



# Telehealth Medical Insurance System (TMIS) for Pandemics Requirements and Traveling Difficulties

Aliaa Humoud Al-Ghaithi<sup>1</sup>, Aziza Abdullah Al-Hinai<sup>1</sup>, and Mohammad Hameed AlTaei<sup>1\*</sup>

<sup>1</sup>College of Computing and Information Sciences, University of Technology and Applied Sciences (UTAS),  
Suhar, Sultanate of Oman

\*Corresponding author

## Abstract

Medical insurance system has been and is still the most necessary service for all people. It is one of the most important type of insurances that protects people's health from long-term and short-term risks, and pandemics. Due to the current situation of Covid-19 and the increasing costs of medication, such system is very important and needed nowadays. On the other hand, Telehealth technology and Telemedicine applications have proven their positive role in preventing the spread of epidemics and diseases due to physical spacing, decreasing the visits to the health institutions, and reducing travels abroad; besides, it helps in obtaining a high-quality diagnosis and treatments from different places worldwide.

The goal of this project is to design a prototype of a new system that combines medical insurance system with Telehealth technology to get a Telehealth Medical Insurance System (TMIS) that facilitates communication between the patients and medical providers remotely through insurance companies without visiting health institutions unless for necessary cases. This new system will first guarantee protection rules of dealing with pandemics such as: social distancing, telediagnosis, and preserve patients from infection by some viruses or other infectious diseases. Second, it guarantees medical treatments in a qualified and high-quality medical provider with lower costs and without travelling difficulties and costs. The implementation of this system will focus on finding the most suitable and secure way for patients via a protected website to do online communication with medical providers. It will also improve transactions for obtaining medical insurance and reduce pressure in hospitals and medical centers, as well as providing healthcare solutions that meet long-term needs. Thus, people living worldwide can easily subscribe to this system either individually or via their institutions, and they will have many benefits and options, it will cover their increasing medical expenses, decrease the cost of diagnosis and treatments and travelling, as well as increasing the quality of health care and protecting them from the pandemic issues.

**Keywords:** Healthcare system; Medical System; Insurance System; Telehealth

## 1. INTRODUCTION

Health insurance is unlike any other insurance in its needs and importance because healthcare should be urgent and cannot be delayed when you need. If you don't have car insurance, you can stop it and take the bus until you can afford to get your car fixed; while if you are sick, it is an urgent situation and cannot be

**Email addresses:** [s2017293057.soh@cas.edu.om](mailto:s2017293057.soh@cas.edu.om) (A. H. Al-Ghaithi), [s2017293090.soh@cas.edu.om](mailto:s2017293090.soh@cas.edu.om) (A. A. Al-Hinai), [mohammad.soh@cas.edu.om](mailto:mohammad.soh@cas.edu.om) (M. H. AlTaei)

postponed, ignored, or use alternative until you save up enough money to go to the doctor. Insurance is a means of protection from financial loss. It is a form of risk management primarily used to hedge against the risk of a contingent or uncertain loss. The premium charged by the insurer from the policyholder for the coverage set forth in the insurance policy that includes payments for medical diagnosis, radiology, surgical, prescription drugs, and any other medical services [1][2].

Health Insurance is a type of insurance that offers medical coverage to the policy holder for medical expenses in case of a health emergency. A health insurance plan chosen by the insured provides coverage for different expenses including surgical, day-care, and critical illness etc. [3]

From another side, the availability of the Internet and other computer and information and telecommunication technologies have affected the creation of more informed consumers and providers in the use of technology, which means that many jobs and services related to the people's health were developed and reached to a good quality, easier, high speed and secure. So, in the medical field, we found that Telehealth is the most important application that serves us. This means the distribution of health-related services and information via electronic information and telecommunication technologies. It allows long-distance patient and clinician contact, care, advice, reminders, education, intervention, monitoring and remote admissions. [4]

Therefore, if the medical insurance can be done online using Telehealth application, it'll save you fatigue, internal movements and travel abroad. In addition, it will be preventing the spread of epidemics and diseases due to physical spacing. All the companies and businesses in the world are racing to facilitate the challenges facing human beings and doing their best to provide the finest, easiest, and fastest services to the community especially those services related to public health. Technology has changed major sectors over the past 20 years including media, climate action and healthcare. So, we try to use modern technologies to overcome the difficulties facing patients and medical service providers. Over the past centuries, technology has become the savior of some national and international crises. This technological expansion has affected many areas of life such as health. [5]

Therefore, COVID-19 pandemic showed the value of the Telehealth system which provides remote patients with better access to healthcare. Technology makes it possible for these individuals to connect with health care providers, who can help them to identify signs of disease infection, guide them on how to manage their symptoms, and clarify any information about that disease [6].

