Executive Summary

The main purpose of this research paper was to know the impact of Telehealth on the costs and quality of the healthcare services in Saudi Arabia. Also, the main objective of the research was to provide information about the benefits of Telehealth to facilitate the process of its implementation in the country. So far, the Ministry of Health (MOH) does not provide Telehealth service for its patients. The strategy, that MOH follows, is sending the patients to other places, either inside or outside the country, to receive the proper treatment. However, there were some conditions that required careful care of specialists who could not be available in some cities. Unavailability of them was the reason to transfer the patients from a city to another city and sometimes to another country, which took a lot of time, money, and effort. Hence, this could have destroyed the lives of some patients. Thus, the researcher wanted to prove the benefits of Telehealth if it had been applied in the country.

Hence, the following four research questions were created. First of all, are there benefits to using Telehealth? Second, will it reduce the cost of healthcare services? Third, will it increase the quality of the healthcare services? Finally, is it important for the Saudi health sector to provide this kind of service? By producing these questions, the researcher wanted to examine the benefits of having Telehealth services in Saudi Arabia, and comprehending how the implementation of this technology was likely to reduce the costs and improve the quality of the services. Consequently, an online survey, that contained 12 questions, was created and distributed in two hospitals in Saudi Arabia in order to find answers for the previous research questions.

After analyzing the data of this survey and reviewing some previous research, the results showed that there were benefits to using Telehealth. The results also indicated some of the
benefits of Telehealth such as improving access to a larger number of physicians who worked in different places at the same time, reducing travel time, enabling the patients to have their consultations in environments that they felt comfortable in, and reducing patients waiting times. The results also showed that Telehealth aimed to improve the industry by reducing cost of healthcare services. The service also aimed to make an improvement in the industry by increasing the quality of its services. Moreover, the results showed that it was important for the Saudi health sector to provide Telehealth because of the benefits of the service that was mentioned previously. In addition, most of the caregivers who participated in the survey wanted to have and use this service since they had good skills and experiences in using technology.

Hence, the researcher recommended that the Saudi Ministry of Health must have a clear vision and mission before establishing Telehealth. Also, MOH must have short and long term financial plans to help in knowing where it would stand financially, and how much MOH would need to spend to start applying Telehealth. Another recommendation was to create an appropriate work environment and provide the necessary requirements that could help the providers to do video and audio consultations with their patients effectively. In addition, providing courses and training programs for the providers would help them to gain an idea about Telehealth and would help them to use and deal with the service appropriately. Finally, MOH could start providing the technology in one city at the beginning to help find any problems in the implementation. Then, it could expand the scope of the service gradually.
THE IMPACT OF TELEHEALTH ON HEALTHCARE COST AND QUALITY OF THE SAUDI HEALTH SECTOR

MSA 699 Applied Research Project in Administration
Central Michigan University

Submitted by:
Sabreen Batarfi

Project Instructor:
Dr. David Freed

April 24, 2016
Table of Contents

<table>
<thead>
<tr>
<th>Chapter 1</th>
<th>Problem Definition</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Research Problem</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Research audience and Rationale</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Research Study Scope/Delimitation</td>
<td>13</td>
</tr>
</tbody>
</table>

| Chapter 2      | Literature Review                                          | 14          |
|                | Introduction to the Literature                             | 14          |
|                | Presentation of the Literature                             | 14          |
|                | Benefits of Telehealth                                     | 14          |
|                | Examples of Telehealth                                     | 18          |
|                | Cost-effectiveness of Telehealth                           | 22          |
|                | Telehealth and Increasing Healthcare Quality               | 24          |
|                | Telehealth in Saudi Arabia                                 | 27          |
|                | Summary of the Literature                                  | 30          |

| Chapter 3      | Research Methodology                                       | 33          |
|                | Research Approach                                          | 33          |
|                | Data Collection Approach and Procedures                    | 34          |
|                | Data Collected                                             | 34          |
|                | Primary Research Question and sub-section data details.    | 34          |
|                | Data Collection Procedures                                 | 35          |
|                | Target Population                                          | 35          |
Appendix C  Survey Questions  ................................................................. 80
List of tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived Telehealth benefits</td>
<td>17</td>
</tr>
<tr>
<td>2. Question 1: How many years have you been in the healthcare profession?</td>
<td>40</td>
</tr>
<tr>
<td>3. Question 12: Do you think that Telehealth is going to affect the cost of the healthcare services by</td>
<td>54</td>
</tr>
</tbody>
</table>
# List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The process of Telehealth service</td>
<td>11</td>
</tr>
<tr>
<td>2. Global forecast of Telehealth patients and device and service revenue</td>
<td>21</td>
</tr>
<tr>
<td>3. The impact of Telehealth on hospitalization days and emergency room visits</td>
<td>22</td>
</tr>
<tr>
<td>4. Total cost per patient</td>
<td>24</td>
</tr>
<tr>
<td>5. Willingness to have a video visit</td>
<td>31</td>
</tr>
<tr>
<td>6. What is the length of time that physicians and nurses usually take to meet a patient?</td>
<td>41</td>
</tr>
<tr>
<td>7. How often do patients usually patients remake appointments and visit you again?</td>
<td>43</td>
</tr>
<tr>
<td>8. What is the broadband service at your primary place of work?</td>
<td>44</td>
</tr>
<tr>
<td>9. How does Telehealth provide the healthcare services?</td>
<td>46</td>
</tr>
<tr>
<td>10. Do you think it will be useful to monitor the patient’s condition remotely?</td>
<td>47</td>
</tr>
<tr>
<td>11. Do you think that Telehealth service will be useful in treating patients?</td>
<td>48</td>
</tr>
<tr>
<td>12. If you have the opportunity to use Telehealth service, are you going to use it?</td>
<td>50</td>
</tr>
<tr>
<td>13. Do you think having the ability to have secure consultations with your patient via a video and audio-link will be useful?</td>
<td>51</td>
</tr>
<tr>
<td>14. What are your experience and skills in using technology?</td>
<td>52</td>
</tr>
<tr>
<td>15. Can Telehealth increase the quality of healthcare services in Saudi Arabia?</td>
<td>53</td>
</tr>
</tbody>
</table>
The Impact of Telehealth on Healthcare Cost and Quality of the Saudi Health Sector

Chapter 1: Problem Definition

Background

Since the modern state of Saudi Arabia was first founded by King Abdul-Aziz Bin Abdulrahman AlSaud, public health and disease control were among the government’s top priorities. For this reason, King Abdul-Aziz established the Public Health Department in Mecca in 1925. The Public Health and Ambulance (PHA) were established to meet the needs of the Kingdom’s health and environmental sectors. The PHA built hospitals and health centers across the Kingdom, issued, and enforced regulations to guarantee adequate standards for the practicing of medicine and pharmacology.

From the time when the country had a lack of native resources and expertise, the King’s strategy was to strengthen the Kingdom’s cooperation with international organizations and to collaborate with highly-qualified foreign experts. The King also focused on building a strong infrastructure for a comprehensive health sector that would serve all regions of the Kingdom, as well as keeping pace with the latest international healthcare developments.

Then, the increasing scope of healthcare services needed in the Kingdom during that period created the need for the formation of a Public Health Council. This council was the highest-level supervisory board in the Kingdom and oversaw all aspects of the healthcare, including all hospitals and healthcare centers nationwide. The council’s main goals included the development of a skilled healthcare workforce, as well as controlling the diseases and epidemics, which were prevalent during that time (Altuwajri, 2008).

Eventually, it was necessary to create a large-scaled specialized organization to carry out the Kingdom’s health affairs. In 1950, the Ministry of Health (MOH) was established based on a royal decree from King Abdul-Aziz AlSaud. MOH is the major provider of healthcare services in Saudi Arabia so far. It provides free health services for all citizens. It is
also the major financer of the health care services. It oversees the work of 415 hospitals, 2094 health centers, 2220 private clinics, 1249 first aid centers and ambulances, 15 government colleges, and 18 private colleges all over the Kingdom (MOH, 2013).

Despite the considerable efforts that MOH made to improve the quality of the health care services and the improvement of citizens' health in recent decades, it faced a number of problems and issues that pose challenges to it. One of these problems was underutilization of the potential of electronic health strategies or Telehealth (Almalki et al., 2011).

MOH usually sent patients who have serious or long term conditions to other countries, so they could receive the best possible treatment. Sometimes, it called in a medical team specializing in certain diseases to come to the Kingdom from other countries to detect the causes of the patients' disease. Bringing specialists from abroad could take a long time for the patients to receive the appropriate treatment. For this reason, this research was conducted to show that applying and using Telehealth services would be helpful in some emergency situations.

Telecommunication technologies were being effectively used to transform every sphere of human life, as well as the health sector. Telehealth was frequently understood as an integration of telecommunication systems into the practice of protecting health. The notion grew popular since the end of the previous century, and was connected with such other concepts, e.g. health informatics, health telematics or telecare (Maheu et al., 2002). The concept assumed not only an audio-only conversation, e-mailing or fax, but it also had to be more comprehensive to provide the assessment of the patient. For example, the first case of Telehealth was documented in 1897, when a physician diagnosed a child with croup during a telephone conversation (Lee, 2014). Since that period, an extensive development of telecommunication technologies has been widely exercised for medical purposes.
In general terms, Telehealth was defined as a technique that provides health services and information through telecommunication technologies. It was a helpful and an effective technology that could be used and applied in the health sector. Also, it saved a lot of time, cost, and effort. Telehealth devices included mobile software applications (apps) in addition to hardware. With this technology, patients and specialists could hear and see each other through a video consultation. The consultation included both video and audio communications. In addition, it took place in a private room, as much as if it was a face-to-face consultation with the specialist. This service would be helpful for patients with long term and serious conditions, so there would be no need of moving them from their places. It contained accurate monitoring of the patients’ vital signs in their homes (IEMML, 2013). The benefits from utilizing Telehealth were aimed at different stakeholders, including patients and their families, health-care specialists and the health-care system in general. They incorporated “increased access to health services, cost-effectiveness, enhanced educational opportunities, improved health outcomes, better quality of care, better quality of life and enhanced social support” (Jennett et al., 2003, p.311). The following model illustrated the work process of

![Figure 1. The process of Telehealth service. It illustrates the steps that Telehealth service usually goes through.](image-url)
Telehealth.

**Research Problem**

Although MOH spent a lot of money every year on its services, there were some conditions that required careful care of specialists who could not be available in some cities. Unavailability of them required transferring the patients from a city to another city and sometimes to another country, which could cost a lot of time, money, and effort. This might destroy the lives of some patients such as what happened with Majid. He was a 26-years-old Saudi man, and he was suffering from obesity. His condition was very critical, so he was transferred to another hospital in another city in Saudi Arabia, but he did not receive proper treatment. Not receiving the appropriate treatment required calling in a medical team specializing in obesity and heart diseases from the United States to come and detect the causes of Majid's disease. However, time was not his ally, and he died before the doctors’ arrival.

