on the (what) aspect of information, while the term "security" is defined as the (how) [10, 11]. There has been a notable growth in research and an increased development of research centers in the Middle East. Therefore, applying HIPAA rules and regulations in research has become essential for protecting patient information, privacy, and security. The basic law of government in Saudi Arabia dictates the state's importance of providing public health and healthcare to all citizens, as mentioned in Article No. 31. Privacy of information in all types of communication shall be inviolate, as mentioned in Article No. 40 [5]. Legally, there are laws for implementing healthcare and providing information privacy, but there are no specifications for protecting patients' health information. This study aimed to assess the awareness, knowledge, and attitude of HCPs toward patients' data privacy and security in clinical research using the HIPAA and NCBE rules and regulations.

Methods

Study Design

A mixed methods approach was used, and it consisted of two parts: a cross-sectional study in which the HCPs' awareness and knowledge of HIPAA and NCBE rules and regulations were measured using an anonymous self-administered survey as a descriptive method that was followed by an in-depth semi-structured interview based on the Theoretical Domains Framework (TDF) to explore HCPs' attitudes and perspectives (a supplementary focus group).

Survey Design

The questionnaire items were created after a review of pertinent literature on security, privacy, and privacy in relation to clinical research. The questionnaire comprised two sections; the first included demographic data (age, gender, marital status, education level, and work experience). The second section included 15 questions to measure the awareness of HIPAA rules and regulations, NCBE laws and policies, and the awareness of HCPs toward the role of Institutional Review Board (IRB)/Research Ethics Committee's (REC) to protect patients' data privacy and security in clinical research. Ten HCPs pilot-tested the survey items for clarity and comprehension before distribution. After that, the questionnaire was distributed to the participants (including physicians, pharmacists, and nurses) physically and via an Internet link. The participant inclusion criteria were HCPs who had experiences with both practice and research in a single tertiary referral center. The survey was distributed between January 2022 and March 2022.

Interview Design

A follow-up phone call was conducted with interested participants to provide information, explain the study objectives, and decide upon the interview time. Consent was obtained verbally at the beginning of each focus group (FG) interview. Three in-depth, semistructured FG interviews were conducted with a sample of the participants until saturation of knowledge was reached in the data. All conversations were digitally recorded with the participant's permission and were transcribed verbatim.

Topic Guide

A topic guide was created (online suppl. material, available at https://doi.org/10.1159/000538617). We used a TDF to build the topic guide. TDF is a synthesis of 33 theories to understand behavior and behavior changes [12]. It was developed by collaborations of psychiatrists, health psychologists, and healthcare

providers to help implement these theories by nonexperts [12]. The questions were amended to fit our topic and were revised by two HCPs for understanding. A warm-up question about the participants' opinions about privacy in their research was asked at the start of the interview. The interviews were conducted in English (as many of the HCPs are English speakers), the participants were allowed to use the Arabic language to express opinions more easily, and the section spoken in Arabic was translated to English by N.A. and revised by a professional translator. The interviews were recorded and transcribed verbatim by a professional transcriber. Furthermore, the semi-structured interviews were undertaken virtually using Zoom videoconferencing. Finally, the interviews took place from March to May 2022 and lasted between 40 and 60 min.

Ethical Considerations

The questionnaire was distributed only after receiving approval from the Research Ethics Committee, approval number (withheld for review). Participants were informed of the aim and content of the study. No identifiable information was collected from the participants, i.e., names, ID numbers, or contact information.

Data Analysis

Data were computed using Stata 16 (Stata Corp, College Station, TX, USA). The calculations of the survey were summarized using descriptive statistics (frequency and percentages) and presented in tables. The χ^2 or Fisher's exact test was used to compare group responses. Each correct answer about HIPAA or NCBE knowledge was given a score of one. The total HIPAA and NCBE scores were compared between both groups using the Wilcoxon test. Stepwise quantile regression was used to evaluate factors affecting the knowledge scores. Baseline data and variables related to participants' research history were introduced into the model, and variables with a p value of less than 0.05 were retained in the final model.

