The use of mobile application in primary health care in Saudi Arabia: A cross-sectional study

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ABSTRACT

Background: Technology implantation, for example, smartphone application, in primary health care (PHC) is an approach to enhance healthcare services via availability and convenient access. This study described the factors contributing for not booking an appointment using the mobile application, and why patients visit PHC physicians. **Method:** This is a cross-sectional study that included 477 participants who visited the PHC physicians. Eligible subjects who present in the patients' waiting area were asked to participate by giving them a self-administered questionnaire. **Results:** With a total of 477 participants' appointments, 83.5% (N = 398) of them were booked through the mobile application. Out of 398, 54.6% (N = 217) were not booked by the patients themselves. The most common reasons for the visits were follow-up (38.8%), lab/imaging results (34%), and acute complaint (27.3%). Gender, age, and the number of comorbidities the patient has were significantly associated with those who didn't book the appointment by themselves through the mobile application (P-value <0.001). Males were more likely to book for themselves than females. The average age for patients who booked for themselves through the mobile application was significantly low (Mean = 39.4, SD = 14.5). Those who were able to book for themselves had a lower number of comorbidities. **Conclusion:** Age, gender, and number of comorbidities were significant factors contributing to not to book an appointment/use mobile application by the patients themselves. The mobile application might cause difficulties and influence the appointment booking process. The application should be expanded throughout the country with further modification to meet the patient's needs.

Keywords: Mobile application, primary health care, reason for visit, Saudi Arabia, technology

Introduction

Primary health care (PHC) is an essential concept in the health field and considered as the foundation of the healthcare system.[1] Because of the importance of PHC globally, health institutions are making efforts to improve PHC systems.[2] In Saudi Arabia, the first department for public health was initiated in Mecca in 1925 and followed by the Saudi Ministry of Health (MOH) in 1950.[3] The government gives a high priority to healthcare services, which considerably improved in the last few decades.[3] The family physician is an integral part of the PHS as being the first defense line for the healthcare system and the gate for anyone seeking healthcare services.[3] Although the efforts have been made to improve the health care, the healthcare system still facing some gaps and challenges that necessitates new strategies by the MOH as well as cooperation with other governmental sectors.[3]

Since the primary healthcare center is the base of healthcare, it should be accessible for all populations. Accessibility is the ease in which individuals get the needed care from their chosen physicians within a short time from the chief complaint.[4] Seven factors contribute in the accessibility including availability,

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geographic access, accommodation to need (e.g., mobile health applications), affordability, acceptability, utilization, and equality.[2] Improved accessibility will lead to increased continuity of care, decreased cost, a better quality of care, and patient satisfaction.[5] Easy access will lead to excellent patient satisfaction which reflects the good quality of primary care.[6,7]

Technology implantation in the healthcare system is an important approach to enhance healthcare services via availability and convenient access.[8] Technology can contribute to reduction in the consultation time and improvement in the patients' health outcomes as well.[9,10] In Saudi Arabia, there were few attempts to launch applications in the healthcare field, one of which is '"Health App" that was introduced by MOH.[11] The application allows individuals to access healthcare everywhere, and it offers an online visual/auditory consultation with a specialist.[11] Also, a smartphone application "MNGHA Care" was launched by The Ministry of National Guard-Health Affairs (MNG-HA) in 2016.[12] Through this application, the patient can book appointments, view lab test results, request medication refill and print medical reports.

The utilization of these health services can be done incorrectly. For example, patients still seek their doctors' visit for administrative issues, drug refill or requests for tests which will cause an increasing workload on the healthcare providers and decrease the quality of care delivered to others.[13] A study took place in Germany with 2,866 patients aged 65 years and older, a total of 4,426 reasons for visits were found. The findings showed that half of the reasons, approximately 54.3%, were not related to acute complaints, such as follow-up visits, medical examination, blood tests, and medication prescription or injection.[14]

Another study was conducted in Poland in 2016 included 450 patients. The study showed that the most common reasons for which the patient visits the doctor in PHC were to refill current medications, asking for referral and infections.[15] Moreover, most groups who seek medical care services are at age 20–30 and 50–70.[15]

This study aims to describe the factors contributing for not booking an appointment through the mobile application by the patients themselves. Also, to identify patients' reasons to attend PHC in the Health Care Specialty Center in National Guard, Riyadh, Saudi Arabia.