His story was the inspiration to conduct this research and choose this topic. If MOH was providing Telehealth service for the patients, it would have definitely contributed in receiving his treatment faster than transferring him to another country, and it would be possible that he might be alive now. However, there were other stories for patients with critical conditions, and they could not move easily, so this service would be useful for them and the health sector at the same time. The patients would receive their treatments quicker and easier under the supervision of professional specialists without the need to make a big effort to move. In contrast, it would reduce the time and effort of the health sector staff to provide the necessary health care services for these patients.

This research examined the benefits of having Telehealth services in Saudi Arabia, and how it would reduce costs and increase quality of the healthcare services.

Thus, this research paper would answer the following questions:
1. Are there benefits to using Telehealth?
2. Will it reduce the cost of healthcare services?
3. Will it increase the quality of the healthcare services?
4. Is it important for the Saudi health sector to provide this kind of service?

**Research Audience and Rationale**

The target audience of the present research was health care administrators and policy-makers, who were involved in the consideration of policy on telecommunication. The report could also be interesting for the representatives of the investor sector of the economy, and could attract them to the innovations which were approached in the present paper. The rationale of its preparation was to increase the awareness of appropriate Saudi actors about Telehealth, and to explain the clear benefits which could be obtained from implementing Telehealth in the country.

**Research Study Scope/Delimitations**

This research focused on the benefits of Telehealth services, how it could reduce the cost, and how it could be helpful to increase the quality of the health care services. Thus, it did not provide information about the best ways to apply this service, and how the sector could use it. Also, it would focus only on the Saudi health sector. Consequently, it might not be helpful to use its results and apply its suggestions to a health sector for another country, unless, it has a health system similar to the Saudi health system.
Chapter 2: Review of the Related Literature

Introduction to the Literature

This chapter will show a brief summary and information from previous scholarly journal articles about the benefits of Telehealth, examples of it, its costs-effectiveness, its impact on the quality of the healthcare services, and Telehealth service in Saudi Arabia. It was important to look at these topics because it would help in gaining a good idea about Telehealth and its impact on the health sector. The chapter will include two main sections which are presentation of the literature and summary of it.

Presentation of the Literature

Benefits of Telehealth. E-health referred to all forms of electronic healthcare delivered over the Internet, which ranged from informational, commercial, and educational products to direct services offered by professionals. It drew on the unique capabilities of the Internet in terms of access and speed (Maheu, Whitten, & Allen, 2002). The implementation of transformative e-health technologies was a process which became internationally popular, associated with progressive development of medicine and technologies (Black et al., 2011). This concept was rather broad and had numerous dimensions.

For a lot of people, the Internet was a source of health information. Some studies showed that the total number of Internet users in every country interpreted this role as important, and the number of users utilizing it with such purpose was significantly growing. In some counties, where the access to Internet was almost universal, like in the Scandinavian region, the Internet was the second source of health information, outranked only by health professionals. Instead, actual e-health was covering the issues of professional use of network for health purposes. It was possible to communicate with specialists on the interactive base or order medical health products utilizing the communication technologies. While the boundaries between the Internet users became weaker, the means of communication were
used by all age categories and genders (Kummervold, 2008). One way or another, e-health provided “interactive, interoperable, personally engaging, contextually tailored [information] with the ability to be delivered to mass audiences can really make a difference in enhancing the quality of health care and health promotion efforts” (Kreps & Neuhauser, 2010, p. 334). In some countries, this helped the health sector in treating its patients positively and increasing the quality of its services.

E-health had a great potential to encourage the adoption of healthy behavior by consumers, which led to better disease prevention, health promotion, and early detection of the illnesses. Telehealth was one of the branches of this large concept, which encompassed interactive websites, e-mails, videoconferences, gaming, online communities and applications (Kreps & Neuhauser, 2010). Telehealth was a rapidly evolving and rich sector of mobile computing and networking that held clear promise for improving health care. It involved the use of telecommunication technologies to prevent and treat illness and promote the health of individuals.

In addition, Telehealth had distinct advantages because it used simple and inexpensive technologies that were widely accessible. It was increasingly recognized for its potential to control costs while providing real-time tools to promote wellness, prevent disease, and enable the home management of chronic conditions (Hall & McGraw, 2014). It was a straightforward approach which proved particularly valuable in addressing illnesses that arose quickly and ran a brief course, such as 5-10 days. These illnesses included respiratory infections, seasonal allergies, gastroenteritis, sinusitis, bronchitis, urinary tract infections, and pharyngitis. For some patients, who did not have any alternative source of medication, Telehealth was an ideal solution to understand if they needed medical intervention (Gorton, 2008).
Telehealth was an important technique that could be used and applied in any health sector. According to Duplantie, Fortin, Gagnon, & Landry (2006), “Telehealth is considered a major innovation at the technological, social, and cultural levels. This technology has the potential to increase access to, and quality of, health care services and to lower health system expenditures” (p. 2). This service was helpful and useful in many sections and for many diseases such as heart diseases, diabetes, and so on. In addition, Telehealth was useful in remote and rural areas. Then people who lived in these areas may have been able to receive the appropriate treatment at the appropriate time without the need to move or travel (Duplantie et al., 2006).

One of the main benefits of Telehealth was reducing costs. Based on the result that Duplantie et al. got from their research, Telehealth was a powerful tool to improve health care services for people who lived in remote areas. It also facilitated access to services that had some difficulties with access and made them available easily. In addition, Telehealth brought specialized services to the patients, close to their homes and living places. It also saved travel costs that patients and their families may pay in order to receive the appropriate treatment.

In addition, Telehealth was useful to transfer information about the patients' situations before they were being transferred to an urban center, which made it easy to manage cases. Also, it was an effective way to conduct follow-up visits in order to improve the continuity of care. Moreover, Telehealth offered support to ensure that the complete coverage of people’s needs in terms of health care services was provided (Duplantie et al., 2006). The following table will show Duplantie et al.’s explanation of Telehealth benefits.
Table 1

*Perceived Telehealth benefits*

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Perceived Benefits (Frequency)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical/Patient care</td>
<td>Access to specialized services (5 md, 9 hm)</td>
</tr>
<tr>
<td></td>
<td>Potential to save costs for patients (3 md, 4 hm)</td>
</tr>
<tr>
<td></td>
<td>Facilitates management of transfers (4 md)</td>
</tr>
<tr>
<td></td>
<td>Allows distant follow-up that improves continuity of care (3 md)</td>
</tr>
<tr>
<td></td>
<td>Improves information circulation (3 md)</td>
</tr>
<tr>
<td>Professional</td>
<td>Access to a second opinion (10 md, 2 hm)</td>
</tr>
<tr>
<td></td>
<td>Facilitates communication with peers (7 md, 3 hm)</td>
</tr>
<tr>
<td></td>
<td>Diminishes the feeling of isolation (3 md, 2 hm)</td>
</tr>
<tr>
<td>Educational</td>
<td>Knowledge development and update (7 md, 2 hm)</td>
</tr>
<tr>
<td></td>
<td>Increases access to CME (4 md, 4 hm)</td>
</tr>
<tr>
<td></td>
<td>Multi-disciplinary/multi-centered exchanges (3 md)</td>
</tr>
<tr>
<td>Organizational/Systemic</td>
<td>Supports the hospital as a regional reference center (6 md, 5 hm)</td>
</tr>
<tr>
<td></td>
<td>Ensures availability of services (4 md, 3 hm) saves time and money for meetings (4 md, 3 hm)</td>
</tr>
<tr>
<td></td>
<td>Potential to save costs for health system (3 md, 4 hm)</td>
</tr>
<tr>
<td></td>
<td>Better organization of on-call duties (4 md)</td>
</tr>
</tbody>
</table>

Note. Number of physicians (md), and hospital managers (hm).

Telehealth services played an increasingly important role in healthcare delivery. It could generate large savings for health plans. However, there were a lot of conditions which must be met in order to make the establishment of Telehealth possible. The perceived conditions for the success of Telehealth implementation had different dimensions. On the individual level, Telehealth was supposed to be easy for usage and integration to the daily practice. Healthcare professionals also played an important role by the motivation of who would work with the system, to provide appropriate service. (Duplantie et al., 2006).

On the professional level, Telehealth was likely to be implemented efficiently and was adequate remuneration for professionals in both sites and clear definition of their professional liability, since without it proper decision-making process were difficult. Understanding the roles and responsibilities by medical staff made the system work continuously, without spending unnecessary time for formal procedures. From an ethical point, successful Telehealth system had to ensure proper confidentiality, to avoid the breach of medical ethics and legal regulations. Technologically, the system had to be mobile,
ergonomic, user-friendly and reliable, and must have proper quality which would allow the delivery of a diagnosis. (Duplantie et al., 2006).

On a broader, systemic view (or socio-political), Telehealth required substantial investments of the country or private investors into infrastructure and IT, as well as implementation of the regional agreements, settling the networks of cooperation and access. Finally, the organizational dimension of efficient Telehealth implementation included provision of the resources, specific schedules for Telehealth consultations, and availability of up-to-date equipment. Upon meeting the above described conditions, a country would be capable to launch a Telehealth system, if the political will towards such action was present. (Duplantie et al., 2006).

**Examples of Telehealth.** On the international scale, implementation of Telehealth in different countries further demonstrated the efficiency of this technology. One of the largest Telehealth providers in the United States was Teladoc. Teladoc offered around-the-clock access to physicians via telephone or video consultations through the Internet for patients with minor illnesses. The company provided a network of board certified physicians who delivered cross coverage consultations for minor medical issues. Teladoc reported the significant corporate acceptance of its service, since many companies were purchasing telemedicine services for the employees and made them available during working hours. The reviews of the patients showed that 96% of them were happy with the service (Gingrich, Boxer, & Brooks, 2008). Since Teladoc used the Internet, it provided healthcare services at patients' homes or workplaces which increased the numbers of people who received medical advice and access in areas where there was a lack of providers. Teladoc service saved patients' time and money; it charged only $38 per visit (Uscher-Pines & Mehrotra, 2014). It was one of the examples of Telehealth services and proof of its benefits that were mentioned before.
Telehealth service was also useful for mental health problems and alcohol problems. The Behavioral Telehealth Center (BTC) was an example of a center that offered comprehensive behavioral health assessments to assist in treatment planning and referral management. The BTC enabled ongoing interaction/integration between behavioral health services and primary care teams operating in the Patient Centered Medical Home. The BTC used the Behavioral Health Lab software which provided the structure for a clinical service designed to help manage the behavioral health needs of patients who were seen in primary care. The most common reason for referral to the service was a patient having been screened positively for alcohol misuse, PTSD, or depression. A trained behavioral health technician contacted the patient and delivered a structural behavioral health interview, with the subsequent medical record placed to the primary care provider. This service was used at more than 30 of the Veterans Health Administration (VHA) facilities across the United States. BTC services were associated with decreases in alcohol consumption and depressive symptoms (Possemato, Bishop, Willis, & Lantinga, 2013). This was another proof of the huge success of Telehealth service and its positive impacts on the community. At the same time, it was an example of how Telehealth services could be helpful for many situations and useful for different kinds of diseases.

