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**The investigation of Telehealth Services Impact on Improving the
Quality of Life for Elderly –high Risk Patients:**

Case of Bahrain's Primary Healthcare Sector

By

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Abstract

The telehealth platform is crucial to improving the elderly's quality of life in primary healthcare. This study explores the impact of elderly high-risk patients' quality of life achieved by using telehealth. The study adopts a mixed method. The first 627 patients' opinions are surveyed to answer the online questionnaire using the European quality of life tool and usability and acceptance questionnaire related to the telehealth system. Second, a semi-structured interview is used with 20 staff members and patients from primary health clinics. The inferential analysis results found correlation affected the usability of the telehealth system in QoL dimensions. They showed a significant correlation (Anova Test $p = 0.001$) with mobility, usual activity, and anxiety or depression, while not significant with self-care and pain or discomfort dimensions, similar to QoL with demographic data. While in qualitative data, the interview results showed that telehealth affected different dimensions of QoL. Most respondents (95%) were engaged in usual activities, and 75% indicated that telehealth affected anxiety and depression. While 55 % showed improvement in elderly mobility, only 45% of respondents noted that elderly self-care was affected. Some of the challenges and recommendations the participants addressed were to improve the telehealth system in primary health care.

Regarding trust, the interview results showed that 85% of respondents believed that both clinics and telehealth got the same amount of trust. Respondents revealed some challenges such as physical impairment, difficulty conducting physical examinations, technical instability, lack of communication, language barriers, decreased acceptance of technology by elderly patients, and perception of the elderly using telehealth services in their QoL recommendation. The respondents suggested the availability of 24-hour telehealth for emergency cases, multidisciplinary telehealth clinics, and elderly mobile clinics connected with telehealth. The research recommends introducing innovative applications to enhance patient autonomy, overcoming staff shortages, and offering the elderly educational training courses that address their concerns.

Keywords

Telehealth, elderly, Quality of Life, Digital platform, Technology Acceptance Model, European QoL, Mixed methods.

Background

Telehealth in primary health care has remained controversial in recent studies, especially after the COVID-19 pandemic breakout, which significantly changed our lifestyle and social interaction. It is essential to underline that this subject has become a central axis of World Health. These advances and improvements in consultation and telecommunications have been shown to improve accessibility to health services without the need to see doctors in hospitals when there always remains a risk to grasp coronavirus infection for elderly patients. During the COVID-19 pandemic, the Bahrain Ministry of Health adopted the best strategy for delivering uninterrupted medical -care services to all populations, anytime and anywhere (*Elderly Care - Ministry of Health*, 2020).

Health care industries manipulate ways of delivering health services to cope with the current pandemic to protect patients' health and medical staff. So many health care services shifted from face-to-face to virtual interaction (Steindal et al., 2021). Many policy changes have influenced telehealth uptake during the current time, including the evolution of virtual medication prescription, consultation, education, and counseling. The National Health Regulatory Authority (NHRA) in the Kingdom of Bahrain provides a map of relevant policies for integrating digitalization in primary health care. To ensure patients grasp the proper supervision by the right team at the right time by issuing licensing to practice telehealth for primary health care physicians and health professionals that adhere to international guidelines.

Telehealth gets remarkable acceptance by the population after numerous worldwide global primary health clinic promotional guidance (Chang et al., 2021). Governmental primary care in Bahrain started to lead the pack with the **choose your doctor program** in June 2018, which allows citizens and residents to meet their doctors using video or phone calls with the expectation of complimentary meetings regarding Covid-19 and the early detection program. A virtual emergency clinic for high-risk Covid -19 was conducted in primary health care in Bahrain on regular appointments for the clinical interview following guidelines in treating patients during quarantine.

Recently, the Supreme Council of Health in the Kingdom of Bahrain has targeted all the government health establishments to move towards autonomy and health insurance schemes. The focus of the government of Bahrain is on the new government plan to meet Economic Vision 2030 and on achieving sustainable development goals (*Sustainable Development*, n.d.). Primary health care in the Kingdom of Bahrain is developing new strategic plans for automation in terms of administration and monetary support which refers to the hospital's ability to determine its preferences and translate those preferences into authoritative actions (Cimperman et al., 2013). Therefore, the hospital's logistics and departments introduced a broad concept of change management that requires a critical observation of patient needs and expectations to handle all the possible obstacles that affect the quality of healthcare service delivery.

Methods

Introduction

The previous chapter reviewed the literature, including the theories, models, and studies to define and explore the thoughts of elderly high-risk patients of using telehealth on their QoL. This chapter aims to explain the methodology roadmap that guides this research and outlines the research problem, objective, conceptual framework, variables, research questions, and hypotheses. The chapter then highlights the research methods applied and the justifications for using these methods. It provides details about the research paradigms, followed by the sampling technique used and the study's sample.

Before collecting primary data, content analysis was used as the research method to determine the knowledge gaps and advantages in creating the research instruments. Consequently, secondary data were collected from an extensive range of resources, including academic journals, books, newspapers, health reports publications, statistical documents, and government and health websites.

Research Objective

The research objective of this thesis is to explore the perception of elderly high-risk patients about using telehealth services on their QoL. To reach the objective of this research, the proposed model includes dependent and independent variables from the European QoL & Technology Acceptance Models while moderating variables from the literature review to achieve the objective of this research. A mixed-method approach is used in collecting and analysing data.