So, and due to this importance of insurance and Telehealth, we saw it is necessary to propose and implement a new system which will facilitate the way of dealing with doctors and other medical providers and to serve patients in a better way and save them effort, money, and time.

## 2. TMIS' OBJECTIVES

We will try in this project to use and implement the important functions as services that provide the health care systems as online (remotely) services. This **Telehealth Medical Insurance System** is a secure way to provide services to patients in and outside the city's centers and it can also be national and international since it uses online services via the internet network, and it is managed through an insurance company which guarantees patients with qualified services at good prices.

The purpose of using these services is to help the elderly and people living in rural areas and avoid patients from social closeness and mixing with healthy people. This system will enable communication between the doctor, the patient and other medical providers. It can use private and public clinics. This report will provide and explain accurate and detailed information about our project. The main objectives of this project are:

1. Reducing time and effort for patients.

2. Enabling patients to receive diagnosis and medicine without going to the hospital.
3. Open new business to medical providers and fill the shortage in remote areas.
4. Getting medical services at competitive prices and less time.
5. Protecting people (patients and medical providers) from infection with infectious diseases.
6. Helping handicapped, elderly and people living everywhere to easily communicate with medical providers.

### **3. TMIS' IDEA AND SERVICES:**

The main idea of this system is to combine both insurance and Telehealth in one integrated system for patients which implemented on two levels national and international and focuses on how to link Telehealth technology with insurance systems and its capabilities to get a homogenous system that can help people any time and especially during the pandemics and crises by secured health care. It is to protect both patients and medical provider from the diseases' infection and, at the same time, to provide low cost and qualified medical services through insurance companies that manage the medical services in a good, secure, high quality in a decreased cost.

The job of this system is to support a large group of people, especially people who are unable to reach the hospitals and clinics to get diagnosis and medication easily and quickly and it will be more appropriate during pandemics and decreases pressure on hospitals and clinics. Patients can easily subscribe online in this insurance system and use its services by communicating remotely with registered medical providers in this system using a secure, responsive, and effective methods.

This system has different policies and plans of dealing remotely between patients and doctors or any other medical services providers, its front end created by using HTML, PHP and which is suitable for different telehealth applications such as: Telediagnosis, Tele-monitoring, Teleradiology, and Tele-pharmacy, and introduce the following services:

- Insurance employees communicate with patients and medical providers to manage insurance information, track payment, and other administration services.
- Hospital staff schedule appointments for the patients with medical providers.
- Doctors can use video meeting with patients for diagnosing and he can save prescriptions in the system database after diagnosing.
- Pharmacists can reach the prescription in the database or receive it directly from the patient.
- Medical providers communicate and consult each other through this system.
- System admin manages users' files, add medical providers, create accounts, and receive feedback and problems.

### **4. TMIS' REQUIREMENTS:**

During the analysis phase of this system, we started by discussing and defining all kinds of requirements for this system to make our system more feasible, flexible, speed, and fulfilling, we will summarize some of the necessary requirements for TMIS in the following:

#### **4.1 User and System Requirements**

In the following table we will summarize some of the important user and system requirements for our system TMIS:

TMIS System Requirements	TMIS User Requirements
Simple and understandable interfaces for all users to communicate and do their jobs.	New patients should register by themselves and should feel comfortable using the system.
Enable patients for easy search in different medical insurance plans for patients	The system should be easy to be used and fulfilled by patients' needs.
Secure, reliable, accessible, and uncomplicated system.	Patients needs internet access, and he should know how to deal with the system interface.
Medical providers can deal with all patients and diseases and must be punctual.	Multiple users should be able to access the online insurance system at the same time.