In addition to mental health problems, Telehealth allowed patients with long-term conditions to monitor vital signs and transfer readings to health professionals who worked remotely. This service was increasingly advocated as a way of delivering higher quality care more efficiently for better management of people with long-term conditions. Since patients with long-term conditions needed to stay in the hospitals and be under the supervision of professionals for long time periods to receive the appropriate treatment, this required the health sector to provide enough beds in its hospitals for these patients which could cost a lot of money and waste a lot time. The impact of Telehealth on primary care was, therefore, an
important element in understanding the opportunities to introducing Telehealth, because it was the best solution and the best alternative for these situations (Steventon, Bardsley, Doll, Tuckey, & Newman, 2014). With it, patients were able to receive their treatments at the lowest possible cost and effort.

One more example of the success of Telehealth in doing its work efficiently was the research that has been done by Bardsley et al. (2013). Their research was about the effect of Telehealth on glycemic control. The participants of their study were patients with type 2 diabetes. In the results of this research, Telehealth modestly improved glycemic control in patients with type 2 diabetes, and it produced significant patient benefits. As the authors noted, better information systems and stronger practice engagement led to more impressive changes in the healthcare system (Bardsley et al., 2013).

Another study conducted by Bagayoko et al. (2014), showed the medical and economic benefits of Telehealth in low and middle-income countries. The results of this study showed that Telehealth had a positive influence on the improvement of the medical decision making in remote areas. Also, it had a positive impact on the healthcare quality and costs reduction, and increased the appeal of participating district hospitals. An additional study conducted in some African countries with low income by Piette et al. (2012) demonstrated that Telehealth programs made the health care system more efficient and decreased such instances, as transmission of syphilis and maternal death from hypertension. The implementation of Telehealth for prophylactically aimed at large amounts of people quitting smoking (which was verified biochemically), and the figures of weight loss, physical activity, and other modes of a healthy lifestyle increased too.

The barriers to the implementation of such programs in the developing countries were still substantial. It was necessary to deal with such instances as technological gaps, lack of end-user acceptance, weak cultural appropriateness in certain types of societies, and
infrastructural problems, such as adequate access to reliable electricity and Internet. Also, a lack of funds in the healthcare system and among the patients became challenges for such implementation (Lewis, Synowies, Lagomarsino, & Schweitzer, 2012).

The previous information showed the benefits of Telehealth and its positive impact on the different sections of the healthcare sector, and how it served different kinds of diseases in a positive way. All of its positive effects influenced the community as a whole by contributing to reduce the mortality rate, maintaining public health, and spreading health awareness among the people. In the end, this was not meant to replace face-to-face visits completely, but a Telehealth service was a part of a collaborative work and met the real needs of local health professionals. It was economically viable and helped to improve patient access to specialized health care if applied to health problems for which care was in high demand (Alkmim et al., 2012).

The previous information showed the benefits of Telehealth and its positive impact on the different sections of the healthcare sector, and how it served different kinds of diseases in a positive way. All of its positive effects influenced the community as a whole by contributing to reduce the mortality rate, maintaining public health, and spreading health awareness among the people. In the end, this was not meant to replace face-to-face visits completely, but a Telehealth service was a part of a collaborative work and met the real needs of local health professionals. It was economically viable and helped to improve patient access to specialized health care if applied to health problems for which care was in high demand (Alkmim et al., 2012).

The previous bar chart showed how the number of people who use Telehealth will increase from 2012 to 2018. The figure shows the number of people who use Telehealth will increase from 2012 to 2018. The global Telehealth market was expected to more than double,
as medical providers increasingly employ remote communications and monitoring technology to reduce costs and improve the quality of care (Cassell, 2014).

Finally, Telehealth also reduced the cost and became useful for the providers at the same time. The next sample will show the benefits of Telehealth for the providers and how it reduced hospitalization days and emergency room visits. It showed that the hospitalization days before implementing Telehealth were 74.4 days, but these days reduced to 26.1 after applying Telehealth. It also showed that the emergency room visits were 10.8 before using Telehealth. However, the visits became 4.6 after using Telehealth. In the following section, a more specific discussion of the cost-effectiveness of Telehealth will be conducted.

Cost-effectiveness of Telehealth. Telehealth had cost-effectiveness especially for patients with long-term conditions. They were the largest population of patients who spent a lot on their treatments, so Telehealth was the best solution for them. There was research that was conducted to examine the cost-effectiveness of Telehealth. The participants of this research were patients with long-term conditions such as diabetes. The results showed that Telehealth reduced their payments to receive their treatments (Advanced Telehealth Solutions, n.d.; Henderson et al., 2013).

There were also many other studies that proved the cost-effectiveness of Telehealth. Some studies suggested that Telehealth was cost-effective for the management of congestive heart failure (CHF) patients. Another nineteen studies reported that Telehealth was a cost saving source. According to the literature review, that Grustam, Severens, Nijnatten,
Koymans, & Vrijhoef (2014) did, almost 60% of the reviewed studies showed that Telehealth interventions for CHF patients were cost-effective.

Another cost analysis was conducted to show the effectiveness of a home Telehealth program (HTP). It was a program that was established using internet video-links to facilitate a specialist Pediatric Palliative Care Services (PPCS) consultation directly into families’ homes. The results of this study also proved that the home Telehealth program reduced the cost of health care services for the families who lived far from the hospitals (Bradford et al., 2014). The research of the National Health Service (NHS) in England demonstrated that Telehealth saved costs per patient up to 8% (Smith & Jones, 2014).

One of the specific instances where Telehealth provided cost saving was home Telehealth. The studies conducted by Finkelstein, Speedie, & Potthoff (2006) showed that availability of the inexpensive telecommunication systems and physiologic monitoring equipment brought benefits, especially to the elderly patients who required skilled nursing care at home. Considering the growing amount of such patients in developed countries, the industry was likely to expand substantially. At the same time, the professional health service provided by nurses travelling to the patient’s home was too expensive for numerous household patients. Consequently, the rural and underserved urban patients experienced access problems, which deteriorated their health expectations. The average cost savings, in the case of Telehealth substituting the actual visits by the specialist, was about $26 per visit. The positive effects of home Telehealth was demonstrated among the patients with such conditions as diabetes, heart diseases, and other systemic illnesses (DelliFraine & Dansky, 2008).

All of the previous examples were the best description of how Telehealth could reduce the healthcare costs and helped patients receive their treatments at the lower possible cost, especially for those who lived
in rural areas. The sample to the right shows the benefits of using Telehealth and remote monitoring. It showed that the total cost per patient is decreased by 8% which proved the cost-effectiveness of this service.

**Telehealth and increasing healthcare quality.** Telehealth services provided a variety of opportunities to address public health challenges such as universal access to the uneducated, distance education, and home care. All of these facts helped in improving the quality of healthcare. Thus, it was something globally, and it connected people from different countries with professional specialists, so they could receive their treatment in the best possible way.

An important improvement resulting from Telehealth took place due to the development of practitioners involved in the process. Although the benefits were difficult to quantify, they were tangible and had long-term importance. The utilization of Telehealth in medicine provided learning opportunities for the specialists, and the significance of learning was the improved health care of future patients. The utilization of Telehealth technologies improved technological readiness of doctors and other members of the staff and taught them to identify problems faster and with less incoming data. The implementation of Telehealth prepared practitioners to capture symptoms, and increased their effectiveness in the process of interviewing a patient. In addition, through collaboration with other doctors, the involvement of the practitioners developed broader views on the problems which considered ordinary and conventional (Johnston, Kennedy, Murdoch, Taylor, & Cook, 2004).

The use of Telehealth was especially important in case of emergency situations. One of the health problems which was likely to be addressed more efficiently upon utilization of Telehealth was the injury of the spinal cord (SCI), which took place in accidents every day. Due to the profound physiological impact, SCIs were increasing the risk of further negative
health conditions. People suffering from spinal cord injuries were perfect candidates for Telehealth interventions, which could prevent them from negative consequences and bring these people a better integration with the rest of the world. Telehealth service for SCI patients, delivered via telephone or videoconferences, was likely to reduce their further hospitalizations, thus decreasing the pressure towards the health care system (Phillips, Vesmarovich, Hauber, Wiggers, Egner, 2001).

One of the major challenges in rural health care was the shortage of primary care physicians. One of the things that the healthcare sector and providers were required to do was to ensure that their services were available for everyone and everywhere. Since it was difficult to serve some kinds of services in some areas, Telehealth will be the best alternative solution to apply in these areas. An example of the success of Telehealth in providing healthcare services in rural areas was the program that Leona and Harry created (Stingley & Schultz, 2014).

In 2009, Leona and Harry created the Rural Healthcare Program to improve access to and quality of care in areas of the upper Midwest that have shortages in health care workforce and low population density. The program focused its efforts to provide Telehealth service. The service’s videoconferencing technology connected rural emergency department staff with emergency physicians and nurses located at the service’s “hub.” The results of the effectiveness of this program indicated that Telehealth helped participating rural hospitals increase patients’ access to specialists, increase the use of evidence-based treatment, decrease time to transfer a patient to a facility that was able to provide a higher level of care, and reduce unnecessary patient transfers (Stingley & Schultz, 2014).

As mentioned before, Telehealth helped patients with long-term conditions to receive their treatments easily. There were many examples of applications that illustrated Telehealth potential for improving access, quality, and efficiency in health care. A couple of them have
been mentioned by the researcher previously. One of these examples was Telehealth for congestive heart failure CHF which monitored weight, blood pressure, heart rate, and pulse oximetry. A number of studies addressed the impact of using the Telehealth for CHF on health outcomes. These studies showed that this program led to a decrease in both hospital readmissions and mortality having been reported (Kvedar, Coye, & Everett, 2014).

Another example by Kvedar et al. (2014), was Home Health Program for Veterans: Over a four-year period, the Veterans Health Administration (VHA) introduced a national home Telehealth program called Care Coordination/ Home Telehealth that integrated home telemonitoring and health informatics with disease management technologies. Data gathered from 17,025 participating patients having one or more of six chronic illnesses (ranging from diabetes to depression) demonstrated high patient satisfaction levels with the program, plus a 25% reduction in numbers of bed days of care and a 19% reduction in the number of hospital admissions as compared to usual care (p. 4).