Methods

This cross-sectional study was done in the Health Care Specialty Center in National Guard, Riyadh, Saudi Arabia. The population of the study consisted of all patients who visited the PHC physicians in 2019, a total of 477 patients participated. Patients who were unable to complete the survey were excluded. Patients who were not physically present, such as visits attended by a representative of the patient, for example, a family member or caregiver, were excluded as well. The participants were selected from the waiting area of the primary healthcare center by convenience sampling technique. Eligible subjects who were present in the patient waiting area were asked to participate by giving them a self-administered questionnaire.

Based on a previous study,[14] the questionnaire consisted of demographic data, comorbidities and reasons for the visit. Additional sections were added including booking modality (mobile application or not), who booked the appointment, and reasons for not booking an appointment by the patients themselves. A pilot survey was conducted by the researchers and further modifications were made as needed. The data collection was conducted on two random days each week until the required sample size was satisfied. Data were collected between July and September 2019.

Statistical analysis was performed using SPSS version 21 (SPSS Inc., Chicago, IL). Frequencies and percentages were used to describe categorical variables while mean/median and standard deviation for continuous variables. P value <0.05 was considered significant. A descriptive analysis was done to report basic data distribution. To examine the association between the variables, Chi-square test was used for categorical variables, while t-test was used for numerical variables.

Ethical consideration

Confidentiality and anonymity were maintained throughout the study and no name or medical record number was documented. The study was approved by the Institutional Review Board of King Abdullah International Medical Research Centre. Informed consent was taken from all study participants.

Results

During the study period, July to September 2019, a total of 477 patients were included. Of them, 50.5% (n = 241) were males and 49.5% (n = 236) were females. Among all participants, 34% (N = 162) were at the age of ≥56 years for mostly males (N = 114), while the age of the females was more distributed among the categories. The most common comorbidities among the participants were hypertension (34.4%), diabetes (32.3%), and dyslipidemia (23.1%) [Table 1].

Out of the 477 participants' appointments, 83.5% (N = 398) were booked through the mobile application, out of these, 54.6% (N = 217) were booked by someone else than the patients. Out of the 217 appointments, 96.4% (N = 209) were booked by a family member for mostly females (N = 124), while most of males booked for themselves through the mobile application [Table 1]. The most common reasons for the visits were follow-up with a percentage of (38.8%), followed by lab and imaging results inquiry (34%) and acute complaint (27.3%) [Table 2].

The participants were asked about the reasons for not using the mobile application and the non-self-appointment booking through the mobile application, out of 296,

Table 1: Distribution of personal characteristics of patients who attended the Health Care Specialty Center in National Guard from July to September 2019 (n=477)

Variable	Male (n=241, 50.5%)	Female (n=236, 49.5%)	Total (n=477, 100%)
Age:			
≤15	6 (2.5)	10 (4.2)	16 (3.4)
16-25	32 (13.3)	42 (17.8)	74 (15.5)
26-35	28 (11.6)	56 (23.7)	84 (17.6)
36-45	24 (10.0)	29 (12.3)	53 (11.1)
46-55	37 (15.4)	51 (21.6)	88 (18.5)
≥56	114 (47.3)	48 (20.3)	162 (34.0)
Mean (SD)			
Co-morbidities			
Hypertension	112 (23.5%)	52 (10.9%)	164 (34.4%)
Diabetes	90 (18.9%)	64 (13.4%)	154 (32.3%)
Dyslipidemia	69 (14.5%)	41 (8.6%)	110 (23.1%)
Rheumatoid arthritis	42 (8.8%)	9 (1.9%)	51 (10.7%)
Thyroid disease	11 (2.3%)	29 (6.1%)	40 (8.4%)
Asthma/COPD	24 (5.0%)	5 (1.1%)	29 (6.1%)
Neurological disease	21 (4.4%)	5 (1.1%)	26 (5.5%)
Others	18 (3.8%)	4 (0.8%	22 (4.6%)
Kidney disease	15 (3.1%)	5 (1.1%)	20 (4.2%)
Heart failure	6 (1.3%)	7 (1.5%)	13 (2.8%)
Musculoskeletal problems	8 (1.7%)	3 (0.6%)	11 (2.3%)
Psychiatric disease	0	5 (1.1%)	5 (1.1%)

190 (64.2%) have contributed to the reason for being illiterate educationally/technologically [Table 3].