Research Design and Data Collection

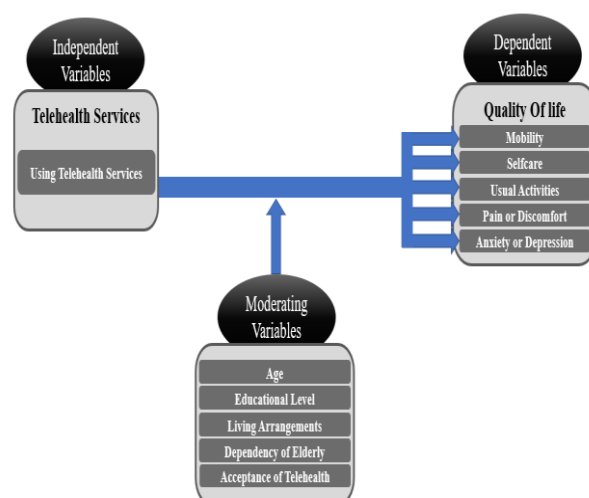
According to Fetter et al. (2013), the research design is a comprehensive outline of the methodological decision taken, as many research designs apply to different researches. However, research design selection depends primarily on the research problem to be investigated. The study presents an exploratory research approach to review the data provided to assess the thoughts of elderly high-risk patients using telehealth on their QoL in primary health care centres. The study design used a mixed methodology – quantitative and qualitative.

Three data sources in qualitative research develop a comprehensive understanding of phenomena (as patients, Nurses, and health care professionals)—confluence triangulation, as its methodological technique applied to support both validation and competencies of research findings. The triangulation aims to check the validation of the research, “deepening and widening” the researcher's understanding of examining phenomena.

Conceptual Framework

The research model was established by the Europ-QoL group during many stages of development, as the European group decided to have a comprehensive instrument that involved many descriptive dimensions, including the HRQoL tool sources in qualitative research develop a comprehensive understanding of phenomena (as patients, Nurses, and health care professionals)—confluence triangulation, as its methodological technique applied to support both validation and competencies of research findings. The triangulation aims to check the validation of the research, “deepening and widening” the researcher's understanding of examining phenomena involved many descriptive dimensions, including the HRQoL tool, which contains mobility, daily activities, self-care, psychological functioning, social and role performance, and other health problem. In 1988 the generic instrument included 6 dimensions and was developed after several studies of the Euro QoL questionnaire. Theoretically, the group decided to be confined into 6 dimensions: mobility, self-care, main activity, social relationship, pain, and mood.

Relationship among the variables



Quantitative Method Questionnaire Design

EuroQoL instrument designed based on levels asking elderly patients about their Quality of life. The questionnaire was redrafted and piloted extensively before the final version was produced by in-depth interviews with patients in different countries to assess comprehensively.

The tool helps health organizations with quantitative research and to understand patients' QoL in any health facility with different health services and technologies. Adapting the EuroQoL instrument aims to add value in improving QoL and life expectancy of the elderly and provide valuable feedback to the hospital board, staff, commissioners, patients, and the public. Not to mention that the EuroQoL group encouraged the researcher to obtain a license to adopt and use the tool in the current research. The EuroQoL Tool consists of five dimensions of HRQoL to evaluate the effect of telehealth in the elderly with the five-dimensional classification; each dimension has four levels for assessing elderly QoL. Telehealth Usability questionnaire was added to increase the power function relationship between the effect of improvement of elderly QoL achieved by using telehealth, to increase valuations to QoL parameters, validity, and reliability of each particular measurement field (Kind et al., 2005). Five Euro QoL dimensions as listed in the table. Each item or question of the survey is coded for statistical analysis.

The online questionnaire consists of and develops three sections as follows:

- Section 1: includes demographic data of the elderly patients, is used as moderating variables, and consists of 9 questions.
- Section 2: include five main dimensions of QoL with four levels, each with a total of 20 items, for the study's requirements and represent the dependent variables.
- Section 3: includes usability and acceptance and contains 7 questions on 3 points Likert scale. And it is derived from the Telehealth Usability Questionnaire designated to be comprehensive to cover six usability factors (including usefulness, ease of use, effectiveness, reliability, satisfaction, and future use) of 20 questions in the original version of the questionnaire. Seven questions were selected based on the research objectives. In conclusion, the questionnaire is categorized into three sections; the first includes demographic data, the second section is related to elderly QoL, and the final section comprises usability and acceptability of telehealth technology. In January 2022, a request was sent to the Euro QoL group for a license to adopt the Euro QoL tool for the quantitative method. After accomplishing all the requirements, the EurQoL group does not require licensing for non-commercial use.

Survey Sampling Design

Primary Health Care elderly patients who attended selected health centres during March and April 2022 were eligible to answer the questionnaire. The elderly population was defined as high risk with one or more diseases and used telehealth services in the last 12 months.

Primary health care medical records provided information on 700 patients, presenting the research population as requested. The sampling method used is the probability stratified random sampling technique. Then, a filtration process was conducted to exclude elderly patients who couldn't read after finishing their

consultation with family physicians. The patients were directed to a separate room to meet the researcher to answer the online questionnaire in a secure, confidential environment. The survey started during the second week of March 2022 and continued till the end of April 2022. Based on pre-study considerations of statistical power and the overall number of the elderly population, a minimum sample size of 390 was calculated and considered a confidence level of 95% with a margin of error of 5% to determine the sample size. In addition, to compensate for the design effect, a sample size of more than 600 exceeded the target.

Survey Analysis

Elderly patient responses were collected from the participants and imported into the Statistical Package for the Social Sciences (SPSS) version 25. A self-administrative survey was used in the data collection method in this research.

Qualitative Method

Sampling and data collection

Semi-structured interviews were conducted; the interview comprised a set of 7 open-ended questions on the perception of elderly high-risk patients' using telehealth services on their QoL, exploring the interviewer about telehealth challenges that affect elderly QoL and their recommendation to improve QoL for older adults. The questions were developed from the conceptual model, designed to be comprehensive to identify the effect of telehealth services on elderly QoL.