Thematic analysis of the interviews was performed with MAXQDA Analytics Pro 2020 (VERBI Software). Thematic analysis is the systematic identification and analysis of patterns, meanings, and themes within qualitative data [13]. Thematic analysis is initiated by familiarization with the data, then generating initial code and potential themes. Next, the themes are refined by reviewing and defining them. Throughout the thematic analysis process, multiple researchers are involved to enhance the trustworthiness of the findings [13]. Two authors (N.A., M.A.) examined each transcript independently, and a third author (A.A.) checked for discrepancies between the two versions. Discussions were used to settle disagreements. Data were examined following each interview to create initial codes and identify significant and new information.

Each FG was concluded with a summary that was to be verified by the participants and checked for any ambiguity to increase rigor and reliability. The two researchers (N.A., M.A.) met after each interview to discuss the data they had gathered. Memoranda was made during the interviews and used for data collection and analysis utilizing MAXQDA memos (such as describing interviewee's expressions or hesitation to answer specific questions effectively). Interviewers continued collecting data until they found enough information to supplement their understanding of the topic. Interview data were kept private.

Results

Survey Design

Description of the Participants

The majority of the 108 survey respondents, who were divided into two groups based on their field of practice – physicians (20.37%) and nonphysicians (79.63%) – were women (64.81%). Nearly 90% of all responders fell within the age range of 44 or younger. Both categories (physicians and nonphysicians) showed that >80% have a bachelor's degree. The majority of respondents in the nonphysician categories have a bachelor's degree. In contrast, the majority of respondents in the physician group have either a bachelor's degree or a fellowship/board educational level (40% and 31%, respectively). Additionally, the majority of survey participants (60%) (60% for nonphysicians and 68% for physicians) had >5 years of professional experience. There were significant differences in gender, age groups, and educational levels between physicians and nonphysicians (Table 1).

Research History

Respondents were questioned about their history or engagement in research. The majority (64.81%) claimed a history of engagement, and out of the 108 people surveyed, 27 said they were presently engaged in research projects either in the proposal writing, data gathering, or data analysis stages. More physicians were working on research and had significantly more publications than nonphysicians (Table 2).

Perceptions of the Impact of the IRB/REC Rules and Regulations

In reporting perception of the impact of the IRB/REC rules and regulations for protecting health information, half of physicians respondents reported that they agree that the rules made research easier (50%), while the other half were either undecided (36.36%) or disagreed with the statement (13.64%). Almost all nonphysicians (80%) and physicians (72.73%) agreed that the IRB/REC rules and regulations strengthened participants' trust in the researchers. Another point that both groups agreed on was that the rules and regulations also enhanced confidentiality (81.82% and 84.88% for physicians and nonphysicians, respectively). The perceived benefit of the rules and regulations to improve the privacy and security of patients' healthcare information was reported to be agreed on by both groups (68.18% and 88.37% for physicians and nonphysicians,

Table 1. Baseline data of study participants

Variables	Nonphysicians (*n* = 86; 79.63%)	Physicians (*n* = 22; 20.37%)	Total (*n* = 108)	*p* value
Female	66 (76.74)	4 (18.18)	70 (64.81)	<0.001
Age groups, years				0.01
25–34	52 (60.47)	7 (31.82)	59 (54.63)	
35–44	23 (26.74)	6 (27.27)	29 (26.85)	
45–54	8 (9.30)	5 (22.73)	13 (12.04)	
55–64	1 (1.16)	3 (13.64)	4 (3.70)	
65+	2 (2.33)	1 (4.55)	3 (2.78)	
Educational level				<0.001
Bachelor's degree	74 (89.16)	7 (31.82)	81 (77.14)	
Master's degree	3 (3.61)	2 (9.09)	5 (4.76)	
Medical degree	3 (3.61)	3 (13.64)	6 (5.71)	
Fellowship/board	3 (3.61)	9 (40.91)	12 (11.43)	
Doctorate's degree	0	1 (4.55)	1 (0.95)	
Work experience				0.07
6 months–5 years	34 (40.96)	7 (31.82)	41 (39.05)	
6–10 years	21 (25.30)	4 (18.18)	25 (23.81)	
11–15 years	13 (15.66)	1 (4.55)	14 (13.33)	
+16 years	15 (18.07)	10 (45.45)	25 (23.81)	