Upon analyzing the factors that influence booking the appointment through the mobile application, we found that gender, age, and the number of comorbidities the patient has were statistically significant (*P*-value <0.001). Our analysis of gender as a factor showed that 114 out of 181 who booked for themselves via the mobile application were males, while 71.6% of females did not book for themselves (*P*-value <0.001). There was a significant association between age and booking an appointment, the average age for patients who booked for themselves through the mobile application was significantly lower than the other group (Mean = 39.4, SD = 14.5) versus (Mean = 49.1, SD = 20.8) (*P*-value <0.001) [Table 4].

The analysis showed that there is a significant difference in the average number of comorbidities the patient has between patients who booked for themselves through the mobile application and those who did not. Those who were able to book for themselves had significantly lower number of comorbidities compared to those who didn't book by themselves (mean = 1.0, SD = 1.29) vs (mean = 1.55, SD = 1.41) (*P*-value <0.001) [Table 4].

Discussion

This cross-sectional study had analyzed the data of 477 participants to identify the factors contributing for not booking an appointment through the mobile application by the patients themselves and why patients visited the PHC.

The use of mobile technologies can potentially benefit the primary care centers by facilitating the availability, accessibility, and communication between healthcare providers and patients. Also, it might help in improving patient health outcomes and satisfaction toward the provided services. The results of previous studies in Saudi Arabia show that there is great potential for mobile health applications to be used by the patients.[16,17] Education\technology Illiteracy was a major reason in this study for participants not to book an appointment by themselves through the mobile application and to use the mobile application. Illiteracy in Saudi Arabia in 2018 was approximately 5.6%.[18] Regarding the technology, illiteracy was found in 38.2% of our participants. Patients may face difficulties with the newly implemented technology, for example, a mobile-based appointment system. A systematic review done by Zhao P *et al.*[19] described the barriers of using technology in health care, which include poor technological skills, lack of trust in the internet, and patient's tendency to choose verbal communication. A study conducted by Google and Compete in the United States in 2012[20] stated that only 21% of patients used the computer or mobile devices to book appointments.

The results of Katz A *et al.*,[21] which tends toward our results, found that the most common reasons for visits were acute complaint (35.4%) and follow-up (34.6%). Another study conducted in the United States by Binns HJ *et al.*[22] with the acute problem (48.5%), chronic problem, routine (18.2%) chronic, flare-up (8.2%) as the most common reasons for visits. Follow-up was the most common reason for thevisit in our study, possibly because of the high prevalence of major chronic diseases among people in Saudi Arabia. As the previous studies stated, the prevalence of hypertension is 15.2%, and diabetes mellitus is 18.5% in adults.[23,24] Having the lab and imaging results inquiry as the second most common reason in our study might reflect the general population perception of a blood test being a screening tool for any disease. As shown in our results, follow-up was the most common reason for visit, we recommend features to be added in the mobile application. For example, selecting the exact services needed for the physician visit or writing a brief description of the complaint, which may improve the healthcare system more and save time for the healthcare providers as well as the individuals.