Data Analysis

MAXQDA software was used to perform and manage the interview transcription. Categorization and coding of the interviewers. The analysis's outcome was visually presented through the software to observe any positive or negative relationships that affect elderly QoL. In addition, the recommendation and suggestions will help to encourage improvement in elderly telehealth impact on their QoL. The three qualitative data records are 1) the interview with family physicians, 2) the interview with the head of the administration office, and 3) the interview with the patients discussing their experience with telehealth in terms of improving QoL, challenges, and recommendations to improve telehealth that affect their QoL.

The MAXQDA software functions illustrate the main codes of the research and organize the respondents' answers.

Ethical Considerations

The survey avoided using inappropriate, discriminatory, or offensive language to formulate survey questions. The author will submit the proposal for approval from the ethics committee in primary health care. Also, it will be conducted utilising main ethical issues, including autonomy, informed consent, confidentiality, privacy, safety, and data protection. Respondents have been provided with sufficient information about the study's purpose before answering the research questionnaire and conducting the research process with clear objectivity. Moreover, the privacy of individual information and the confidentiality of given answers were guaranteed. Provide enough time for the completion and submission of the questionnaire with respect to all individuals participating in the research process. Using professional words or ideas were fully recognized through proper citation. Then verbal consent will be taken from both patients & interviewers. They will be informed that their participation is entirely voluntary, there is no obligation

to participate, and they have the right to drop out of the survey at any time. Moreover, it will not impact their care at this health centre if they choose not to participate. The questionnaires will not request participants' names or ID numbers to ensure anonymity and confidentiality. Secure passwords will be activated to ensure the security of data on the laptop.

Descriptive Analysis Finding

Demographic Information of the Participants

A total of 600 elderly patients responded to the questionnaire. The personal data gathered from the respondents included gender, age, marital status, educational level, living arrangements, the presence of the elderly in the clinic, number of telehealth used by the patients in the last 12 months, and presence of comorbidities as reported in Table 1.1.

Table 1.1 Socio-demographic and Baseline Characteristics of the Participants

Variable		Frequency	Percentage
Name of Health Centre	Ahmed Ali Kanoo	88	14.7
	Dair	140	23.3
	Jidhafs	171	28.5
	Isa Town	121	20.2
	Zallaq	80	13.3
Sex	Male	331	55.2
	Female	269	44.8
Age Group	young old	336	56
	middle old	170	28.3
	oldest-old	94	15.7
	Single	35	5.8
Marital Status	Married	352	58.7
	Divorced	116	19.3
	Widow	97	16.2
	living alone	248	41.3
Living arrangements	With the partner only	180	30
	with partner & another carer	172	28.7
	primary School	270	45
	secondary School	105	17.5
Educational level	high School	59	9.8
	collage Degree	129	21.5

The presence of the elderly in the clinic	Postgraduate	37	6.2
	use wheelchair	74	12.3
	walk in	526	87.7
	Number of telehealth sessions that used by the patient in the past year	1 – 2	188
		3 – 4	191
Comorbidities		5 – 6	221
	Diabetes	583	97.2
	Hypertension	414	69
	heart disease	158	26.3
	respiratory diseases	54	9
	Joint or osteoporosis	128	21.3
	Others	16	2.7

The average age of the participants was 70.318.22 years, as shown in Table 4.1 with more than half ($n = 336$, 56.0%) aged between 60 and 69 years, approximately 30% aged between 70 and 79 years, 15.7 percent aged above 80 years. While most of the participants were married ($n = 352$, 58.7%), only 5.8% of them ($n = 35$) were single. Divorced and widowed participants constituted 19.3% and 16.2% of the participants, respectively.

Regarding the educational level, approximately half of the participants had a primary school level ($n = 270$, 45.0%). Patients with college degrees constituted only 20% of the participants. Up to 88% of the patients presented to the health care facility as walk-in patients, and only 12% presented using a wheelchair. Most patients (41.3%) were living alone (30%, and 28.7% only with a partner and with both the partner and another carer, respectively).

Almost all participants had diabetes mellitus ($n = 583$, 97.2%), and almost 70% of them were hypertensive (69%, $n = 414$). The least prevalent comorbidity was joint or osteoporosis ($n = 128$, 21.3%), followed by respiratory diseases ($n = 54$, 9%).

Effects of Telehealth Services on the QoL for Elderly High-Risk Patients

This part of the questionnaire determined the impact of telehealth on patients' quality of life, including mobility, self-care, usual activity, pain/discomfort, anxiety, and depression. The responses were as follows:

Table 1.2 Effect of Telehealth Services on the QoL for Elderly High-Risk Patients

QoL Dimension	Effect of telehealth QoL	of in Cou	nt	Percenta ge
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	It has no effect on a patient's mobility	99	16.50%		It decreases patient pain or discomfort	149	24.80%
Telehealth effect the patient's mobility	It is helping the patient move more often	450	75.00%		Patient does not suffer from anxiety/depression. Telehealth has no effect on that	365	60.80%
	It is making the patient move less often	6	1.00%	Telehealth effect the patient's anxiety and depression	Patient suffers from anxiety or depression. Telehealth has no effect on that	24	4.00%
	Patient unable to move	45	7.50%		It increases the patient's anxiety or depression	2	0.30%
	Patient washes & dresses himself/herself. Telehealth has no effect on that	74	12.30%		It decreases patient's anxiety or depression	209	34.80%
Telehealth effect the self-care of the patient	Patient unable to wash or dress him/herself, and telehealth has no effect on that	525	87.50%				
	It increases the interest of patient in washing/dressing	1	0.20%				
	It decreases the interest of the patient in washing or dressing	0	0.00%				
	The patient does usual activity, and telehealth has no effect on that	121	20.20%				
Telehealth effect the usual activity of the patient	The patient is unable to do usual activity, and Telehealth has no effect on that	69	11.50%				
	It increases patient usual activity	410	68.30%				
	It decreases patient usual activity	0	0.00%				
	Patient does not suffer from pain/discomfort, and Telehealth has no effect on that	320	53.30%				
Telehealth effect the patient's pain and discomfort	Patients suffer from pain or discomfort; however, telehealth has no effect on pain	126	21.00%				
	It increases patient pain or discomfort	5	0.80%				

The impact of telehealth on the dimensions of patients' quality of life is summarised in table 1.2. In general, the negative effects of telehealth among different aspects of patients' QoL were uncommon.