Table 2. Research history of survey respondents

Variables	Nonphysicians (*n* = 86; 79.63%)	Physicians (*n* = 22; 20.37%)	Total (*n* = 108)	*p* value
Have you ever been a part of or conducted a research study? (Yes)	53 (61.63)	17 (77.27)	70 (64.81)	0.22
Are you currently working on a research study? (Yes)	14 (16.28)	13 (65)	27 (25.47)	<0.001
In which phase are you currently working on?				0.57
Proposal writing	4 (22.22)	2 (12.5)	6 (17.65)	
Data collection or data analysis	8 (44.44)	8 (50)	16 (47.06)	
Publication	6 (33.33)	4 (25)	10 (29.41)	
How many publications do you have?	0 (0–1)	2 (1–5)	1 (0–3)	<0.001

respectively). Last, both groups had equal opinions in agreement, disagreement, and undecidedness about the claim that the rules and regulations increased the amount of time needed to complete the study (Table 3).

HIPAA Knowledge

The survey included six general questions to gauge respondents' knowledge of HIPAA, including questions about specific rules (such as privacy and security rules), who should adhere to HIPAA, and what steps should be taken if research participants' personal information is discussed. Five out of the six questions in this section of the survey were correctly answered by more than 50% of the survey respondents, with no differences in the responses between physicians and nonphysicians (Table 4). The median score for the correct answers in both groups was 4 (25th–75th percentiles: 3–5). There was no difference between physicians and nonphysicians in the total correct answers about HIPAA knowledge; this reflects the awareness of HCPs on patients' health information security and privacy (p = 0.659). HIPPA score was affected only by prior participation in research which

Table 3. Scaled perceptions of the impact of the Institute Review Board (IRB)/Research Ethics Committee's (REC) rules and regulations for protecting health information

Have the rules and regulations	*N* (%)						*p* value
	agree		undecided		disagree		
	nonphysician	physician	nonphysician	physician	nonphysician	physician	
Made research easier	51 (59.30)	11 (50)	29 (33.72)	8 (36.36)	6 (6.98)	3 (13.64)	0.54
Strengthened the participant's trust	69 (80.23)	16 (72.73)	15 (17.44)	6 (27.27)	2 (2.33)	0	0.60
Added cost	40 (46.51)	6 (27.27)	29 (33.72)	8 (36.36)	17 (19.77)	8 (36.36)	0.15
Enhanced confidentiality?	73 (84.88)	18 (81.82)	11 (12.79)	3 (13.64)	2 (2.33)	1 (4.55)	0.74
Delayed time to study completion	34 (39.53)	7 (31.82)	32 (37.21)	8 (36.36)	20 (23.26)	7 (31.82)	0.66
Improved the privacy and security of participant's healthcare information?	76 (88.37)	15 (68.18)	9 (10.47)	5 (22.73)	1 (1.16)	2 (9.09)	0.03

Table 4. Health Insurance Portability and Accountability (HIPAA) knowledge of survey respondents

Questions	Nonphysicians (*n* = 86; 79.63%)	Physicians (*n* = 22; 20.37%)	*p* value
The major goal of privacy rules is to _____.			0.12
• Protect an individuals' health information in clinical and in research settings (Correct)	76 (88.37)	21 (95.45)	
• Protect the insurance company	0	1 (4.55)	
• Keep all health information documents sealed	9 (10.47)	0	
The security rules aim is to _____.			0.18
• Allow healthcare professionals flexibility to create their own privacy procedures	9 (10.47)	4 (18.18)	
• Protect all health information that is held or transferred in physical and electronic form (Correct)	67 (77.91)	17 (77.27)	
• Protect healthcare information for medical insurance companies	9 (10.47)	0	
Health information that contains at least _____ patient identifier(s) is protected.			0.51
• One (Correct)	36 (41.86)	12 (54.55)	
• Two	45 (52.33)	10 (45.45)	
• Five	5 (5.81)	0	
If you observe someone wrongfully disclosing a research participant's health information, what should you do *first*?			0.39
• Talk with your supervisor about the situation	24 (28.24)	9 (40.91)	
• Talk to the person who is disclosing health information (Correct)	58 (68.24)	12 (54.55)	
• Confront the participant	3 (3.53)	1 (4.55)	
Two researchers are eating lunch at a busy restaurant and discussing a research participant's case that involves confidential health information regarding the participant. What should they do?			0.139
• They should not mention the name of the participant	38 (44.19)	14 (63.64)	
• Ask others what they think	1 (1.16)	1 (4.55)	
• Move to a private location (Correct)	46 (53.49)	7 (31.82)	
The rules and regulations that help protect the security and privacy of patient's health information are required to be followed by?			0.25
• Healthcare providers	4 (4.65)	3 (13.64)	
• Medical and/or clinical researchers	2 (2.33)	0	
• All of the above (Correct)	80 (93.02)	19 (86.36)	