There was also Tele Intensive Care Units technologies ICUs. While many hospitals inpatient units were being downsized with the shift to outpatient care, Tele-ICUs were expanding to the point that they provided care for six million patients per year, at an annual cost of $107 billion. This number remained constant over time. There were several studies that were conducted by Network for Excellence in Health Innovation NEHI and the University of Massachusetts Memorial Medical Center which showed that ICU care provided remotely by trained physicians could decrease mortality by more than 20%, decrease ICU lengths-of-stay by up to 30%, and reduce the costs of care. As a result, Tele-ICU technologies could leverage coverage over more ICU beds and increase productivity by providing direct consultation and management of ICU patients at a distant site through remote two-way audio, visual, and physiologic monitoring (Kvedar et al., 2014). Each one of the above examples
showed how Telehealth could allow providers to extend care to a wider population of patients, reduce costs, and increase patient and provider satisfaction. It could be a helpful tool to improve the quality of healthcare services and meet the patients' expectations by increasing their health awareness, which may lead to a reduction of mortality rates.

In developing the telemedicine, it was important to setup and validate quality control systems, which would ensure the excellent performance. The research of Giansanti, Morelli, & Macellari (2008), suggested that such a system could follow two main phases. Phase 1 would be focused on data acquisition and preliminary evaluation of appropriate telemedicine services and products, and phase 2 was aimed at their evaluation, utilizing a quality assessment checklist, which tested the Telehealth systems regarding their parameters. The quality control was important to safeguard the health and life of the patients utilizing the system.

The next part of the literature review will be focused on the research of the issues of Telehealth implementation in Saudi Arabia, which will consider the above described benefits and challenges of the process implementation.

**Telehealth in Saudi Arabia.** In the recent decades, the health sector in Saudi Arabia witnessed significant progress. The e-Health Center in the King Faisal Specialist Hospital & Research Centre (KFSH&RC) in Riyadh was established in 1993 by a royal decree, and was considered the highest tertiary care institution in the Middle East region (El-Mahalli, El-Khafif, & Al-Qahtani, 2012). The hospital provided free medical care and accommodation for the patients, and was actively developing Telehealth technologies. It was connected with George Washington University Hospital and Massachusetts General Hospital in Boston, and maintained consultations in verifying the accuracy of radiology, histopathology reports and patient management protocols (Alajmi et al., 2015). This institution was one of the most successful providers of Telehealth in the country, which allocated resources towards the
nexus of researchers and practitioners in the field of Telehealth. The values of the organization were quality, relevancy, cooperation and respect.

In 2005, the Saudi Association for Health Informatics (SAHI) was established. The goal of the organization was to improve the health informatics education and training. SAHI was supported by key members of the Saudi government and played an important role in the development of Telehealth. Its projects covered the whole country. The organization engaged in conducting the e-health conferences and creating a network of Telehealth awareness (Househ, Al-Tuwajri, & Al-Dosari, 2010).

In general, over the previous 30-40 years the government of Saudi Arabia spent billions of Riyals to develop and improve the quality and coverage of health care, which resulted in the emergence of numerous private and government hospitals. The hospitals were providing all kind of medical services, including such sophisticated procedures as open-heart surgery, transplantation and cancer therapy. However, it was often noted that this progress was not accompanied by the advancement of e-health in general, with the Telehealth field as one of its aspects. In this regard, it was necessary to mention the variation of healthcare providers, which eventually led to the records of the patients being scattered in different facilities, which led to the great waste of costs and efforts (Altuwajri, 2008).

The state of affairs in Telehealth in the country was not optimal. While telemedicine was implemented in 1993, and a substantial budget was allocated towards its development, as of 2012 only 33.3% of healthcare specialists were actually implementing such technologies in their practice. The most frequent users were consultants, especially those with experience more than 20 years. It led to the surprising conclusion that the older the healthcare provider was, the stronger was his intention to utilize Telehealth technologies (El-Mahalli et al., 2012). The studies of 2015 showed that 47.3% of physicians in the country never used Telehealth, and 11.8% rarely used it. The willingness to utilize telemedicine technologies also had a
direct correlation with the level of technological experience of the practitioners (Alajmi et al., 2015). This statistic meant that the lack of physicians with relevant professional traits, or lack of motivation among such specialists to participate in the Telehealth implementation, was one of the gravest challenges to the success of the project.

Some regions of Saudi Arabia suffered from this problem more than others, namely the southern region. In this district, there was a shortage of Community Health Centers and of specialists in these institutions. The specialist shortage existed in regards to the radiology specialists, although a shortage of other practitioners was also present. The implementation of Telehealth in such regions upon providing satellite transmission of data to other medical facilities would save costs on training healthcare specialists and time on treating the patients (Ahmed & Aldosh, 2014). The development of Telehealth medicine in such regions was particularly important, since in some cases it provided not just simplification of life or cost-saving, yet guaranteed the survival of the patients, especially in cases of emergencies.

The implementation of Telehealth in Saudi Arabia could face certain important challenges. They could be grouped into several categories. The economic barriers were concerned with the financing and managing Telehealth programs; technological barriers were connected with the possible technological gap, especially in the distant regions; organization barriers were concerned with the difficulties of implementing new technologies into existing practice (regarding privacy concerns and lack of consistent information standards); finally, behavior barriers were connected with the human factor and readiness of the stakeholders of the process (Altuwajri, 2008). These challenges were connected with each other and must be addressed on the complex basis.

However, these challenges did not prevent investors and other actors from engaging in the Telehealth development. The advantages of the model, presented in the example of other countries, were tangible and provided results in qualitative and quantitative dimensions. The
strategy of Telehealth implementation in Saudi Arabia was thus an important part of the national development.

Summary of the Literature

The present study was aimed on examining the benefits of having Telehealth services in Saudi Arabia, and comprehending how the implementation of this technology was likely to reduce the costs and improve the quality of the service. With this regard, numerous scholarly sources were overviewed, analyzing the experience of Telehealth implementation in different countries, both developed and developing. The objective of the research was to provide information about the benefits of Telehealth to facilitate the process of its implementation in the country. The research was analyzing the issue in regard to several questions.

The first question was to figure out, ‘What are the benefits of Telehealth?’ It has been confirmed that this service aimed to improve healthcare for patients by improving access to a wider range of physicians and reducing travel time, so there would be no need for patients to move from one place to another. Telehealth also aimed to improve the health industry by enabling the patients to have their consultations in familiar environments, reducing cost of healthcare, increasing the quality of it, and reducing patients’ waiting times. It must be part of a collaborative network. In addition, it must meet the real needs of local health professionals, use simple technology, and have at least some face-to-face components. Telehealth could be economically viable and could help to improve patient access to specialized health care if applied to some health problems where there was a high demand for care services. Finally, it was obvious that people would be more than welcome to use this kind of service.

The second question was to figure out how this technology was connected with reduction of the costs. It was learned that being a private case of health conception, Telehealth provided significant benefits in cost-saving of the state sector and individuals,
making the healthcare for home patients more efficient, and exercising long-term benefits for the health of the nation in different countries.

The third question of the study was to assess the expected increase in quality of healthcare. The review of the issue demonstrated that Telehealth had a strong correlation with the quality of healthcare in various instances, and was simplifying the access to the high-qualitative medical service to a large population. Moreover, the expected perception of Telehealth was strong. The following pie chart shows the willingness of people to have a video visit.

![Willingness to have a video visit](image)

(Sarasohn-Kahn, 2015).

*Figure 5. Willingness to have a video visit. This figure showed that 64% of people were willing to have video visits, while 36% of them were not willing.*

As a result, if people had the desire to get this type of service, providers must consider people’s requirements. Also, they must try to achieve them since it would not cost a lot of money, and everyone had the ability to get internet access easily. Considering it, the
implementation of Telehealth was a significant contribution to the medical infrastructure of Saudi Arabia and became a significant bonus, increasing the quality of life of the citizens.

Finally, the research was aimed at explaining why it was important for the Saudi health sector to provide this kind of service. This section was based on the above determined benefits of Telehealth, and included the information about Telehealth experience and its potential in the country. The review of the sources demonstrated that the issue of e-health and Telehealth in Saudi Arabia was concerning the researchers who described the major benefits and challenges of this phenomenon in the country. However, the situation with Telehealth still was not the best in the world, and the country experienced certain problems in this regard. It required the regulators of the process to pay more attention to the issues. The efforts should be made in all directions, including staffing, technologies, financing, organizing, and policy and legislation. The actions in these sectors were interrelated and could not be effectively achieved in isolation. The awareness of the above presented data, combined with the discussion on cost-effectiveness and quality-increasing potential of the Telehealth, made it viable that implementation of Telehealth in the Saudi health sector would have a long-term positive contribution.
Chapter 3: Research Methodology

Research Approach

The purpose of this research paper was to determine and provide information about the impact of Telehealth on the healthcare costs and quality of the health sector in Saudi Arabia. In this chapter, the researcher provided information about the methodology that was used for this research. The chapter will be divided into three sections. The first section will present data collection approach and procedures. The second section will focus on the proposed approach for data analysis and synthesis. The third section will mention the methodological limitations.

Since Telehealth was a new service that the Saudi health sector had not used, it was useful to do a feasibility study. The feasibility study was helpful to determine the effectiveness of Telehealth service if it would be applied in Saudi Arabia, how it would reduce the costs of the healthcare services, and how it would improve its quality. In addition, the feasibility study was useful to determine the possibility to achieve this kind of service in Saudi Arabia with the current health system and the desired benefits of it.

The data was collected by surveying some physicians and employees of the Saudi health sector because they were the main persons who would use the Telehealth service. Thus, it was important to gather information about nurses, physicians and specialists' awareness and attitude towards Telehealth. The survey was distributed at two of the biggest hospitals in the western region of Saudi Arabia and examined how the physicians feel about having such a service. It also examined how the service could help them in providing health care services in the best possible way and at the lowest cost and effort. Surveying these persons, who were nurses, physicians, and specialists, allowed the researcher to know whether or not they wanted the availability of Telehealth to provide the healthcare services to their patients.
Data Collection Approach and Procedures

Data collected. The data was collected by using the SurveyMonkey website and involved the application of qualitative techniques. The SurveyMonkey website was used to share the questionnaire with the participants. This online questionnaire surveyed nurses, physicians, and specialists in long-term condition diseases such as diabetes, heart diseases, and so on. The purpose of the survey was to solicit opinions from those who would use this technology to provide the healthcare services. The survey was helpful to know the physicians’ opinions about this service and if they saw it as a helpful factor or not.

It was important to survey nurses, physicians, and specialists because they would be responsible for providing the Telehealth service. To ensure the productivity of this service, it was important to know their overall opinions about Telehealth. The researcher needed to know what they thought about it. For sure, their attitudes and behaviors significantly affected the effectiveness of the service. It was critical to understand their points of view to determine the feasibility of implementing Telehealth service in Saudi Arabia. The participants were asked to answer several questions related to the nature of their work, the ways that they followed to provide the healthcare services, and the time that they took to provide the services. The survey was sent to them by email.