Table 1.4 Correlation Between Educational Level and Dependency with Usability and Acceptance of Telehealth

		Mean	N	Std. Deviation	P-Value
Educational level	Primary School	1.35	270	0.60	0.040
	Secondary School	1.39	105	0.65	
	High School	1.45	59	0.73	
	Collage Degree	1.56	129	0.74	
	Postgraduate	1.54	37	0.71	
Dependency	Use wheelchair	1.23	74	0.44	0.006
	Walk-in	1.45	526	0.68	

Inferential Analysis

Associations Between Demographic Data with Usability and acceptance of Telehealth

Table 1.3 below shows that the two demographics that showed a positive correlation with the acceptance of telehealth were dependency status and educational level.

Usability of Telehealth in Association with Demographic Data	P-Value
Gender	0.737
Age Group	0.332
Marital Status	0.663
Living arrangements	0.224
Telehealth Group	0.942
Educational level	0.040
Dependency	0.006

*Average mean of Analysis of Variance (ANOVA)

No differences were found between the overall usability and acceptance of telehealth and different characteristics of the demographics, except for dependency status and educational level. In Table 4.4, the mean of all questions about the usability of telehealth was calculated. Considering that the lower the mean, the higher the acceptance of the use of telehealth, patients with lower educational levels and those who presented in wheelchairs had a higher acceptance of telehealth. Obviously, the patients with lower educational levels and those in wheelchairs had a higher acceptance of telehealth use. Dependency, in particular, strongly affected on the patients' acceptance.

The details of educational level and dependency, which had a significant correlation, are presented in detail below:

As you can see in the table above, there is a strong link between the level of education and the degree of dependence among older people and their ability to use and accept telehealth.

Correlation between Demographic Data and the Effects of Telehealth on Dimensions of patient QoL

Using a Chi-square test, the correlation between demographic data and the effect of telehealth on dimensions of patients' QoL was assessed, as shown in Table 4.6.

Table 1.5 Correlation between Effect of Telehealth QoL and Demographic Data

QoL Dimensions	Special Test	Demographic Data					
		Sex	Age Group	Marital Status	Living arrangement	Educational level	Dependency
To what extent does telehealth affect the mobility of the patient	Chi-Square			0.001**		0.001**	0.001**
	Fisher's exact	0.141	0.001**		0.001**		
	Cramer's V	0.095	0.466	0.230	0.254	0.218	0.779
To what extent does telehealth affect on self-care of the patient	Chi-Square						
	Fisher's exact	0.552	0.675	0.413	0.413	0.454	0.877
	Cramer's V	0.037	0.036	0.049	0.049	0.078	0.015
To what extent	Chi-Square	0.341	0.001**	0.001**	0.001**	0.001**	0.001**

does telehealth affect the usual activity of the patient	Fisher's exact	0.020	0.402	0.321	0.288	0.361	0.507
To What extent does telehealth affect the patient Pain & discomfort	Chi-Square						
To what extent does telehealth affect the patient anxiety or depression	Fisher's exact	0.067	0.084	0.161	0.441	0.003**	0.136
	Cramer's V	0.093	0.086	0.071	0.050	0.145	0.048
	Chi-Square						
	Fisher's exact	0.001**	0.001**	0.001**	0.001**	0.034*	0.007**
	Cramer's V	0.139	0.137	0.246	0.346	0.111	0.131

* Significant at 0.05

**Significant at 0.01

Correlation between Demographic data no 1: QoL with gender

The gender of the user of telehealth services influenced the relationship between using telehealth services and elderly anxiety and depression significantly (Fisher Exact Test p 0.001). It was found that telehealth decreased anxiety and depression among males by 40.8% in comparison to females by 27.5%. However, gender reported no impact on other dimensions of QoL.

Correlation with Demographic data no2: QoL and Age

The age of the user of telehealth services influenced the relationship between using telehealth services and elderly mobility, usual activity, anxiety, and depression significantly, as shown in Table 4.6 (p 0.001). The majority of young and middle-aged patients (83.9%) and less than a third of the elderly (31.9%) found it to reduce anxiety and depression (Fisher Exact Test p 0.001). Similarly, by testing the correlation between age and usual activity (p 0.001), the result showed that telehealth increased the usual activity of young and middle-aged patients (78.6% and 71.8%, respectively), but not that of the oldest-old patients (25.5%). However, 74.3% of all age groups reported no impact of telehealth on pain and discomfort. Nonetheless, only 21% of young-old, 30.6% of middle-aged, and 26.6% of the oldest-old patients reported that telehealth decreased their pain and discomfort, with no significant correlation between the two. Additionally, a positive impact of telehealth on patients' mood was specifically observed among the oldest-old group, with 55.3% of them stating that telehealth decreased their depression (Fisher exact test p 0.001). In contrast, two-thirds of the young and middle-aged groups reported no impact of telehealth on their anxiety and depression status.