Table 5. National Committee of Bioethics (NCBE) knowledge of survey respondents

Questions	Nonphysicians (n = 86; 79.63%)	Physicians (n = 22; 20.37%)	p value
The National Committee of Bioethics is defined as?			0.59
• A committee that monitors compliance with biomedical research ethics and requirements (Correct)	76 (88.37)	19 (86.36)	
• A committee decides which drugs will appear on that entity's drug formulary	3 (3.49)	0	
• An executive body of the council that is responsible for the direct supervision over the health insurance industry	7 (8.14)	3 (13.64)	
NCBE is related to one of the following?			0.13
• Saudi Commission for Health Specialties	22 (25.58)	2 (9.52)	
• Saudi Food and Drug Authority	7 (8.14)	4 (19.05)	
• Research Center (Correct)	57 (66.28)	15 (71.43)	
Institute Review Board (IRB)/Institutional Research Ethics Committee (REC) is a representative committee in each institute, appointed by NCBE and is responsible for ____.			0.05
• Approval of new drug to formulary	3 (3.49)	3 (13.64)	
• Providing approval for the principal investigator for conducting any research studies (Correct)	81 (94.19)	17 (77.27)	
• Supervising and evaluating training programs	2 (2.33)	2 (9.09)	
Research participants have the right to withdraw at any point during or after the research project as mandated by ____.			0.73
• Saudi Health Council	10 (11.63)	3 (13.64)	
• Council of Cooperative Health Insurance	6 (6.98)	2 (9.09)	
• National Committee of Bioethics (Correct)	70 (81.40)	17 (77.27)	
NCBE committee rules and regulations are applied to _____.			0.007
• Foreign and Saudi researchers (Correct)	68 (80)	17 (77.27)	
• Only Saudi researchers	17 (20)	2 (9.09)	
• Only foreign researchers	0	3 (13.64)	
NCBE rules and regulations are _____.			0.04
• Optional for HCPs conducting research	37 (43.02)	6 (27.27)	
• Applicable only to research in hospital settings	24 (27.91)	3 (13.64)	
• Law mandated by a royal decree (Correct)	25 (29.07)	13 (59.09	

indicates improved HIPPA knowledge for those who had experience with clinical research (β: 1.16 [95% CI: 0.52–1.81]; p = 0.001).

NCBE Knowledge

Table 5 lists the six broad questions included in the survey to determine respondents' familiarity with the NCBE, including inquiries regarding the NCBE's definition, the area it primarily influences, and the individuals to whom its rules and regulations are applied. The survey demonstrated that more than 50% of the survey respondents from the physician group correctly answered all six questions. In the nonphysician group, five out of the six questions in this section were correctly answered by more than 50% of the survey respondents. The median score of correct answers was 5 (4–5) in nonphysicians and 5 (4–6) in physician groups (p = 0.517). Factors increasing the score were working on a research project (β: 0.87 (95% CI: 0.35–1.39); p = 0.001), and years of work experience (β: 0.35 (95% CI: 0.12–0.58); p = 0.003), while increased age was associated with lower score (β: −0.28 (95% CI: −0.54 to −0.01); p = 0.04).