In this study, there was a significant association between those who did not book an appointment through the mobile application or did not use the application by themselves and being a female. This can be explained by the local social norms where females tend to rely on males. In addition, the findings in this study showed that the majority of the educationally illiterate participants were females. This study found that those who were able to book for themselves had a lower number of comorbidities. It is been found that a higher comorbidity score is associated with lower quality of life (QoL), and it is the most common reason for disability.[25,26]

Table 2: Distribution of booking details among patients who attended the Health Care Specialty Center in National Guard from July to September 2019 (n=477)

Variable	Male [n=241, 50.5%]	Female [n=236, 49.5%]	Total [n=477, 100%]
Appointments were not booked through the mobile application	39 (16.2)	40 (17)	79 (16.6)
Appointments booked through the mobile application	202 (83.8)	196 (83)	398 (83.4)
Who booked the appointment via the mobile application			
Patient him/herself	114 (47.3)	67 (28.4)	181 (37.9)
Family member	85 (35.3)	124 (52.5)	209 (43.8)
Relative	3 (1.2)	5 (2.1)	8 (1.6)
Reasons for appointment			
Follow up	125 (51.9)	60 (25.4)	185 (38.8)
Lab/imaging results	80 (33.2)	82 (34.7)	162 (34.0)
Acute complain	59 (24.5)	71 (30.1)	130 (27.3)
Request for labs/imaging	70 (29.0)	46 (19.5)	116 (24.3)
Refill current medication	78 (32.4)	35 (14.8)	113 (23.7)
Request for referral	22 (9.1)	7 (3.0)	29 (6.1)
Mistaken appointment	17 (7.1)	1 (0.4)	18 (3.8)
Immunization	1 (0.4)	2 (0.8)	3 (0.6)
Others	1 (0.4)	1 (0.4)	2 (0.4)

Table 3: Distribution of reasons for not using the mobile application and the non-self-appointment booking through the mobile application among patients who attended the Health Care Specialty Center in National Guard from July to September 2019 (n=296)

Reasons for not booking an appointment	Male (n=127, 43%)	Female (n=169, 57.0%)	Total (n=296, 100%)
Illiterate educationally/technologically	88 (69.3)	102 (60.4)	190 (64.2)
Acute complaint	11 (8.7)	37 (21.9)	48 (16.2)
Problem with the app	18 (14.2)	2 (1.2)	20 (6.8)
Never tried to use the app	1 (0.8)	16 (9.5)	17 (5.7)
Child	6 (4.6)	10 (5.8)	16 (5.4)
Others	3 (2.4)	2 (1.2)	5 (1.7)

Table 4: Association between "Who booked the appointment" and Number of Co-morbidities the patient has, age, and gender among patients attending Health Care Specialty in National Guard from July to September 2019 (n=477)

Variable	Who booked the appointment			
	Patient him/herself n (%)	Other n (%)	X^2/Z	P
Gender			18.113	<0.001
Male	114 (47.3)	127 (52.7)		
Female	67 (28.4)	169 (71.6)		
Age:	Mean±S.D 39.4±14.5	Mean±S.D 49.1±20.8	-5.528	<0.001
Number of Co-morbidities the patient has	Mean±S.D 1.00±1.29	Mean±S.D 1.55±1.41	18.153	<0.001

The result of this study found that young patients are more likely to book an appointment through the mobile application by themselves than older patients. As supported by Atallah N *et al.*,[16] it suggests that the use of mobile applications was more likely seen in patients aged 18–30 years.[16] Also, a study conducted by Czaja SJ *et al.*[27] suggested in their finding that people aged (60–91 years) were unlikely to use technology in general compared to younger adults. It might be due to the use of smartphones and different applications on a daily basis by the younger population, which may ease the use of health applications.

Limitation

The study was done in a single-center, and the results cannot be generalized to Saudi population; the sample size was not large enough as well.

Conclusion

The results of this study suggest that age, gender, and number of comorbidities are significant factors contributing to not to book an appointment/use mobile application by the patients themselves. Majority of the participants did not use the mobile application by themselves because of illiteracy. Patients can have problems using the newly introduced technological system in PHC centers, which can negatively influence their capability to book an appointment, with other reasons such as illiteracy. The application should be expanded throughout the country with further modification to meet the patient's needs. Further studies with patient's education level obtained and other variables are encouraged to examine their significance.

Highlights

This study provides an overview of factors influenced the booking process via mobile application, further modification on the application to adapt these factors are encouraged to get the full benefits of mobile application in PHC.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other

clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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