Correlation with Demographic data no3: QoL and Educational Level

The educational level of the user of a telehealth service influences the relationship between using telehealth services and elderly mobility and usual activity ($p < 0.001$) of the Chi-square test. Anxiety or depression ($p < 0.001$) using the Fisher Exact Test. This association is illustrated in table 4.6 and appendix C. Regardless of the educational level, most patients reported that telehealth improved their mobility by 75% and increased their usual activities by 68.3%; the findings were more evidenced among highly educated patients by 92.7% and 91%, respectively. In addition to decreasing pain and discomfort, it found a significant correlation between the two (Fisher exact test $p < 0.001$) among all levels of education by 25%. The impact of telehealth on decreasing patients' anxiety and depression by 35% was also observed between all levels of education.

Correlation with Demographic data no 4: QoL and living arrangement

According to table 4.6 and appendix C, the living arrangement of the user of telehealth services significantly influences the relationship between using telehealth services and elderly mobility, anxiety, and depression (p 0.001) by using the Fisher exact test. Using the Chi-square test, living arrangements significantly influence the relationship between using telehealth and usual elderly activity. More than 50% of those who lived alone reported that telehealth decreased their anxiety and depression, compared to around 20% of those who lived with other people. Additionally, patients who lived alone also noted that the telehealth helped them move more often compared to those who lived with a partner alone and those who lived with a partner and other caregivers (87.5%, 75.6%, and 56.4%, respectively).

The impact of telehealth use on decreasing pain and discomfort was seen among those who lived alone or with a partner only (26.6% and 28.3%, vs. 18.6% in those who lived with a partner and other caregivers). However, regardless of the living arrangement, most patients (70-80%) reported that telehealth had no impact on their pain and discomfort. Likewise, all patients reported that telehealth had no effect on their self-care, though variations existed.

Correlation with Demographic data no 5: QoL and Dependency

The dependency of the user on telehealth services influences the significant positive relationship between using telehealth services and elderly mobility, usual activity through the Chi-square test ($P < 0.001$), anxiety, or depression which testing with Fisher exact test ($P < 0.001$). While most patients who presented in a wheelchair were unable to move, telehealth did not affect their self-care, usual activities, pain, and discomfort; 51% of them reported that telehealth decreased their anxiety and depression. In contrast, 33% of those who presented as walk-ins reported that telehealth decreased their depression and anxiety. Around 80% thought that telehealth increased their usual activities and helped them move more often. Still, it did not affect their self-care (99.8%).

Correlation with Demographic data no 6: QoL and Marital status

The survey results indicate that the marital status of the users of telehealth services influences the relationship between using telehealth services and elderly mobility, usual activity, anxiety, and depression by using Chi-square and Fisher exact test ($P < 0.001$), as illustrated in Table 4.6. Most elderly found that they move more with telehealth; they are single approximately 97.1% and divorced 94.8%. In this regard, the survey results demonstrated an increase in usual activity of the elderly who used telehealth among single and divorced by 91.4%, 93.1% respectively. The similarity of the effect found in decreasing anxiety and depression is a large proportion of participants are divorced and widows with 55.2% and 56.7%. On the other hand, telehealth has no effect on all marital statuses with self-care, pain, and discomfort, as seen in the previous table.

The survey result demonstrated that some demographic

data did not affect elderly QoL, even though descriptive analysis reported a significant impact on selected demographic on elderly

QoL; for example, there is a strong correlation between mobility and usual activity with dependency. For example, moderate correlation between usual activity with age group, marital status, and educational level. On the contrary, many significant demographic factors have a weak correlation with dimensions of QoL, as shown in Table 4.6

Qualitative Findings

This chapter presents the results of the study. The first section will present the data collected from the semi-directive interviews, which will be synthesised and summarized into various themes accordingly. MAXQDA software was used to facilitate the transcription of the interview and the answers to the questions by managing and organizing the outcomes and the results by themes. The qualitative data will be used to validate the result of the survey and enhance the impact of the discussion. Most importantly, it will achieve the research objective and answer sub-research questions. In the last part of this chapter, a summary of what was found will be given.

Profile of the Participants

A total of 20 interviews were conducted with the participant who signed up for the study and agreed to participate. Eight of the twenty interviews were conducted with physicians, eight with nurses, and four with patients. Seven physicians were Family Physicians, seven nurses held a BSc degree, two patients were female, and two were male. The sample size was sufficient to reach data saturation.

Coded the documents with the structural codes and performed a content analysis of the data. The interviews were coded independently, line by line, allowing new codes to emerge inductively using MAXQDA (Version 2020). Categories and subcategories were continually revised in a cyclical process, with new categories created to reflect the reality of research data.



Figure 2 Word cloud of the top 50 word

Seven overarching themes characterized the effects of telehealth services on the quality of life for elderly high-risk patients: decreasing anxiety and depression, assisting high-risk patients in their self-care, assisting them in their usual routine, availability of the network and devices for telehealth, reducing pain and discomfort, and assisting them in their mobility. Even though telehealth made things easier and got more health professionals involved, participants were worried about the different problems they faced, the clinical effectiveness and limits of virtual physical exams, and the possibility that access differences could get worse. Many people gave suggestions on how to improve the quality of life (QoL) of older people who used telehealth and were at high risk.