Primary research question and sub-question data details. It was necessary that the data to be collected in this section supports the stated research questions that were mentioned previously in chapter 1, which are as follows:

1. Are there benefits to using Telehealth?
2. Will it reduce the cost of healthcare services?
3. Will it increase the quality of the healthcare services?
4. Is it important for the Saudi health sector to provide this kind of service?
In order to find an answer for the first question, the researcher created two questions in the survey. These questions asked the participants to choose the best definition of Telehealth and if they planned to monitor patients’ conditions remotely or not. The researcher asked the participants about their opinions regarding the cost effectiveness of Telehealth to find an answer for the second research question. Moreover, the researcher asked the participants of the survey if they thought that Telehealth could increase the quality of the healthcare services to answer the third research question. Finally, to find an answer for the last research question, the researcher created eight questions in the survey. The participants were asked about the length of time that they usually took to meet with their patients. They were also asked about how many times they rescheduled appointments. In addition, they were asked to answer a question about using Telehealth if they had the opportunity to do so. In total, there were 12 questions in the survey that were related to the four research questions.

Data collection procedures. The surveys were distributed in two of the biggest hospitals in the western region of Saudi Arabia. They were King Fahd's hospital and Al-Noor Specialists hospital. All the 12 questions of the survey were reviewed and approved by Central Michigan University. Also, these surveys had to be approved by officials in the two hospitals to distribute the surveys to the physicians.

Target Population. In general, there were 71 thousand physicians who worked in the Saudi health sector. However, the surveys were distributed to the nurses, specialists, and physicians who specialized in long-term condition diseases such as cardiologists, endocrinologists, diabetes specialists, obesity specialists, and so on. They would be the doctors who would use Telehealth service the most.

Sample Details. This research involved the use of at least 50 participants, who would be chosen through a random sampling technique. In this technique, each individual, whether nurse, doctor, or specialist, had the same chance and probability to be chosen as a participant
in this research. In addition, this study did not include participants who were children under the age of 18.

**Instrumentation.** The reason for conducting the online survey was that the researcher believed that using the online survey could save the time, money, and effort. It also made the process quicker than going to Saudi Arabia and handing out the survey to the target sample. Majorly, the questions used in the survey focused on the research topic and were created for this research. Thus, it was important to understand the participants’ opinions and thoughts regarding Telehealth, side by side with the stated research questions. The survey was inclusive of the research questions that are available in Appendix C. Moreover, participants were asked uniform questions and the answers were recorded, to eliminate bias in making the inferences. Moreover, the participants attempted the survey through official written letters that included a request for their participation in the research.

**Procedures.** The surveys were sent to the participants by email during the work time for the employees which started at 8:00 a.m. and ended at 2:00 p.m. The researcher contacted the employers who gave her the permission letters, and they were responsible for sending the link to the employees in their hospitals. To ensure confidentiality and anonymity, survey respondents were not asked to provide any personal information.

This research was designed to make the survey procedure as simple as possible, by making sure that the study was conducted with the permission from the two hospitals. All the chosen participants, therefore, answered the questions administered through online multiple choice questions by using SurveyMonkey website.

**Timing.** The participants were given equal time to answer the questions of the survey. The time set aside for this survey was around two to three weeks, considering the number of the participants that were invited to help find answers for the research questions.

**Data Analysis Approach and Synthesis**
The data collected from surveying the physicians allowed the researcher to provide brief information about the impact of Telehealth on the healthcare costs and quality. In an attempt to meet the objectives of the research, this section will entail the description of the data analysis techniques and synthesis that was used in the research. This technique mainly focused on the analysis of the information that was collected from the survey. The data analysis with synthesis technique, which was used in this research, would use and focus more on descriptive statistics to analyze and present the data graphically.

Based upon the data, this research discussed some elements. The first element was the impact of Telehealth service on the Saudi health sector. The second was the benefits of it on the healthcare services. The last element was how Telehealth would reduce the costs and increase the quality of the services provided.

The data was analyzed using graphs and charts to clarify how Telehealth could reduce the costs of the healthcare services and improve the quality of the services in Saudi Arabia. From the descriptive statistics, a number of variables were calculated and the hypothesis was tested. From the analysis, logical conclusions were made. This method simply described the data. It helped visualizing what the data demonstrated, and by this, it presented the data in a more meaningful way. It also helped in combining the organized description and the statistical commentary.

**Methodological Limitations**

There were some limitations of this research that could negatively impact it and could lead to inaccurate results. First of all, the sample size was small compared to the population size which was 71 thousand physicians who worked in the Saudi health sector. This might affect its result because it might not accurately represent the whole population. The second limitation was that this research would take place in Saudi Arabia, so its result could not be helpful to be used in other countries, unless these countries have a health system similar to
the Saudi health system. The last limitation was the time. The time of conducting this research might not be the most appropriate time. In Saudi Arabia, they had the spring break during the same weeks the survey was conducted. Thus, nurses, physicians and specialists were on their vacations.
Chapter 4: Data Analysis

Introduction

The purpose of this research paper was to know the impact of Telehealth service on healthcare cost and quality in the Saudi health sector. In order to discuss this impact and the benefits of the service, several elements of it were discovered in the research. Also, this research offered information about how Telehealth planned to reduce the costs and increase the quality of the services provided. Thus, the researcher adopted a feasibility study approach by surveying nurses, physicians, and specialists in two of the biggest hospitals in the western region in Saudi Arabia. The researcher believed that it was important to survey them to ensure the productivity of this service because they would be the persons who would use and provide the Telehealth service to the patients. An online survey was distributed to them.

Consequently, this chapter will present the results of this survey. The chapter will begin by presenting demographic data of the sample participants who were surveyed. Thus, descriptive statistics were used to analyze and present the data graphically. Hence, the data was analyzed using graphs and charts to clarify how Telehealth could reduce the costs of the healthcare services and improve the quality of the services in Saudi Arabia. Also, it helped in knowing the benefits of Telehealth and why it was important for the Saudi health sector to provide this kind of service more frequently. From the descriptive statistics point of view, a number of variables were calculated and the hypothesis was tested. At the end, logical conclusions were made. There will be two main sections in this chapter besides the introduction section. The first section will be about data presentation and analysis, and the second one will be about data analysis summary.

Data Presentation and Analysis

In this section, some charts and narrative were used to analyze the data and describe the displays for the 12 questions of the survey. The researcher was looking to get at least 50
responses to the survey from the two hospitals, which were King Fahad’s hospital and Al-Noor Specialists hospital. Dr. Kamal Balkhoyor and Mr. Ayman Ajeeb were asked to provide information about the number of the physicians and nurses in their hospitals. Dr. Balkhoyor, who was the chairman of the ethic committee at Al-Noor Specialist Hospital, said that there were three floors in the hospital, and each floor contained at least 60 physicians and 90 to 95 nurses. However, Mr. Ayman, who was the general manager of King Fahad’s Hospital, said that there were more than 500 physicians and nurses in his hospital. Based on this information, there were almost a total of 965 employees in the two hospitals. However, a total of 202 participants provided their responses to the questionnaire items that were posted on the SurveyMonkey website. The researcher will describe and analyze the answers for the 12 questions in the following paragraphs of this section.

First of all, the table below shows the answer for the first question in the survey, which was, ‘How many years have you been in the healthcare profession?’ It shows that most of the respondents, 73 persons (36.14%), were employees who had been working in the healthcare profession for five years and below, while 25.25% with a total number of 51 of the participants had been working for six to 10 years in the health sector. In addition, 16.34% of the participants had been working for 11 to 15 years; they were 33 persons of the 202. Finally, there were 45 persons who had been working in the healthcare profession for 16 years or more with a percentage of 22.28.

Table 2

| Question 1: How many years have you been in the healthcare profession? |
|-----------------------------|-----------------|----------------|
| Answer choices              | Responses in present | Number of responses |
| Five years and below        | 36.14%           | 73              |
| Six to 10 years             | 25.25%           | 51              |
| 11 to 15 years              | 16.34%           | 33              |
| 16 years or above           | 22.28%           | 45              |
| Total                       | 100%             | 202             |
It was important to start the survey by asking the participants this question to know if there was a huge variation in their career experiences or not. Having this variation was helpful in gaining a general idea of the participants’ ages, which could help to know whether or not different generations would accept this service in their health systems. Thus, it helped in knowing that Telehealth would be a service that most of the caregivers might use. Also, it helped to know that Telehealth would not face rejection from most healthcare providers because rejection might be a major obstacle to the success of Telehealth service if it would be applied in the Saudi health sector.

The second question in the survey was about the length of time that physicians and nurses usually took to meet a patient. The following pie chart shows the result of the participants’ answers for this question. One hundred and ninety-nine out of 202 respondents answered this question.

- 40.20% (80) for 11 to 15 minutes
- 21.11% (42) for 10 minutes or less
- 26.13% (52) for 21 minutes or more
- 12.56% (25) for 16 to 20 minutes

Answered: 199
Skipped: 3
As shown in the figure above, most of the participants’ answers were that they took 11 to 15 minutes to meet their patients with a total of 80 respondents (40.20%). While 26.13% of the participants chose 10 minutes or less (52 respondents). Moreover, 42 persons of them spent 21 minutes or more to meet their patients (21.11%). Finally, 12.56% of the participants, with a total number of 25, chose 16 to 20 minutes as the answer for the question.

Knowing the time that physicians and nurses usually took or spent with each patient helped the researcher to prove the efficiency of Telehealth service. Since one of the benefits of Telehealth was reducing the patients’ waiting time that he/she might take to meet their doctors, it was important to know the time that physicians usually spend with their patients in face-to-face consultations. This helped to find an answer for the first research question, which was, ‘Are there benefits to using Telehealth?’.

The third question in the survey was about the time period that patients usually needed to re-make appointments and visit their physicians again. The following bar chart shows that 195 out of 202 participants answered this question. It also shows that most of the respondents chose once a month as an answer for this question with a total number of 70 and 35.90% of all the respondents. In addition, the chart shows that almost 32% of the participants noticed that their patients remade appointments and visited them again once every three months. They were 62 of the respondents. Moreover, this data indicates that 21.54% of the participants said that the patients visited them again once a week. In total, 42 respondents out of 195 chose this answer. Finally, 10.77% of the respondents, with a total number of 21, mentioned that their patients remade appointments and visited them again twice a year.
The reason behind asking the participants this question was to figure out how many times the patients were able to see their doctors during the year. Increasing the demand of healthcare services and increasing the number of patients, who were waiting to receive the proper treatment, might lead to reduce the number of face-to-face consultations that occurred between a physician and his/her patient. What happened in this situation was that the physicians usually wanted to see patients as much as they could and provide services for the largest number of their patients. Thus, patients might have had to wait for at least a month to see their doctors, which could have affected their lives negatively, especially for patients who had long-term illnesses. Distinctly, having the Telehealth service would be very helpful in such situations. Then patients would not have to wait more time to visit their physicians whenever they needed to do so. Once more, asking this question helped the researcher to find

![Figure 7](image-url)
an answer for the first research question which was about if there were benefits to using Telehealth or not.
After that, the participants were asked to provide answers for the fourth question which was about the broadband service at their primary place of work. A total number of 201 of the participants provided answers for this question. As shown in the figure below, 80 participants said that the services at their workplaces were reliable but slow. In addition, 77 of them said that the services at their primary workplaces were reliable and fast. However, 23 persons out of 201 said that the services at their workplaces were unreliable, while 21 of them were not sure about the broadband services at their primary place of work. Respectively, the percentages of the answers were 39.80%, 38.31%, 11.44%, and 10.45%.