Interview Design

Theme 1: Factors Influencing Variability in Defining Patients' Data Privacy and Security

• Nature of the Research

Participants mentioned that privacy is more secure in research than in practice. Physicians mentioned that they are more careful, as there is somebody following the process, unlike in practice:

"...for example, in practice, a patient comes to you asking for a doctor's number. You can give him ..., but the research is much less." (FG 1)

Furthermore, the nature of the research affected privacy violations, such as variability in sample size and nature of communication. For instance, some research contained a small sample number and for a very long time compared to other research where there are hundreds of patients:

"As Dr. (...) said, it depends on the type of researcher, especially dentistry... For example, you must be part of the research, and you will not pay anything, so I will start to pressure you to accept. However, we, as pharmacists, if, for example, a research questionnaire ... and he refused, I will go to another participant, no condition that I would pressure him to accept." (FG 1)

• Junior versus Senior Researchers

Participants discussed that they noticed privacy violations when the primary investigator involved an inexperienced research assistant:

"... in general, (researchers) who know research procedures, how to do research and ethical aspects will not do that ... but I'm talking about the participants who are with us, for example, data collectors ... they must have an ethical guide, or study points that were taken in the past and not violate the data." (FG 3)

Theme 2: Underlying Factors Contributing to Unauthorized Use of Patients' Data Privacy and Security in Clinical Research

• Slip-Up Error

Participants discussed that the reason might be a human mistake, similar to any other error:

"... pressure causes a medical error, so this might happen... work pressure puts pressure on all people... no doubt it affects." (FG 1)

• Local Research Culture

Interviewees discussed that the Saudi culture and nature of the communication might have contributed to such behavior, as the following interviewee mentioned:

"...I stay for an entire hour (with the patients), I sit with him and talk ... and I have his number. We are in culture as long as someone I sit with and talk to in private. They become friends, and we do not need to set boundaries ... Compared to other countries, we are definitely more. Saudi Arabia, for example, this is the norm!" (FG 1)

Furthermore, the problem of using personal mobile phones for planning recruitment and other research arrangements might aggravate it:

"Perhaps this is one of the mistakes that can happen in research. (communication) is not through a phone designated for work ... so violation happen... besides I am not supposed to keep them (the patients' contacts) ... but what happens is not like that ..." (FG 3)

Theme 3: Enhancing Patients' Data Privacy and Security: Recommendations from HCPs

• Continuous Education

HCPs mentioned that the matter is that protecting privacy depends on the researcher's knowledge and that there is no dedicated education the healthcare provider received:

"..., it is certainly (was) part of the curriculum in the college. ... after this, no one teaches you or provides you instructions ... " (FG 3)

• A Reminder

Participants discussed that an application for research that sends reminders might help:

"For me, I see that it is not easy at all, in a kind of difficulty to remember these things, you need a tool or something that reminds you that." (FG 1)

• Limit Researchers' Number and Access to Data

Interviewees mentioned that the limiting number of researchers who access patients' data is vital:

"I think that according to the number of data collectors ... it is very important that two or three data collectors are allowed with the patient and not more ... do not assign more people." (FG 3)

"The most important, I think, for example, was to set a password, and this password had an expiration date, and it would be granted by the head of the department. This is among the things that help." (FG 1)

"... (a password) for a certain period, it was three months, and the password changed from time to time, and you could only open it from inside the hospital, the internal internet." (FG 1)

Integration between Survey and Interview Components of Our Research

The integration of a mixed methods study, specifically by incorporating a qualitative design to enhance the understanding of the quantitative component, is a valuable approach in research that we undertook in our study [14]. By utilizing both qualitative and quantitative methods, researchers can gain a more comprehensive and nuanced understanding of the phenomenon under investigation. The interview study provided context, depth, and richness to the survey data, offering insights into the underlying reasons, motivations, and perceptions that

may not be captured through survey study alone. This integration aligns with the transformative mixed methods research framework proposed by Creswell and Plano Clark [15] which emphasizes the complementary nature of qualitative and quantitative methods in addressing research questions. Furthermore, the use of a qualitative design within a mixed methods study can also help in the interpretation of quantitative results, as qualitative data can elucidate the meaning and significance of quantitative findings. This integration is supported by the work of Tashakkori and Teddlie [16], who advocate for the synergistic use of qualitative and quantitative methods to capitalize on their respective strengths and offset their individual limitations. More discussion about the explanation of the survey component by the interview components is presented in the discussion section.