**Table (1) TMIS System and User Requirements**

#### 4.2 Functional and Non-Functional Requirements:

They are the most important requirements which must focus on. There are many such requirements for different types of users that will be included in our online medical insurance system TMIS. Therefore, they are summarized in the following table:

TMIS Functional Requirements	TMIS Non-Functional Requirements
Enable users to login by valid username and password.	The system needs to be accessible 24 hours a day, 7 days a week.
Enable patients to select and subscribe desired plan and do online payments.	The system must be able to recover from failures like power down.
Enable patients to do online payments for premium and medicine.	The System should keep all the personal and medical information for users secured.
Enable patients to communicate with medical providers, insurance employees, and admin.	The system should be supported by both Arabic and English languages.
Provide patients with any documentations regarding his medical case.	The system should send advertising and promotional flyers by email or messages.

**Table (2) TMIS Functional and Non-Functional Requirements**

## 5. SYSTEM PROTOTYPE & DESCRIPTION

Figure (1) will present the prototype of our Telehealth Medical Insurance System (TMIS) In general we can say that this system consists of 6 main parts (Patient, Doctor, Admin, Hospital, Pharmacy, and Insurance company). Each part is responsible for some service or job. All of them are connected through a secured network and linked to sharable database.

Figure (2) shows most of the activities and services in this system that focus on the patient as the pivot of this system, patient is considered as the main part of the system who deals with all parts through specific services.

Figure (3) will show the context diagram of our system in which we explained the main functions and services of this system and how all the users communicate together through these services. The insurance companies manage the medical services in a good, secure, high quality on a decreased cost.