The question in the above figure was another question that helped the researcher to find an answer for the first research question as well as the fourth research question. The participants’ answers helped to find out if there were benefits to using Telehealth in Saudi Arabia or not. In addition, it helped to know if it would be important for the Saudi health
sector to provide this kind of service or not. It was helpful to know whether or not the services in the Saudi hospitals were provided in reliable and fast ways. This information helped the researcher to prove some of the benefits of having Telehealth in Saudi Arabia such as increasing the quality of the healthcare services and reducing the patients’ waiting time.

For a healthcare provider, it was important to be able to provide the services for more patients and be able to serve them whenever they needed to receive treatment. Thus, inability to meet them in a timely manner and having slow broadband services could have affected the health industry negatively and reduced the quality of the services provided. For this reason, having the Telehealth service would help in solving the problem.

In addition, the participants were asked about the definition of Telehealth. Thence, the researcher asked them to choose one answer as the meaning of Telehealth from their point of views. The results showed that more than 50% of the participants did not choose the correct answer. As indicated in the following bar chart, 201 participants provided answers for this question, while one participant skipped it. The bar chart also shows that 38.81% of the respondents were not sure about what the answer was for the question. Nevertheless, 37.31% of them chose the correct answer, which was that Telehealth provided healthcare services through video and audio communication between physicians and patients. Moreover, 18.41% of the participants chose video communication between physicians and patients as the answer for the question. Whereas, 5.47% of them chose that Telehealth provided healthcare services through video and visual communication between physicians and patients. Additionally, the bar chart shows the number of the respondents who chose each answer, which were 78 persons chose the first answer, 75 persons chose the second answer, 11 persons chose the third answer, and 37 persons chose the fourth answer.
Since Telehealth was not a service that was provided in Saudi Arabia, the researcher wanted to know how much the participants knew about it. Before conducting this research and distributing the survey, the researcher asked some doctors who worked in different hospitals in Saudi Arabia about Telehealth, although not all of them knew exactly what it was. For this reason, a brief summary about Telehealth was provided at the beginning of the survey. This could help the participants to gain an idea about the service and know what they were asked about. Thus, the researcher wanted to add this question to make sure that the participants understood and knew the real meaning of Telehealth. However, the results showed that most of them did not know what the service was. Thus, this helped the researcher to write logical recommendations in chapter five of this paper, in order to help in establishing the service appropriately.

Subsequently, the participants were asked to provide answers for another question which was, ‘Do you think it will be useful to monitor the patient’s condition remotely?’.

**Figure 9. How does Telehealth provide the healthcare services?** This figure shows the results of the participants’ answers for the fifth question in the survey that relates to the definition of Telehealth.
following figure shows that more than 80% of the participants thought that it would be useful to monitor the patient’s condition remotely. Forty-three point zero seven percent of the participants thought that it would be very useful to monitor the patient’s condition remotely (87 persons), while 42.57% thought it would be useful to some extent (86 persons). On the other hand, 4.46% of the participants thought that it would not be useful to monitor the patient’s condition remotely (9 persons). Besides, 9.90% of them did not know if it would be

![Figure 10](image)

*Figure 10. Do you think it will be useful to monitor the patient's condition remotely? The figure shows the number of the participants who answered this question and the percentages of the respondents for each one of the four choices. Useful or not (20 persons). This question was answered by all 202 participants.*

Providing this question to the participants helped the researcher to find an answer for the fourth research question which was, “Is it important for the Saudi health sector to provide this kind of service?” The participants’ answers assisted in knowing whether or not they would accept Telehealth and use it. The researcher thought that accepting the service was the first step in implementing it appropriately. It might not be useful to establish a service that no
one would use because this would lead to the failure of this service. Accordingly, it was important to ask the participants if using remote monitoring would be valuable or not.

Then, the participants were asked about their opinions regarding the usefulness of Telehealth in treating patients. All the 202 participants answered this question. The following figure shows that more than 70% thought that Telehealth would be useful in treating patients. It indicates that 52.48% of the participants thought that Telehealth would always be useful in treating patients, and 24.26% of them thought that Telehealth would rarely be useful in treating patients. Nevertheless, 3.47% of the participants thought that Telehealth would not be useful in treating patients. Moreover, 19.80% of the respondents were not sure if Telehealth would be useful in treating patients or not. In total, there were 106 persons who chose “always useful” as an answer for the seventh question. Also, there were 49 persons who chose “rarely useful,” but seven persons chose “not useful.” In addition, there were 40 persons who chose “not sure” as the answer for this question.

![Figure 11. Do you think that Telehealth service will be useful in treating patients? The figure provides an illustration of percentage and the number of the answers that the participants provided for each option. Asking this question helped the researcher to answer the fourth research question which was, ‘Is it important for the Saudi health sector to provide and have Telehealth service](image)

**Answered: 202**
or not’. If the health providers in Saudi Arabia thought that Telehealth would be useful in treating patients and wanted to use the service, it would be important for the Ministry of Health to establish it. Also, knowing the providers’ opinions about Telehealth would help the ministry in starting the service comfortably, without wondering about how to persuade its employees to use it.

Another question that helped the researcher to find an answer for the previous research question was, ‘If you have the opportunity to use Telehealth, are you going to use it?’. The researcher thought that it was important to ask the participants directly and know if they would use this service or not. The results for the answers of this question surprised the researcher because more than 90% of the participants chose to use Telehealth if they had the opportunity to do so. One hundred and ten of them said that they would use it sometimes, and 69 of them said that they would use Telehealth always. In addition, 17 persons of the participants said that they would rarely use Telehealth. On the other hand, just 5 persons of the participants said that they would never use Telehealth. In total, 201 persons out of 202 of the participants answered this question.

In addition, 54.73% of the respondents, who were 110 persons, chose “sometimes” as the answer for the eighth question, and 34.33% of them, who were 69 persons, chose “always” to be their answers. In addition, 8.46% of the participants, who were 17 persons, chose “rarely,” while 2.49% of them, with a total number of five, chose “never” to be an answer for the question. These results showed the importance of having Telehealth in Saudi Arabia. Most of the physicians and nurses from the two hospitals who participated in applying the survey were going to use the service if they would have the opportunity to do so. Having agreement about using the service from providers who worked in different work environments was one proof of the importance of the availability of Telehealth in the Saudi
health sector. The bar chart below shows the results of the participants’ answers for this question.

![Image of bar chart]

**Figure 12.** If you have the opportunity to use Telehealth service, are you going to use it? The figure shows the number of the participants who answered this question and the number of the respondents for each choice of the four choices which the percentage of each answer.

After that, the participants were asked to provide answers for the ninth question which was, ‘Do you think having the ability to have secure consultations with your patient via video and audio-link will be useful?’. This question was provided to help the researcher know whether or not it was important to have Telehealth in Saudi Arabia. The researcher wanted to ensure that the participants understood what Telehealth was. This question also helped the researcher to provide more reasonable recommendations in the next chapter.

In the next figure, the results of the participants’ answers for the ninth question will be provided. It shows that more than 90% of the participants thought that it would be useful to be able to have secure consultations with their patients via video and audio-links. This result could be more supportive to the answers of the eighth question in the survey, and led to the same conclusion. The figure shows that 50.75% of the participants thought that it would be useful sometimes to have secure video and audio consultations. They were 102 persons.
Additionally, 35.82% of them, with a total number of 72, thought that it would always be useful to have secure consultations with their patients via a video and audio-link. Ten point forty-five percent of them, who were 21 persons, thought that it would rarely be useful to have this kind of consultations. In contrast, 2.99% of the participants thought that it would never be useful to have secure consultations using a video and audio-link. They were just six persons.

The next question in the survey was the participants’ experiences and skills in using technology. They were asked to assess the level of their skills in dealing with the technology and using it. The figure below displays that 41.09% of the participants (83 persons) assessed their skills to be “very good,” and 33.66% of them (68 persons) decided that their skills were “excellent” in using technology. Also, 21.78% of the respondents (44 persons) selected “good” as an answer that described their skills in using technology. Moreover, 3.47% of them

---

**Figure 13.** Do you think having the ability to have secure consultations with your patient via a video and audio-link will be useful? This figure indicates the results of the answers for the question provided. Each answer includes the number of the participants who chose it and its percentage.
(seven persons) said that they had “poor” experiences and skills in using technology. All of the 202 participants answered this question.

![Bar chart showing the distribution of experiences and skills in using technology among the participants.](image)

**Figure 14.** What are your experience and skills in using technology? The figure shows the results of the answers for this question and the total number of the participants who answered it. It indicates the number of the respondents for each answer and the percentage of it.

Since Telehealth was the delivery of healthcare services via telecommunication technologies, it was important to know the levels of the skills that most of the participants had regarding technology. It was important to know if they could use it effectively or not because they would be the persons who would use Telehealth frequently. This information helped the researcher to provide reasons for why it was important to have a Telehealth service in Saudi Arabia, since most of the participants could use technology. It also helped in providing proper recommendations.

Then, the participants answered the 11th question which was about increasing the quality of healthcare services in Saudi Arabia by applying Telehealth. The results of the answers for this question helped the researcher to analyze and find an answer for the third research question which was, “Will it increase the quality of the healthcare services?”
Additionally, these results led to the identification of another benefit of Telehealth, which was increasing the quality of the healthcare services. Thus, this also helped in answering the first research question, which was about the benefits of Telehealth.

The previous chart illustrated the results of the participants’ answers for the 11th question. Also, it showed the total number of the participants who provided their answers. In the chart, it appeared that 47.03% of the respondents totally agreed with the statement in the question which included that Telehealth could increase the quality of healthcare services in Saudi Arabia. The number of the respondents who chose this answer was 95. It also appeared that 45.05% of the participants somewhat agreed with this statement, and they were 91 persons. However, almost 3% of the participants, who were six persons, disagreed with the statement. Nevertheless, 4.95% of them did not know if Telehealth could increase the quality of the healthcare services in Saudi Arabia or not. They were just 10 persons.
The last question in the survey was provided to gain an idea about the impact of Telehealth on the cost of the healthcare services in Saudi Arabia and answering the second research question. The following table indicates the results of the participants’ answers about the effect of Telehealth service on the healthcare cost. It shows that more than 60% of the respondents thought that Telehealth would reduce the cost of the healthcare service. In details, 129 of the participants thought that Telehealth would affect the cost of the healthcare services by reducing it (64.18%). On the other hand, 47 persons thought that Telehealth would increase the cost of the healthcare services (23.38%). Finally, 25 of the respondents thought that Telehealth would not make any changes on the cost of the healthcare services

Table 3

*Question 12: Do you think that Telehealth is going to affect the cost of the healthcare services by:*

<table>
<thead>
<tr>
<th>Answer choices</th>
<th>Responses in present</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing it?</td>
<td>64.18%</td>
<td>129</td>
</tr>
<tr>
<td>Increasing it?</td>
<td>23.38%</td>
<td>47</td>
</tr>
<tr>
<td>Making no changes to it</td>
<td>12.44%</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>201</td>
</tr>
</tbody>
</table>

(12.44%).