Discussion

Privacy and security of patients' data in clinical research have crucial value [17]. Previous report demonstrated that HCPs may lack sufficient knowledge to maintain patients' privacy [18]. There are limited data on the knowledge of national (NCBE) or international (HIPAA) guidelines for patients' data privacy and security in clinical research for HCPs in Saudi Arabia. Therefore, we performed this study to assess the awareness, knowledge, and attitude toward patients' data privacy and security in clinical research among HCPs, by utilizing the guidelines of the Health Insurance Portability and Accountability Act (HIPAA) and the National Committee on Bioethics (NCBE). The approach used was both quantitative and qualitative in nature, to assist not only in understanding and assessing the awareness, knowledge, and attitude (the what) but also, the why within the context of this study. To paint a better picture of HCP's awareness, knowledge, and attitude toward patients' data privacy and security in clinical research, a deeper and better understanding of the description and comprehension was needed by implementing a mixed methods design to produce stronger conclusions than each methodology alone. The findings in this study revealed varying levels of awareness among HCPs in reference to guidelines mentioned previously (HIPAA and NCBE), which was a crucial aspect of the study's objective to assess knowledge in this domain. Furthermore, the study delved into the attitudes of HCPs toward patient's data privacy and security, uncovering significant insights that align with our initial objective of understanding HCP perspectives in the context of clinical research. These insights are instrumental in identifying gaps and formulating strategies for improving compliance and ethical conduct in clinical research, directly linking to the study's primary objectives. This study consisted of two components: the survey study and the interview study. The survey study included 108 participants (86 nonphysicians and 22 physicians). Despite the difference in the baseline characteristics and research experience, most participants agreed about their perceptions of the impact of the IRB/REC rules and regulations for protecting health information and their knowledge about HIPAA and NCBE. The survey has showed that physicians and nonphysicians have acceptable awareness of the HIPPA; however, this was significantly better in HCP who had participated in clinical research. The results also indicated the necessity to improve the knowledge of HCPs about data privacy and security in clinical research. Factors associated with better knowledge were prior participation in research, working on research projects, work experience, and younger age.

Utilizing an interview study in conjunction with survey results offered the added benefit of more understanding of the findings. Based on the interview study, several factors were identified that could impact patients' privacy and security in clinical research. Participants expressed concerns about the nature of the research, particularly in cases where the research involved sensitive health information. They emphasized the need for stringent measures to safeguard patient privacy, especially when inexperienced individuals were involved in data handling and management. Additionally, human errors were highlighted as a significant concern, with participants expressing apprehensions about the potential for data breaches due to inadvertent mistakes.

Furthermore, in response to these concerns, participants suggested various improvements to the data privacy and security process. This included limiting access to sensitive data to a specific number of authorized personnel, thereby reducing the risk of unauthorized exposure. Continuous education initiatives were also recommended to ensure that all individuals involved in clinical research, especially those handling patients' data, were well-versed in privacy protocols and best practices. Furthermore, participants stressed the importance of regular reminders about the rules and regulations governing data privacy and security to mitigate the likelihood of oversight or complacency.

The perception of HIPAA privacy rules was evaluated in other studies. A sample of 1,527 epidemiologists

in the USA were asked questions about the positive and negative potential effects of the HIPAA privacy rules. A measurement approach was used to determine the influence of the HIPAA privacy rules on health research. Only a quarter of epidemiologists agreed that the rule increased participants' confidentiality and privacy. The rule also negatively affected the IRB submission process, including approval delays and increased costs [19]. Furthermore, a cross-sectional survey of HCPs working in the training and research hospital aimed to determine the HCP's attitudes toward the privacy and confidentiality of the patients. The sample consisted of 174 nurses and 183 physicians. The study identified that at the highest, 40.8% of nurses and 26.8% of physicians reported that they were well aware of patient rights, and at their lowest, 2.9% of nurses and 8.2% of physicians reported that they were uninformed of patients' rights [20].

A cross-sectional study assessed the knowledge, perceptions, and practices toward medical ethics of 128 physician residents in three teaching hospitals. The results showed that most residents (98.0%) experienced ethical issues during their practice, which indicated a lack of knowledge and the ability to solve ethical problems among physician residents [21]. A study focused on the information system was also conducted in Saudi Arabia. The study aimed to assess the application of HIPAA regulations using a qualitative assessment approach to examine security information systems in two main Saudi healthcare institutions. A survey was used to examine the security and safeguarding of information. As a result, the scores from the two health security information systems in both institutions were relatively close. Thus, it was suggested that the Saudi Ministry of Health should construct a national policy for health information security based on the HIPAA model [22].