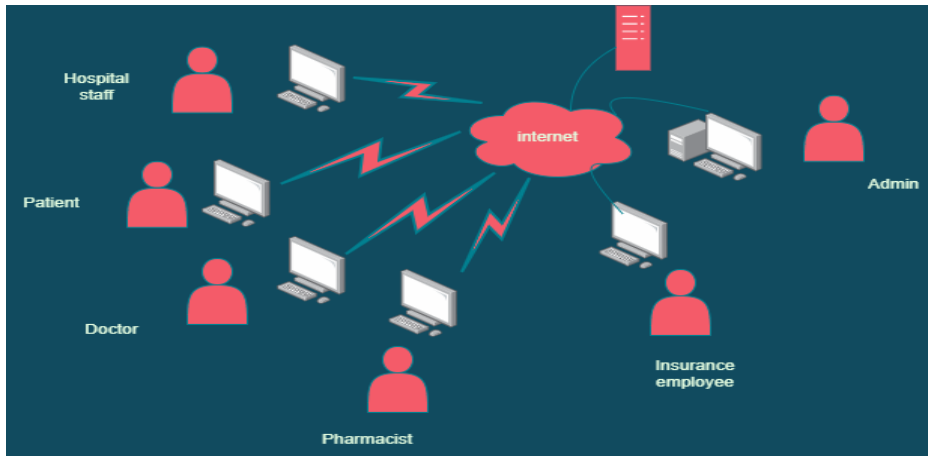


Figure (1) TMIS' Prototype

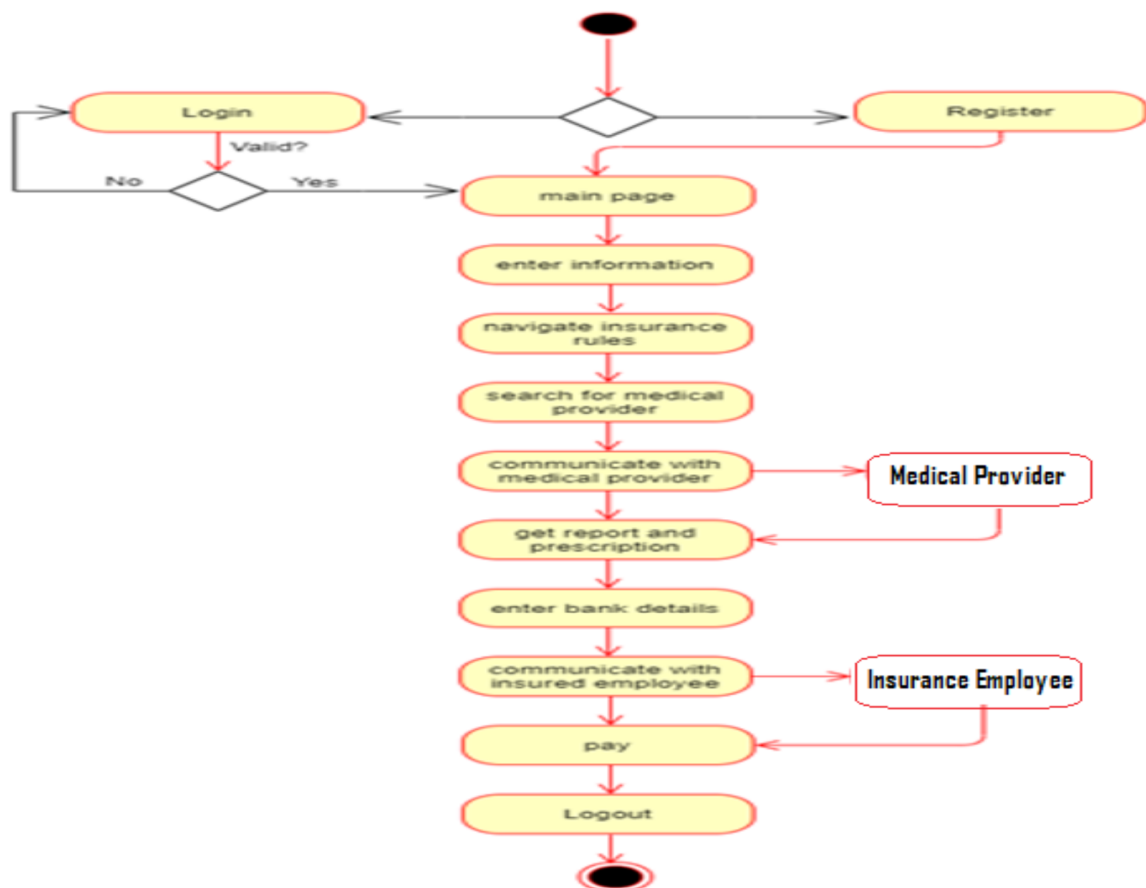


Figure (2) TMIS' Patient Activity Diagram

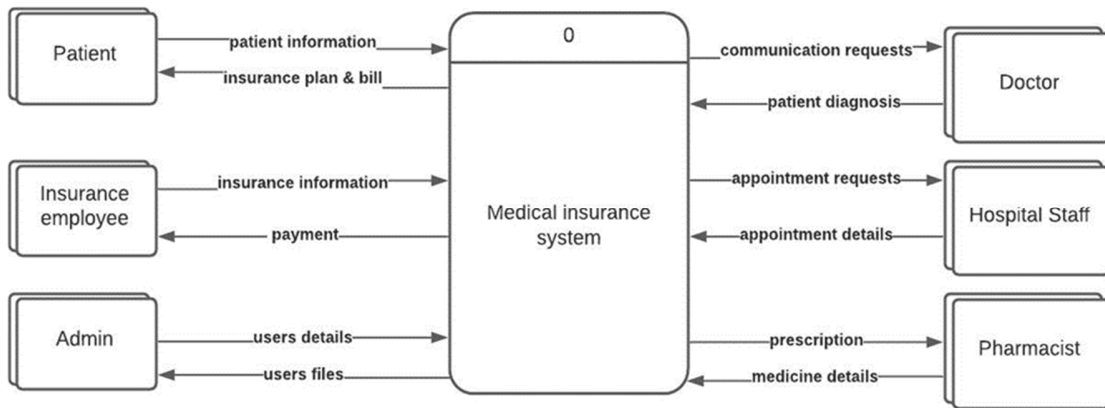


Figure (3) TMIS’ Context Diagram

### 6. TMIS Implementation and Results

Telehealth as an expansion of telemedicine, but unlike telemedicine, which has a narrower focus on the curative aspect, it encompasses the preventative, promotive, as well as the curative aspects of the field. [7] So, in order to implement this system a website was created using HTML, CSS, PHP, SQL, JavaScript, and Bootstrap. Our system provides friendly user interfaces for each user. The system has four main categories of users: administrator, insurance employee, patient, and medical provider (doctors, pharmacists, hospital staff). Some screens are shown in figure (4).