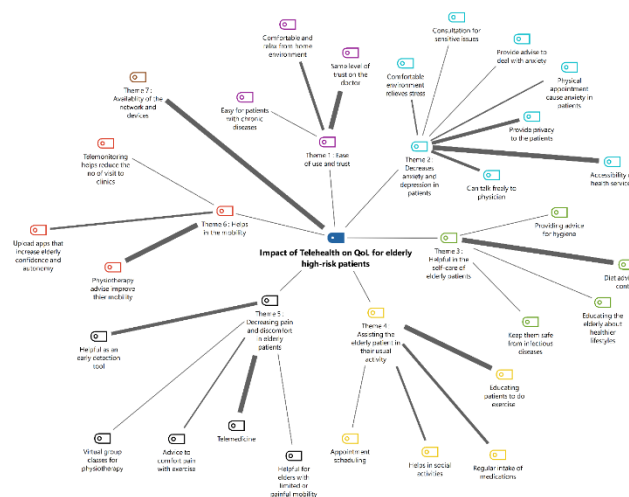


Figure 1 The Perception of Elderly High-Risk Patients of Using Telehealth Services on Their Quality of Life

Discussion

In general, the quantitative study findings are consistent with several studies; the results showed that telehealth improved patients' mobility, usual activities, and anxiety or depression. However, in contrast to the reported studies, the results of the present study revealed no impact of telehealth on patients' self-care, pain, or discomfort, while in a qualitative study, feedback that telehealth effect elderly pain or discomfort, usual activity, and anxiety or depression. The dimensions cited less were mobility and the elderly's self-care, as most interviewees were from medical staff who have a vital role in prescribing medication, and mental counselling, while mobility, and self-care, in their opinion, need more physical assessment.

The oldest elderly are more likely to report improved psychological symptoms like anxiety and depression, while the young and middle elderly are more likely to benefit physically. Highly educated patients reported more mobility and usual activity improvements than other educational levels. In contrast, other measures of QoL like pain or discomfort and anxiety or depression were relatively similar among all levels of education groups. The sex of elderly patients who participated in this study was male more than female, significantly improving anxiety and depression. In contrast, sex had no effect on other QoL dimensions.

Single and divorced elderly patients were more likely to improve mobility and usual activity; divorced and widowed patients reported decreased anxiety and depression. Moreover, elderly who lives alone reported a more positive impact on their mobility, usual activity, and mood condition while using telehealth. On the other hand, this study found no statistically significant associations between the living arrangement of the user of telehealth services and self-care, pain, or discomfort of the patient. Moreover, mobility and usual activity are more likely to significantly impact independent patients compared to dependent elderly. While mood thought positively affected dependent people.

The usability of telehealth significantly correlates with elderly mobility, usual activity, and anxiety or depression, while acceptance of telehealth technology positively impacts patients' mobility.

Most respondents believed that both clinics and telehealth have the same trust. Nonetheless, suggestions to improve communications and minimize challenges like internet speed and physical examination of high-risk patients should be addressed. These include adopting an elderly mobile home clinic, increasing network capacity, establishing collaborations with private telecommunication companies, and launching 24 hours telehealth consultation service.

In summary, those patients who live alone with higher educational achievements and the oldest elderly are more likely to benefit from telehealth. Challenges of the service are available and should be addressed as appropriate.

Managerial Recommendations

The findings of this study have several important managerial implications. One of the strategic goals of primary health care is to improve telehealth that affects elderly QoL.

1. Overcome the Shortage of Human Resources and strengthen Telehealth Clinic

To overcome the shortage of qualified professional medical staff due to the voluntary retirement scheme and COVID 19 opening center and work overload with lack of availability of appointments at local health centers. In Addition to the growing phenomenon of an ageing society and the implementation of telehealth for this age group who are frequent attendance to the health care centers and rehospitalization as a complication of their health and social conditions, applying such technology is cost-effective for primary health care by early detection of health behavior for elderly patients. This group of patients with a higher incidence of chronic diseases involves extensive utilization of health resources., So virtual geriatric clinics will enhance the reallocation of health resources that meet the increasing demand for health and social services and improve elderly autonomy even with multi-morbidity. Additionally, find the solution to usual human resources shortages. The proposal suggests that primary Health Care offers an action plan to overcome the problems:

- Recruit new health professionals apart-time and work from home contracts to conduct telehealth.
- Comprehensive, collaborative health team in the multidisciplinary clinic: develop shared experiences and roles with a more flexible range of transferable skills and flexible changes in a different care setting through the comprehensive clinic with different specialties of interprofessional teams from primary and secondary care (Giordano et al., 2016). The intervention included coproduction by teams that differed in composition from one site to another through (Telehealth modalities); this can be successful enhancement through training schemes (Gardenier et al., 2021).
- Twenty-four hours telehealth clinic provides accessibility and continuity of care.

2. Smart Home Environment

Smart home environment: connection of devices and sensors with the elderly smart, innovative home community to measure their mobility as bathing, preparing meals, watching TV, sitting on the sofa, and monitoring activity of daily life activity, which reflects the health status of elderly patients. This application describes the elderly activity as time, location, and injuries, sharing results and data uploaded to cloud storage to represent it to a health professional(Beale & Jaruzel, 2017).

3. Telehealth Occupational Therapy

As decreased self-care in research finding as an elderly individual has difficulty performing daily living activities such as cooking, dressing, and bathing, home evaluation needs to be monitoring by occupational therapists to meet ageing demand and enhance community-based care to continue the elderly to live safely at home. In addition, enter a partnership with funding charities in the community to provide structural changes, installation of a grab bar or ramp, and devices like a fire alarm, glucose monitoring sensor, and wheelchair. Finally, educational videos for recording any activities problems at home and uploaded to be reviewed by occupational therapy(RENDA & LAPE, 2018).

4. Regulation and Telehealth Policies

- Primary health care needs to raise policies and update guidelines used for both health care providers and patients inaccessible of the secure process to create a trustworthy environment.

- Create a funding framework to promote innovation, coding of incentives, and policy issues related to incentives to emphasize best practices.
- Affordability for the individual might require a strategic change in the funding model as telehealth services will be charged with health autonomy in the future.
- Telehealth should be considered part of the overall strategy for developing care services. Development plans should have the Joint Strategic Needs Assessment. Pathway redevelopment should be managed with comprehensive involvement from all those concerned with delivering the care pathway and policies in practicing telehealth. Application of local forum supervises clinical governance of health provider and hospital indicators and discusses it regularly.