Mohammad Nejad et al. [23] conducted a cross-sectional study to measure nurses' awareness of patients' rights in a teaching hospital. The study used a two-part validated questionnaire. The study showed that out of 156 nurses, 58% had good awareness, 39% had medium awareness, and the remaining 2.5% had poor awareness. A significant relationship exists between nurses' awareness and work experience. The study recommended that special measures and strategies should be considered to promote nurses' awareness of patients' rights [23].

Our research findings unveil noteworthy distinctions from the literature reviewed, particularly in the realm of gender, age groups, and educational levels among physicians and nonphysicians. Unlike the existing literature, we identified significant differences in these demographic variables, suggesting that contextual factors specific to our study population may influence these disparities. A key similarity, however, emerges concerning physicians' perspectives on research rules, where half of the respondents agreed that the regulations facilitated the research process but simultaneously extended the time required for study completion. Similarly, HCPs acknowledged the pivotal role of IRB/REC in upholding data privacy and security, aligning with the existing literature. On the other hand, our research diverges notably in terms of participant numbers and methodological approaches.

The findings from this study underscore the importance of enhancing HCPs understanding and adherence to patients' data privacy and security, particularly concerning HIPAA and NCBE guidelines in Saudi Arabia. As previously noted by the interviewees, they recommended improvements to data privacy and security protocols. One recommended policy change is the implementation of mandatory HIPAA certification for all healthcare providers. This certification process should be designed to ensure that every HCP, regardless of their role or level of experience, possesses a thorough understanding of HIPAA regulations and the importance of patients' data privacy and security in clinical practice. The certification program could include comprehensive training modules covering various aspects of HIPAA, including patient rights, data handling procedures, and the legal implications of data breaches. Additionally, regular recertification, perhaps on an annual or biennial basis, could be mandated to ensure that healthcare providers stay current with any changes or updates in HIPAA regulations. This policy change would not only enhance the overall compliance with patient data protection standards but also foster a culture of continuous learning and vigilance among HCPs, ultimately leading to improved patient trust and safety in healthcare settings. Also, ongoing training sessions and assessments are crucial to keeping HCPs abreast of the latest developments in data privacy and security, potentially through online modules, workshops, or continuing education credits. Establishing a culture of compliance within healthcare institutions is also vital, promoting a proactive approach toward data protection, including regular audits and feedback mechanisms. Furthermore, collaboration with IT experts is necessary to develop secure data systems, especially with the increasing use of technology in healthcare.

Implications of the Study

This study explored the knowledge and perception of HCPs about patients' data security and privacy in clinical research and factors that could improve data privacy and security. Prior publications and participation in clinical research were associated with improved knowledge of HIPAA and NCBE rules and regulations. These data could be used to develop targeted educational programs for HCPs to improve HCP knowledge and awareness and to enroll them in more clinical research projects to enhance their knowledge about the rules and regulations. Raising the awareness of data privacy and security among HCPs could help promote public trust in clinical research. Several factors could affect the privacy and security culture [24], and new technologies are being developed to enhance healthcare security [25]. Future studies are required to evaluate factors that influence data privacy and security in clinical research and evaluate the methods that can be used to enhance privacy and security culture and systems.

Study Limitations

The study has several limitations. The research was limited by the sample size and demographics and affiliation to a single institution; therefore, generalization of the findings to other HCPs in different centers could be an issue. The study is cross-sectional, and a causal effect cannot be established. Additionally, using an online questionnaire could have introduced selection bias. Also, the limited number of publications by the survey participants may be a source of bias in interpreting the results. The accuracy of self-reported data is another issue. HCPs may be reluctant to participate or report their knowledge because of concerns about their professional competence.

Conclusions

Patients' data privacy and security remain vital to clinical research. Identifying factors that could compromise data privacy and security, enhancing HCP knowledge, and fostering a culture of data privacy can ultimately enhance the integrity of clinical research. HCPs realize the role of IRB/REC to maintain data privacy and security. Enrollment of HCPs in clinical research and continuous education could improve HCP knowledge of regulatory rules.

