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## Research article

# The Effect of Telemedicine on Patients' Compliance in Family Medicine Follow-ups in Qatar

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## ABSTRACT

**Introduction:** Telemedicine is the delivery of health care services to patients distantly. During the Coronavirus Disease 2019 (COVID-19) pandemic, telemedicine has become an essential implement in delivering healthcare services worldwide. Accordingly, in March 2020, the Primary Health Care Centers (PHCCs) in Qatar has started telephone consultation follow-up appointments in Family Medicine (FM) clinics instead of conventional consultation. Given the limited data about telephone consultations in Qatar, our aim of this study is to investigate the possible impact of telemedicine on chronic disease patients' follow-up compliance.

**Methods:** This study compares the compliance of adult patients with chronic diseases following-up within FM clinics in Qatar's PHCC through telephone consultations with a minimum of three telephone consultations ordered between April to November 2020, in comparison to the compliance of the same group of patients to their prior face-to-face follow-up consultations in FM clinics with a minimum of three face-to-face ordered follow up appointments between April to November 2019. A cross-sectional study will be carried out to investigate the effect of telephone consultation in PHCC on patients' compliance with reference to conventional face-to-face consultation. Patients' data will be received from Health Information Management in twenty-seven PHCCs in Qatar.

**Conclusion:** Due to the limited studies on the effectiveness of telemedicine on patient compliance in FM follow-ups within Qatar's PHCC, comparing patients' follow-up compliance with telephone consultations to their prior face-to-face consultations would be helpful in assessing patients' quality of care delivering within FM clinics. With telecommunication being easily accessible and time-efficient, it is believed, when used correctly, it might improve compliance and adherence to the management prescribed by the physician and follow-up appointments in Qatar's PHCC. In addition, this study will help in providing recommendations that could guide the organization on forming policies to be applied in PHCCs after the resolution of the COVID-19 pandemic.

**Keywords:** telemedicine, face-to-face clinic, primary health care center, follow-up, patients' compliance, Qatar.

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## 1. INTRODUCTION

Telemedicine or telecommunication in medicine refers to the delivery of health care services, where distance is a critical factor by all health care professionals (World Health Organization: WHO). During the Coronavirus Disease 2019 (COVID-19) pandemic, telemedicine has become an essential and crucial tool in delivering healthcare services worldwide. Although telemedicine was first introduced in the late 19<sup>th</sup> century, its role and implications remained questionable for multiple decades, especially in developing countries [1]. Nevertheless, the COVID-19 pandemic accelerated the implementation of telemedicine, displayed its advantages, and provided a chance to explore its limitations. Accordingly, in March 2020, the Primary Health Care Centers (PHCCs) in Qatar has replaced the majority of face-to-face follow-up appointments in Family Medicine (FM) clinics with distant telephone consultations.

Due to its not yet proven values in cost-effectiveness compared to conventional approaches, telemedicine had a limited role in health care worldwide prior to the COVID-19 pandemic (WHO). Thus, there is limited data regarding telephone consultation's effectiveness in the literature [2-3]. According to WHO, chronic diseases are announced as an epidemic that primarily impacts the economy and is the leading cause of death worldwide [4]. One of few systemic review studies about telemedicine in the Middle East and North Africa region showed that the lack of knowledge, skill, and experience in using technology was found to have a major influence on patients' perceptions of telemedicine in the Gulf Cooperation Council countries [5]. Though, among the established studies worldwide, findings have demonstrated similar clinical outcomes and patient satisfaction between telemedicine and conventional follow-up in primary care outpatient settings [6-8]. Moreover, a study conducted in a specialized nephrology center in the United States of America (USA) that provided a telemedicine consultation service for chronic kidney disease patients living in rural areas found that telemedicine consultations have superiority in follow-up compliance compared to in-clinic visit consultations [9]. In addition, almost half of face-to-face follow-up consultations were either canceled or had no-shows to the appointment [9]. In a recent review article regarding the impact of telemedicine on diabetic patients in 47 articles within the USA concluded a positive effect on HbA1c levels, revealing the effectiveness with compliance [10]. Moreover, in a prospective study, a pediatric headache clinic in the USA, where a survey was completed by the patient's family, concluded that the telephone consultations were more favorable, as they would save time and transportation costs, compared to in-clinic visits [11]. On the other hand, few studies suggested having telemedicine as an add-on service rather than a substitute to follow-up onsite visits would increase patient satisfaction [12]. Thus, a study emphasized the need to fill the gap of knowledge within primary care for chronic diseases within the COVID-19 pandemic [13].