**Data Analysis Summary**

The above presentation of the data showed some important findings. First of all, it showed that there were various participants from different generations who attended to answer the survey questions. It also showed that most of the participants used to spend between 11 to 15 minutes to diagnose their patients. In addition, the data showed that patients usually remade appointments and visited their doctors again one time each month. In addition, almost 40% of the participants said that the broadband service at their primary
workplace was reliable but slow. Moreover, more than 90% of the participants did not choose the correct meaning of Telehealth.

The results also showed that more than 80% of them thought that it would be useful to monitor their patients’ conditions remotely, and 76.8% of them thought that Telehealth would be useful in treating the patients. Furthermore, more than 90% of the participants said that they would use Telehealth if they had the opportunity to do so. Also, more than 90% of them thought that it would be useful to have secure video and audio-link consultations with their patients. Additionally, the data analysis showed that most of the participants had very good experiences and skills in using technology. Finally, most of the participants said that Telehealth would increase the quality and reduce the cost of the healthcare services in Saudi Arabia.
Chapter 5: Summary Conclusions, and Recommendations

Overview

The main objective of this research was to know the impact of Telehealth service on the healthcare cost and quality of the Saudi health sector. It was conducted to find answers for the four research questions which were, was there benefits to using Telehealth, would it reduce the cost of healthcare services, would it increase the quality of the healthcare services, and was it important for the Saudi health sector to provide this kind of service? In this chapter, the researcher would provide a summary of the research, answers for the research questions in the conclusions section, her recommendations, and future research suggestions.

Summary

Prior research and studies were designed to examine the benefits of having Telehealth services in Saudi Arabia, and comprehend how the implementation of this technology was likely to reduce the costs and increase the quality of the healthcare services. With this regard, the researcher overviewed numerous scholarly sources and analyzed the experience of Telehealth implementation in different countries. As mentioned previously, the objective of this research was to provide information about the benefits and the impacts of Telehealth to facilitate the process of its implementation in Saudi Arabia. The research was analyzing the issue in regard to the four research questions.

In the literature review that was conducted in chapter two, the researcher figured out that Telehealth had many different benefits. At first, this technology aimed to improve healthcare for people by improving access to a wider range of specialists, reducing travel time and minimizing time off work for families and healthcare workers. It was also enabling residents to have their consultations in familiar surroundings, reducing cost of healthcare,
increasing the quality of it, and reducing patient waiting times. Telehealth also could be economically viable if applied to health problems where care was in high demand. In addition, this service could help in improving patient access to specialized health care. Finally, Telehealth could help the Saudi health sector to improve its services and serve its patients effectively.

Besides, the researcher distributed surveys in two of the biggest hospitals in the western region of Saudi Arabia. This survey was conducted in order to find answers for the four research questions. The researcher used a descriptive statistics technique to analyze the data. Graphs and charts were also used to clarify the results of the survey. At the end, the data analysis of the survey concluded that Telehealth could increase the quality of the healthcare service and reduce the cost of the services. The results also supported the findings from the literature reviews which include some of the benefits of Telehealth. For instance, the data analysis concluded that Telehealth could help in reducing the patients’ waiting time and making the physicians’ schedules more organized. In addition, the data concluded that it was important for the Saudi health sector to establish and provide this technology. All of these findings helped the researcher to find answers for the research questions which will be provided in the following sub-section.

Conclusions

In this section and based on the information that was collected from the previous literature review and the data analysis, the researcher will provide answers for the four research questions that were provided in chapter one and three. The research questions and their answers are as follows:

**Are there benefits to using Telehealth?** Based on the information that was collected from the literature review and the questionnaire data analysis, the answer for this question was yes, there are benefits to using Telehealth. In chapter two, previous studies confirmed
that Telehealth improved healthcare for patients by doing several things. First of all, it was improving access to a larger number of physicians who worked in different places at the same time. It was also helpful in reducing travel time, so there would be no need for patients to move from one place to another. Telehealth also improved the health industry by enabling the patients to have their consultations in environments that they felt comfortable in. Telehealth aimed to improve the industry by reducing the cost of healthcare services, increasing the quality of it, and reducing patients’ waiting times. However, Telehealth must be part of a collaborative network. In addition, it must meet the real needs of local health professionals, use simple technology, and have at least some face-to-face components. Another benefit of Telehealth was that it can be economically viable. It also could help to improve patient access to specialized health care if applied to some health problems where there was high demand on care services.

In the previous analysis of the survey questions, the researcher found out that Telehealth can help in allowing the physicians to keep in touch with a higher number of patients and organize their schedules more. The previous data analysis indicated that most of the physicians and nurses spent 11 to 15 minutes with their patients, but there were some of them who spent 21 minutes and more. Knowing the time that physicians and nurses usually spend with each patient helped the researcher to prove one of the benefits of Telehealth service that was mentioned in chapter two, which is reducing the patient waiting time.

Another benefit of Telehealth which the data analysis explored was that it can be helpful in the situations where patients wait for a long time to be able to see their physicians again. The results of the survey showed that patients might have to wait for at least a month to see their doctors again. Of course, this could affect their lives in a negative way, especially for patients who have long-term diseases. Thus, the benefit of having Telehealth service was
that patients would not wait a long time to visit their physicians. They would be able to see and talk with their physicians whenever they needed and at the proper time.

Also, Telehealth service could help in making the healthcare services to be more reliable and fast. In the questionnaire data analysis, almost 40% of the participants said that the services in their workplaces were reliable but slow. Since Telehealth could increase the quality of the healthcare services and reduce the patients’ waiting time, it was obvious that it could help in making the services to be more reliable and fast. Time played a significant role in providing the healthcare services, so it was important for the patients to be able to receive the accurate treatment at the most proper time. In addition, inability to meet the patients at the appropriate time could affect their health negatively as well as the health industry. It could reduce the quality of the services provided. For this reason, having the Telehealth service would help in solving this problem and making the providers provide more reliably and with faster services.

Finally, the questionnaire data analysis showed that Telehealth could increase the quality of the healthcare services. This was another benefit of Telehealth that was proven by the literature review and the conducted survey. The results of the data analysis also showed that Telehealth could affect the cost of the healthcare services by reducing it. All of the prior information proved that there were benefits to using Telehealth.

**Will Telehealth reduce the cost of healthcare services?** The answer for this question was that Telehealth would reduce the cost of the healthcare services based on the information that was collected in earlier parts of this paper. The previous literature review showed that Telehealth provided significant benefits in saving the cost of the state sector, healthcare providers, and individuals. This could lead to making the healthcare for home patients more efficient and could exercise long-term benefits for the health of the nation in different countries. Additionally, the previous data analysis showed that Telehealth could
affect the cost of the healthcare services by reducing it. More than 60% of the respondents indicated that Telehealth would reduce the cost of the services.

**Will Telehealth increase the quality of the healthcare services?** The review of the subjects that was conducted in chapter two demonstrated that Telehealth had a strong correlation with the quality of health care in various instances. It was also simplifying the access to the high-qualitative medical service to a large population. Moreover, the expected perception of Telehealth was strong. In addition, the literature review showed that most people desired to get this type of service. Thus, providers must consider people’s requirements and must try to achieve them since it would not cost a lot of money. This would lead to an increase of the quality of life of the citizens as well.

Besides, the results of the data analysis showed that Telehealth could affect the quality of the healthcare services by increasing it. More than 90% of the providers who participated in the survey agreed that Telehealth could increase the quality of the healthcare services. Hence, it is possible to say that the answer to this question was yes, Telehealth would increase the quality of the healthcare services.

**Is it important for the Saudi health sector to provide this kind of service?** Based on the information from chapter two and the data analysis, the researcher found out that it was important for the Saudi health sector to provide Telehealth service due to several reasons. First of all, based on the above determined benefits of Telehealth, and the information about Telehealth experience and its potential in the country, it appeared that the country would experience certain problems in regards of Telehealth. Thus, this would require the providers to pay more attention to the issues. The efforts should be made in all directions, including staffing, technologies, financing, organizing, and policy and legislation. The actions in these sectors would be interrelated and could not be effectively achieved in isolation. The awareness of the presented data in chapter two, combined with the discussion
on cost-effectiveness and quality-increasing potential of the Telehealth, makes it sustainable that implementation of Telehealth in the Saudi health sector would have a long-term positive contribution.

In addition, the results of the survey that was conducted for this research paper showed that most of the participants agreed that it would be useful to monitor the patients’ conditions remotely. Also, most of them mentioned that they would use Telehealth if they had the opportunity to do so. In addition, Telehealth could help the Saudi health sector in reducing the patients’ waiting time and could make its services more reliable and fast. Telehealth also could be helpful in reducing the cost of the health industry in Saudi Arabia. Moreover, the data analysis showed that Telehealth service could increase the quality of the Saudi healthcare services.

In addition, the researcher believed that one of the most important reasons for the Saudi health sector to have Telehealth was that most of the providers in the country have good experiences and skills in dealing with technology. This would make the process of establishing Telehealth in the country easier. Then, the Ministry of Health would not spend more money to provide courses for its providers to teach them how to deal and use the technology. Finally, the researcher thought that MOH should provide Telehealth since most of the providers who participated in the survey said that they would like to use Telehealth and do video and audio consolations with their patients. All of these reasons make it important for the Saudi health sector to have and provide Telehealth service.

**Recommendations**

At this point, the researcher believed that having logical recommendations can help in implementing the Telehealth service in Saudi Arabia appropriately. Thus, the upcoming six recommendations were made based on the findings that were reached by the researcher in chapters two and four. The researcher assumed that these recommendations must be
considered by the Ministry of Health before applying Telehealth. This could lead to more positive results of the implementation of the technology in the country.

First of all, any new service must have a clear vision and mission in order to be established correctly and lead to implementation of it successfully. For this reason, the Ministry of Health must create a vision for establishing Telehealth that would show where MOH wants to go by having such a service and how this service would contribute to the achievement of its goals. This first step, which is setting a vision, could be helpful in identifying and understanding the strategies that must be followed in order to establish the service appropriately.

Secondly, any new business must start with specific measurements that would contribute to achieving its goals successfully. For example, the researcher believed that MOH should have short and long term financial plans because financial consecrations are critical for any business even if they are not the major objective of it. This could help MOH to know where it stands financially, and how much it needs to spend to establish Telehealth.