5. Net Work Articulture and Telehealth Resource Center

To ensure efficient and effective communication between health providers and elderly patients, a surge in demand for primary health care through the existing network infrastructure in all departments at health centers to meet the network traffic congestion. Applying software-defined networks to support telehealth. Provide office for the advancement of telehealth, and these centers prepare telehealth programs resource development which contains modules in telehealth operation, regulatory and legal consideration, reimbursement, marketing, and employee training(Ni et al., 2016).

6. Innovative Patient Self-care Automated Process

The innovative process in the elderly using telehealth to achieve higher efficiency and less costly services through a patient self-care automation system. Telehealth poses solutions to challenges such as the growing demand for health services, the aging population, or the need to manage large amounts of information. Although the possibility of involving families and friends as partners in digital platforms thus enhances a strategy for sustaining patient-physician partnerships. To encourage preventive measures and approaches in primary care services, adopt new regulations, and design a unique atmosphere or ecosystem for innovative health centers(Banbury et al., 2018).

Strong Management support with the engagement of stakeholders. Additionally, the processes were developed and planned within the rationalization of primary health care resources. The Table below presents the innovative telehealth consultation process and the outcome:

Table 1.6 Innovative Telehealth Consultation Automated Process and Outcomes

Innovative process	telehealth	Outcomes /Results
Artificial intelligence through an online appointment system to book appointments for telehealth consultation by entering only patient CPR and artificial intelligence through voice conversation by answering the chatbot checklist to complete the process.		To select suitable appointment telehealth time and filter emergencies from non-emergencies cases.
Comprehensive telehealth clinics with different medical specialties and lunch between primary and secondary care.		One-Stop-Shop Consultation.
Develop a media plan to raise awareness and educate elderly patients on telehealth services to enhance efficiency and obtain the necessary health care.		Early detection and health promotion as cost-effective for detecting diseases in their early stages.
Launch of a smartphone application and artificial intelligence that monitors patients' vital signs in a telehealth system.		Motivate the elderly for a healthier lifestyle. Trusted source and accuracy of health information. Improve the quality of life.

A brief SWOT analysis of the effect of telehealth services on QoL for elderly high-risk patients is presented in Figure 5.1. It's conducted to focus on the areas that may promote or hinder the managerial application to improve the QoL of elderly patients that use telehealth services in primary health care.

<u>Strength</u>	<u>Weakness</u>
Resources - I-Seha electronic medical file - Training Center - Extent development of medical knowledge and practice - Establish independent regulatory bodies like NHRA and health center internal and external auditing. - Availability of human resources of expert health professionals. - Acceptable behavior to use innovation by the patients.	Need Improvement - Ineffective appointment system - Lack of elderly empowerment like training and education to use telehealth - Lack of telehealth links between different hospitals, research centers, and academics - No regulatory framework for data privacy, security, and safety. - Fear of loss a specific job when the telehealth system is activated. - Lack of workflow reengineering initiatives to cope with telehealth network applications.

	Absent of evaluation and benchmarking scheme for telehealth.
<u>Opportunities</u> Chance - Availability of expert staff exchange programs. - Telehealth could be a part of e.Government. - There is a new trend of telehealth in medicine (preventive medicine, mobile application, early detection medicine, and cybersecurity). - The social network can educate and conduct awareness session programs. - Telehealth offers new careers involving skillful professionals. - The telehealth business model takes the initiative from the private sector.	<u>Threats</u> Challenges - Increase prevalence of non-communicable diseases among the elderly. - Competition between private and government health centers in advance to use telehealth. - Demographic changes. - Lack of sustainable business model for telehealth. - Lack of incorporation of the strategic plan in Biomedical information in the medical education system. - According to regulation, there is a lack of stakeholder commitment to take part in responsibilities in utilizing telehealth. - Lack of cross-platform with different artificial intelligence for elderly user-friendly application.

Table 1.6 Telehealth Services Used by Elderly Patients in Primary Health Care

Research Limitations

This study's limitations include the following:

- There was a lack of previous local and regional studies on similar topics; only a few studies assessed the perception of elderly high-risk patients of using telehealth services on their quality of life; most studies found it was a comparison between two groups of traditional and innovation or one group in pre and post telehealth use, it suggested that the service is relatively new in the field and needs to be investigated further.
- The main limitation is the research focused on the conceptual model of the survey, not on the demographic characteristics and other moderating factors, which are conceded to be a rich source of data. Knowledge management should be applied to utilise

the data most efficiently and effectively in public administration and decision-making.

- Moderate heterogeneity was identified among studies that measured depression, mental components, and the physical QoL, which need a long time and special medical tool for assessment.
- The European Quality of Life did not include items related to the behavioral intentions of elderly patients to use telehealth systems services. For future research, this aspect must be discretely used with the European Quality of Life for future research.
- The data used in this study were collected mainly in five big health centers in the kingdom of Bahrain. From the perspective of data reliability and integrity, it should also include older adults in small villages, then a cross-national study involving comparative analysis can be conducted.

Future Research

What is now needed is a cross-national study involving telehealth clinics of government sectors in primary and secondary care to promote a general perspective and comprehensive analysis, especially the Bahrain health system moves towards autonomy and health insurance. In addition, it is necessary to benchmark the results with other countries' findings. In addition, decision-maker leadership should broaden collaborative telehealth policies at organizational levels to ensure the growth of telehealth capacity and sustained funding.