Telemedicine is a newly developed method to overcome emerging challenges and help facilitate health care delivery and patient compliance. By comparing compliance of the same group of patients with both face-to-face and telephone follow-up consultations, we will be able to identify the effect of telephone consultation on patients' compliance. Although there are various studies on telecommunication with patient compliance worldwide, there is limited information about the effect of telecommunication on the patients' compliance within Qatar's FM clinics.

Patient compliance is an important factor in achieving patient safety, among several other aspects that concerns the patient's availability. Patients often do not follow a treatment plan as directed by a physician due to several factors, including the lack to obtain needed health care services and complex management plans that require supplementary guidance [14]. COVID-19 pandemic has urged the PHCCs in Qatar to deliver their medical advice services distantly via newly established telephone consultation services to ensure the safety of patients and medical staff. Given the limited data about telephone consultations in Qatar, this study aims to evaluate the effectiveness of telemedicine, as an innovative treatment technique, on patient compliance in FM follow-ups within Qatar's PHCC. In other terms, the possible positive or negative impacts of telemedicine on chronic disease patients' follow-up compliance will be investigated.

## METHODS/DESIGN

### 1.1 Study Design

A cross-sectional study will be carried out to investigate the effect of telephone consultation in FM clinics, with reference to conventional face-to-face consultation.

### 1.2 Study Setting

This study will be running based on patients' data received from Health Information Management (HIM) in twenty-seven FM clinics in Qatar. There will be no investigator-patient interaction at any level. Analysis of the anonymous data will be stored on the desktop with a password provided only to the medical investigators.

### 1.3 Study Population

Adult patients with chronic diseases following up within FM clinics in PHCCs.

### 1.4 Inclusion Criteria

The inclusion criteria in this study will be adults ranging in age between 18 and 64 years; who are following up in PHCCs for one or more previously established diagnoses from the following chronic illnesses: prediabetes/diabetes mellitus type 1 and 2, hypertension, dyslipidemia, hypothyroidism, osteoarthritis, chronic anemia, depression, anxiety, and asthma. Moreover, patients should have at least three follow-up appointments in PHCC (under FM clinic) prior to the COVID-19 pandemic between April 2019 – November 2019 (face-to-face consultations) and at least three phone consultation follow-ups in PHCC (under FM clinic) during the COVID-19 pandemic between April 2020 – November 2020.

### 1.5 Exclusion Criteria

The exclusion criteria in this study will consist of patients who are diagnosed with psychiatric illnesses other than depression and anxiety. Pregnant patients with one or more of the chronic illnesses mentioned in the inclusion criteria. Patients and/or caregivers are unwilling or unable to operate Telehealth equipment. Patients who passed away during the study duration. Patients who have been admitted as an inpatient for any medical condition during their scheduled appointments.

### 1.6 Sampling

This study is going to utilize a simple random sampling technique.

### 1.7 Sample Size Calculation

Given the large number of patients meeting the inclusion criteria in FM clinics, the Cochran formula was used to calculate the minimum sample size needed to reject the null hypothesis [15]. Assuming the estimated proportion of an attribute that is present in the population is  $p=0.5$ , a sample size of 385 or more is needed to demonstrate significance. The precision of  $\pm 5\%$  will be aimed to achieve with a confidence level of 95%.

$$n = \frac{Z^2 * p * q}{e^2} = \frac{(1.96)^2 * (0.5) * (1 - 0.5)}{(0.05)^2} = 385 \text{ patients}$$

### 1.8 Statistical Analysis

The study is designed to investigate the possible impact of telemedicine on chronic disease patient's follow-up compliance. Moreover, the study aims to develop recommendations that can help to form policies to be applied in Qatar's FM clinics. The data obtained through HIM will include patients' age, gender, specific chronic illness as mentioned above, number of absences of the last three follow-up appointments in telephone, and number of absences of the last three follow-up face-to-face appointments within April and November 2019.