Another recommendation for establishing Telehealth in Saudi Arabia would be creating a proper work environment. It would be important to provide the necessary equipment and requirements that could help the providers to do video and audio consultations with their patients. For example, MOH would need to establish rooms in its hospitals that contain devices that help the providers use the technology effectively. This would lead to the successful establishment of Telehealth in the country.

In addition, MOH should provide courses for its providers all over the country before establishing Telehealth. It would be good for the Ministry of Health to provide these courses for its employees to help them gain an idea about Telehealth. Most of the physicians and nurses who participated in the survey did not know the correct meaning of Telehealth. Accordingly, these courses would play a significant role in adopting to the new service. Also,
it would not be appropriate to establish the service when most of the providers in Saudi Arabia did not have basic ideas about it. Hence, these courses would have positive effects on establishing the service in the future.

Moreover, training programs are a very important thing that MOH must provide for its employees in order to make them use and deal with the service appropriately. Since Telehealth has not been provided in the country so far, the researcher assumed that most of the providers would not know how to use it appropriately. Another reason for providing training programs would be because most of the providers did not know what Telehealth is. Obviously, they would not know how to use it correctly. Thus, these training program would be very helpful in establishing Telehealth and achieving its goals.

Finally, considering the ways of implementing Telehealth in the country could contribute to the success of the service. For instance, MOH could start providing the technology in one city at the beginning. Then, it could expand the scope of the service gradually. This could help the ministry to figure out any mistakes and problems in the implementation more easily than if it would provide the service in more than one city immediately. Also, solving the problems and making the necessary changes would be easier in this situation. At the end, the researcher believed that all of these recommendations could make a huge difference in implementing Telehealth in Saudi Arabia.

**Future Research Suggestions**

Further research would also be needed in regards of implementing Telehealth in Saudi Arabia in order to support the results of this research paper and make it more reliable. A few improvements should be made in future research and studies that will examine this issue. First of all, future researchers should consider using a larger sample size, comprising physicians and nurses from various hospitals across the country. This would help the
researchers to achieve more generalizability, make their results be more dependable and represent the whole population accurately.

Also, the researcher believed that the forthcoming research must provide and indicate techniques and ways that would help the health sectors to apply the service in the selected industry. One of the research questions that the researcher suggested to be indicated in the future researches is, “How can Telehealth be applied into healthcare sector?” This could help in achieving the reliability that the researcher was looking for. In addition, this could reduce the time that the health providers may spend in finding ways to implement the new service.

Moreover, the time of distributing the survey of this research was not the most appropriate time because they had spring break during the same weeks the survey was conducted. Thus, many nurses, physicians, and specialists were on their vacations, which affected the number of participants who attended the survey. Hence, the researcher suggested that the future researchers must take into consideration the formal vacations in the country before distributing the surveys. Then, they could choose a more applicable time that would allow the participants to have enough time to take the surveys.

Furthermore, the future researchers could also do financial analyses for the hospitals that would be included in their research. These financial analyses could include comprehensive estimates of both capital and operating costs for the past five years in the same hospitals that the surveys and the interviews would be conducted. This information could be more helpful in figuring out the impact of Telehealth on the healthcare cost and how it could help in reducing it. The researcher thought that this was another way that may help the future researchers to find critical answers for their research questions.

Finally, the researcher suggested that the future research may include additional data in order to strengthen the studies. For instance, the researchers could conduct interviews with the patients in order to know their opinions about the service. The researcher believed that it
would be important to interview the patients because they would be the people who will benefit from this service. Without them, there would be no need to provide this service. It would be good to interview them in order to provide information about Telehealth for them directly. In Saudi Arabia, most of them have no idea about this service, so it would be good to talk to them face-to-face, tell them about Telehealth, and receive their feedback immediately. All of these suggestions can help the future research to be done more effectively.
Definition of Terms

This section includes definitions of some of the key terms that were used in this research paper.

_A Home Telehealth program (HTP):_ This is a program that was established using internet video-links to facilitate a specialist Pediatric Palliative Care Services (PPCS) consultation directly into families’ homes (Bradford et al., 2014).

_E-health:_ It refers to all forms of electronic health care delivered over the Internet, which range from informational, commercial, educational products to direct services offered by professionals (Maheu, Whitten, & Allen, 2002).

_Health Informatics:_ This is the practice and technology of collecting, storing, and analyzing health care data electronically and transferring data between computer systems (Health Informatics, 2012).

_Health Telematics:_ It refers to a technological discipline that has as its focus those health-related activities that require information and communication technologies (ICT) to transmit information across significant physical distance. It is one of the newest and most powerful weapons in the high technology arsenal available to society in the struggle to secure better health status for its citizens (Brauer, n.d).

_Teladoc:_ This is a company that provides a network of board certified physicians who deliver cross coverage consultations for minor medical issues. (Gingrich, Boxer, & Brooks, 2010)

_Telecare:_ It is the term for offering remote care of elderly and physically less able people by using communications technologies, together with home measurement and monitoring devices, to evaluate specific health parameters of the patients and provide them with advice or feedback about their condition (Telecare, 2009).
Telehealth: This is a technique that provides health services and information through telecommunication technologies by video and audio communications in private rooms as much as if it is a face-to-face consultation between patients and physicians (IEMML, 2013).

Telemedicine: It is a branch of Telehealth that consists of provision of consultant services by off-site health care professionals to those on the scene; diagnosis and treatment can be done at a great distance through different methods such as the videoconference or rapid transmission of digital files (Telemedicine, 2003).

The Behavioral Telehealth Center (BTC): This is an example of a center that offers comprehensive behavioral health assessments to assist in treatment planning and referral management (Possemato, Bishop, Willis, & Lantinga, 2013).
References


Appendices

Appendix A  Permission to Conduct Study
Appendix B  Survey Consent Form
Appendix C  Survey
Appendix A

Permission Letters

Date: 1/25/2016

Dear Ms. Sabreen,

I have reviewed your survey questions and agree that it would be beneficial to have the Telehealth service in our entity. It is an interesting topic, and you have my permission to use our doctors to gather your data. Please show this permission letter to the relevant units.

If you have any questions regarding this letter of approval, please give me a call at +966563235588.

Sincerely,

The general manager

Ayman Salem Ajeeb
To whom it may concern:

This letter is to conform you that the Committee of Medical Ethics at Al-Noor Specialist Hospital has reviewed and supports the research study of the master’s researcher Sabreen Saleh Batarfi. She will be collecting data that include surveying physicians and nurses. The study titled “The impact of Telehealth service on healthcare cost and quality of the Saudi health sector”. The study’s serial number is 28437.

Mrs. Batarfi will have our support to conduct her study. This study must be coordinated with and supervised by the department of quality at Al-Noor Specialist Hospital.

If you need any further information, please contact us.

Regards,
Dr. Kamal Balkhoyor
Chairman of Ethic Committee
Al-Noor Specialist Hospital, Makkah, KSA
Research Review Application approval/S. Batarfi

Dear Sabreen,

Your Research Review Application has been reviewed and approved. You may start your data collection. This approval will not expire as long as your topic and methodology remain unchanged. If your topic or methodology changes, please submit a new Research Review Application and supporting documents to your instructor by e-mail.

Please contact your instructor if you have any questions. Also, be sure to check with your instructor concerning the due dates for your project.

Good luck with your project. This is the only notification you will receive. Please keep a copy for your records.

Kim Gribben

Assistant Director, MSA Program

Christina Prout
Administrative Secretary Master of Science in Administration Program
Rowe 222, Central Michigan University, Mount Pleasant, MI 48859
*: 989-774-6525 6: Fax 989-774-2575
1-800-950-1144, ext. 6525
*: prout1cl@cmich.edu
8: Visit us online!

WARNING: This message (including any attachment) may contain confidential information and is intended only for the individual(s) named. Please do not distribute, copy, or forward this e-mail without the permission of the sender. Please notify sender if you have received this e-mail by mistake and delete it from your system. Thank you.
Appendix B

Survey Consent Form and Cover Letter

Date: February 22, 2016

Dear Participant:

My name is Sabreen Batarfi and I am a graduate student at Central Michigan University. For my final project, I am examining the impact of Telehealth on healthcare cost and quality of the Saudi health sector. Because you are working in the health sector, and you will be the persons who would use this service the most, I am inviting you to participate in this research study by completing the attached survey.

The following questionnaire will require approximately 10-15 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. Copies of the project will be provided to my Central Michigan University instructor. If you choose to participate in this project, please answer all questions as honestly as possible and return the completed questionnaires promptly by clicking on the survey link found at the end of this letter. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding the impact of Telehealth on the Saudi health sector, the benefits of it on the healthcare services, and how it can reduce the cost and increase the quality of the services provided. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below. Please feel free to e-mail me if you would like a summary copy of the study.

Please note that if you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the MSA Program by calling 989-774-6525 or addressing a letter to the MSA Program, Rowe 222, Central Michigan University, Mt. Pleasant, MI 48859.

Sincerely,

Sabreen Batarfi
+1(999)444-8373/Batar2ss@cmich.edu
Dr. David Freed
+1(517)290-0564/freed1de@cmich.edu

Please click the following link <https://www.surveymonkey.com/r/ooona88> to access this web-based survey.

Thanks for your participation.
Appendix C

Survey Questions

1- How many years have you been in the healthcare profession?
   o 5 years and below.
   o 6 to 10 years.
   o 11 to 15 years.
   o 16 years and above.

2- The length of time that you usually take to meet a patient.
   o 10 minutes or less.
   o 11 to 15 minutes.
   o 16 to 20 minutes.
   o 21 minutes or more.

3- Usually, patients re-make an appointment and visit you again
   o Once a week.
   o Once a month.
   o Once every three months.
   o Twice a year.

4- The broadband service at your primary place of work is
   o Reliable and fast.
   o Reliable but slow.
   o Unreliable.
   o Not sure.

5- Telehealth provides healthcare services through:
   o Voice communication between physicians and patients.
   o Video and visual communication between physicians and patients.
Both video and audio communication.

6- Do you think, it will be useful to monitor the patient’s condition remotely?

- Very useful.
- Somewhat useful.
- Not useful.
- Do not know.

7- Do you think, Telehealth service will be useful in treating patients?

- Not useful.
- Rarely Useful.
- Always useful.
- Not sure.

8- If you have the opportunity to use Telehealth service, are you going to use it:

- Always.
- Sometimes.
- Rarely.
- Never.

9- Do you think, having the ability to have secure consultations with your patient via a video and audio-link will be useful:

- Always.
- Sometimes.
- Rarely.
- Never.

10- Your experience and skills in using technology:

- Excellent.
11- Telehealth can increase the quality of healthcare services in Saudi Arabia.

- Totally agree.
- Somewhat agree.
- Disagree.
- Do not know.

12- In your opinion, do you think that Telehealth is going to affect the cost of the healthcare services by:

- Reducing it.
- Increasing it.
- Making no changes on it.