To achieve high-quality telehealth services, regular quality assurance and performance measurements should be applied continuously to promote the effectiveness and efficiency of service delivery.

Conclusion

Bahrain's primary health system has significantly accomplished and witnessed comprehensive health innovation technology. Recently, the Supreme Council of Health (SCH), responsible for supervising the engineering and technical requirements of health facilities, NHRA provides health regulation for telehealth standards and licensing of primary health care. All the government health entities to move forward towards autonomy and health insurance schemes (*Sustainable Development*, n.d.). Therefore, it is important to adopt telehealth technology for elderly patients. Telehealth enhances regular chronic disease management from the formal health care framework by developing patient self-awareness and knowledge via "expert patient" programs. The ageing process will parallel an escalation in the implementation of telehealth missions to encourage patients to improve their QoL.

A mixed-method approach was used in this research. The data for this study were collected from 627 elderly patients using the Euro QoL & usability and acceptance questionnaire for telehealth. Survey to assess the perception of elderly high-risk patients of using telehealth services on their QoL. Moreover, 20 semi-structured interviews were conducted with medical staff members and patients to gain their views and perspectives in a comprehensive picture of understanding of telehealth services. The mixed methodology approach facilitated the researcher to present various stakeholders' opinions and experiences and offer a rationale on the extent of the European QoL, Usability, and Acceptance Questionnaire to improve digitalization in healthcare system practices.

Descriptive statistics revealed that the average age of the participants was 70.31±8.22 years; more than half of the 56.0% aged between 60 and 69 years, approximately 30% were between 70 and 79 years, and 15.7 % aged above 80 years. While most participants were married, 58.7%, only 5.8% of them were single. Divorced and widowed participants constituted 19.3% and 16.2% of the participants, respectively. Regarding the educational level, approximately half of the participants had a primary school level of

45.0%. Patients with college degrees constituted only 20% of the participants. Up to 88% of the patients presented to the health care facility as walk-in patients, and only 12% presented using a wheelchair. It can also be observed that most patients living alone reached 41.3%, at least (30%, and 28.7% only with a partner and with both the partner and another carer, respectively). Almost all participants had diabetes mellitus 97.2%, and almost 69% were hypertensive; the least prevalent comorbidity was Joint or osteoporosis 21.3 %, followed by respiratory diseases 9%.

The statistical result revealed a positive relationship between using telehealth services and elderly quality of life in some dimensions. For example, using telehealth services improved mobility by 75%, increased the usual activity dimension by 68.3%, and decreased the anxiety or depression in the elderly's quality of life by 35%. At the same time, telehealth services had no effects on the self-care by 99.8% and pain or discomfort dimension in the elderly's quality of life by 74.3%, as 25% of the participants reported a good effect (telehealth decreased their pain and discomfort). In addition to semi-structured interviews of 20 medical staff and patients, explore their telehealth experience in elderly high-risk patients in their QoL. During the interview, telehealth affected different dimensions of QoL. The majority of the respondents, 95%, reported it improved elderly pain or discomfort, 90% stated that it improved usual activity, and 75% showed that telehealth affected anxiety and depression. While 55 % showed improvement in elderly mobility, only 45% of respondents noted elderly self-care was affected.

Correlation between using telehealth services and elderly quality of statistical life results revealed significant influences in some dimensions with demographic data. For example, telehealth services improved mobility with age group, marital status, living arrangement, educational level, and dependency as well as usual activity, and decreased the anxiety or depression in the elderly's quality of life in relation to all demographic data. At the same time, telehealth services had no effects on the self-care dimension in the elderly's quality of life and no effect on the pain or discomfort dimension in the elderly's quality of life through 25% of the participants reported a good effect (telehealth decreased their pain and discomfort). SPSS chi-Square, Fisher Exact Test, and Cremer test were used.

Inferential analysis results strongly affect the usability of telehealth system in QoL dimensions showed significant correlation with (Anova Test p -value <0.001) with mobility, usual activity, and anxiety or depression, while not significant with self-care and pain or discomfort dimensions. Elderly Acceptance of technology positively affected mobility by ANOVA test p <0.005 while not significant with the other four QoL dimensions. Correlation of demographic data with Average mean of usability and acceptance of telehealth (ANOVA Test p <0.005) was found to be significant with low educational levels and dependent elderly patients.

Regarding trust, the interview result showed that 85% of respondents believed that both clinics and telehealth got the same amount of trust regarding the appropriate device used during a telehealth consultation. Six physicians mentioned that the best device is a smartphone, and one believed a computer device is the best effective. One physician stated that different devices such as computers, mobile phones, and I-Pad could be used for successful telehealth consultation. Two mentioned some challenges regarding internet speed deficiency in hospitals compared to patients' side, which differs from one company to another.

In general, studies show that the integration between patient and medical staff experiences and opinions will help to understand the perception of elderly high-risk patients of using telehealth services on their QoL. Based on the study's findings, a number of managerial recommendations were proposed; emphasis has been placed on redesigning the telehealth platform to enjoy greater efficiency and effectiveness. The research findings generated beneficial, productive information that enhanced to overcome many of the encountered issues. Many medical staff members suggested innovation recommendations that can be considered with managerial

primary health care considerations, such as multidisciplinary telehealth platform, smart home environment, regulation, telehealth policies, network agriculture and telehealth resource center, and Innovative patient self-care automated process.

Finally, it may be worth revealing that the data findings will propose a digital framework for geriatric clinics and possibly opportunities to formulate new research questions and present the practical usefulness for primary health care and elderly QoL protocol. Furthermore, another opportunity is to develop the research scope in the future to evaluate and compare the findings and benchmark with other countries in GCC and worldwide. Yet, the data was managed and revealed interesting findings, providing ground for a broader spectrum of future studies.

Bibliography

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