Our analysis will rely mainly on two main variables; face-to-face compliance or pre-intervention variable and telephone compliance or post-intervention variable. Normal distribution will be assessed by Kolmogorov-Smirnov and Shapiro-Wilk tests. Two main statistical tests will be used to compare compliance between face-to-face and telephone consultations for the same sample.

First, Paired Sample T-test; in which the average attendance/response (continuous variable) will represent compliance for both face-to-face and telephone consultations, to provide primary findings. Second, to confirm our finding, the Wilcoxon Rank Sum test will be used, in which attendance/response will be represented as ordinal by defining samples to compliant and non-compliant to follow-ups. Compliant are those who had a minimum of two attendance/responses out of three for each of telephone and conventional consultations. In contrast, one or no attendance/response will be considered as non-compliant.

These advanced statistical analyses will be calculated using SPSS 64-bit version 25. Results will be considered statistically significant if P-values are less than 0.05 in two-tailed tests.

### 1.9 Study Timeline

Data collection will be provided by HIM database; thus, the patient involvement is not required. This step is estimated to be completed before January 2022. Data analysis is expected to be completed in March 2022. The manuscript will be completed by December 2022.

### 1.10 Ethical Considerations & Participant Consent

Institutional review board /ethical approval was obtained from the PHCC Research Sub-committee Committee on the seventh of July 2021, Qatar. Reference number PHCC/DCR/2021/02/011.

Accordingly, a data extraction form was submitted to HIM team that included the aim, variables needed, as well as the inclusion and exclusion criteria for this study. Datasheets were requested to be coded to ensure patients' anonymity.

Informed consent is not required for our study since data will be extracted from HIM database; thus, fulfilling HIM extraction protocol.

A number of quality control measurements will be taken. Data obtained via HIM will be secured in a password-protected fixed PHCC computer. Access will only be prompted to investigators and data analysts during phases of data cleansing and analysis. The HIM data will be permanently deleted after three years of study completion.

## CONCLUSION

Telemedicine, telehealth, or telecommunication in medicine are used interchangeably; however, collectively defined by WHO as delivery of health care services being provided by all health care professionals, where distance is a crucial factor. Due to the COVID-19 pandemic, telemedicine is currently the primary mean of delivering health care services in Qatar. There is a lack of data in the state of Qatar regarding patients' compliance to follow-up appointments using the telecommunication method. Thus, the aim of this study is to compare patients' follow-up compliance with telephone consultation in FM with reference to their prior face-to-face consultation follow-up in Qatar's PHCCs.

There are multiple advantages of performing our proposed methodology to reach the study objectives. First, explore the pros and cons of telephone consultations in Qatar's PHCC. Second, the outcome of the study can potentially assist decision-makers of health care in Qatar about their future plans with regard to telemedicine. In short, this study aims to improve patients' health care quality by building information that could form the foundation of future guidelines for telemedicine use.

A potential limitation of this study would be the inability to assess the quality of care provided and the level of patients' satisfaction in each method of consultation. This could be a point to be studied in future research.

## LIST OF ABBREVIATIONS

**WHO:** World Health Organization

**FM:** Family Medicine

**COVID-19:** Coronavirus Disease 2019

**PHCC:** Primary Health Care Center

**USA:** United States of America

**HIM:** Health Information Management

## DECLARATIONS

### 1. Availability of data and materials

As mentioned above, all the data required for this study is available in the primary health care data sources, which can be easily extracted via HIM. License to SPSS 64-bit version 25 is granted to College of Medicine-Qatar University students. A statistician from Qatar University, Public Health department will be supervising the statistical analysis.

### 2. Competing interests:

The authors declare that they have no competing interests

### 3. Funding

This study protocol is not supported by any institution.

#### 4. Authors' contributions

All authors listed have a significant contribution to this protocol article.

AA and LA contributed to the literature review about telemedicine.

MH and DH contributed to the need of the research and rationale of the study.

YM and AM contributed to sample size calculations and statistical analysis.

MA and MB contributed to ethical considerations related to this study.

NA and MM have critically appraised all manuscript parts and approved the final manuscript.

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