Statement of Ethics

The questionnaire was distributed only after receiving approval from the Research Ethics Committee of Prince Sultan Military Medical City Research Council Number 1407. Participants were informed of the aim and content of the study. No identifiable information was collected from the participants, i.e., names, ID numbers, or contact information. Written informed consent was obtained from all study participants for participation in the study.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

Funding was not received for this study.

Author Contributions

Monirah A. Albabtain, Dalal Alotaibi, Nourah Almazial, and Haneen Mohammed Alghosoon conceptualized the quantitative part of the research designed. Nouf Aloudah conceptualized the qualitative part of the research designed. All authors contributed to the writing of the proposal and final manuscript and approved the final manuscript. Amr A. Arafat analyzed the data and wrote the results.

Data Availability Statement

The data that support the findings of this study are not available publicly due to institutional regulations but will be made available upon justifiable request from the corresponding author and after approval of the institution's IRB to release the data. Further inquiries can be directed to the corresponding author.

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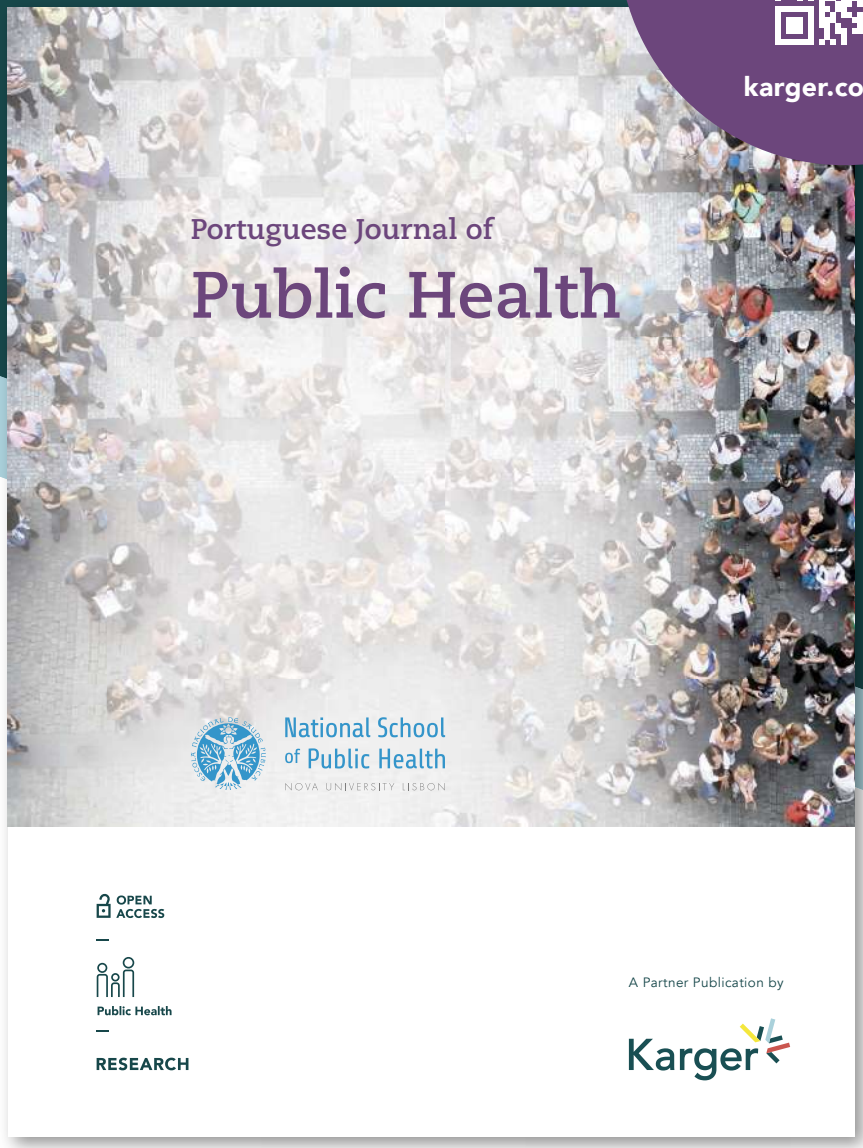

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