The patients are able to choose their preferred medical provider, insurance plan, and subscribe to the insurance plan. They are also able to communicate with both the system admin and the insurance company. The insurance employee deals with medical providers and patients, upload insurance information like policies and prices and track payments. The hospital can manage patient’s files, schedule appointments, view and prepare reports and update billing information.

Doctors can view the patient records, make diagnosis, and write prescription or approve some prohibited medicines in the out-prescription. Pharmacists can retrieve prescriptions from the system database or receive the out-prescription from the patient and send medicines to patients, also he can coordinate payment with insurance companies. An administrator can manage users’ information, create accounts, receive feedback, and respond to users' problems.

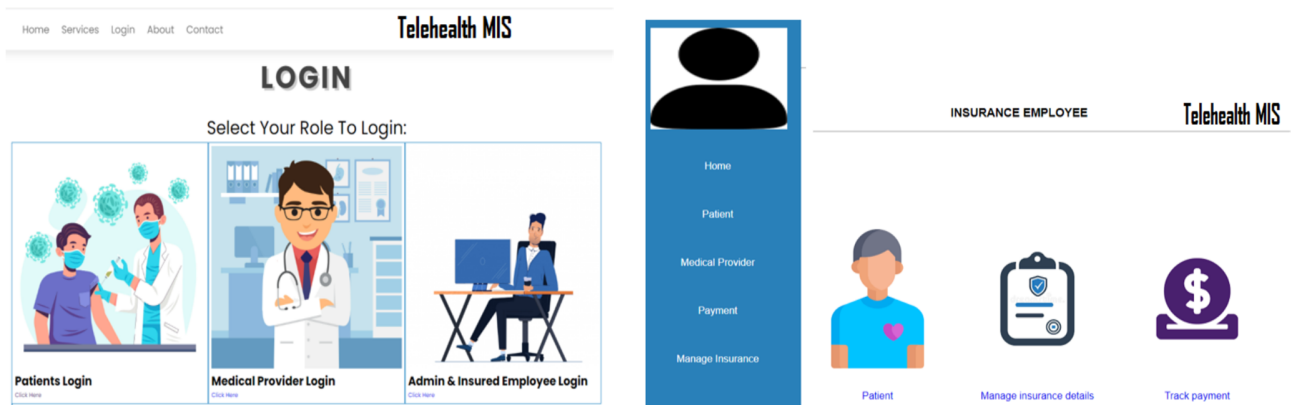


Figure (4) TMIS’ Implementation Screens

## 7. CONCLUSION

To sum up this paper, we designed and implemented a medical system which combines both medical insurance services and Telehealth services in one integrated system that enables all users: patients, insurance employee and medical providers to communicate remotely through an internet website and provide patients by online medical services, by using this technology we protect both patients and medical provider from the diseases' infection and at the same time to provide low cost and qualified medical services through insurance companies. This system is very important and needed for secured health care especially during the pandemics and crises and to spare patients from travelling difficulties.

This system has different insurance policies and plans for dealing between patients and medical providers which can provides patients with some online applications such as: Teleradiology, Tele-monitoring, Teleradiology, and Tele-pharmacy

In conclusion, the medical insurance system is one of the most important types of insurance that protects people's health from short-term and long-term risks. When we combine the insurance with the Telehealth system, we will get more advantages which will be requested nowadays due to Covid-19 pandemic.

Above all and that from the side of insurance, the insured patient will be able to choose and subscribe with the health insurance plan and do payment online, and get their diagnosis, prescriptions, and reports either directly with the insurance company or through his institution.

Finally, our system can strive to provide all patient's requirements in one place and is easy to access. Therefore, in our system, we can provide qualified services with a high quality and appropriate fees for all segments of society.

## REFERENCES

- [1] JULIA KAGAN. *What is health insurance?*.  
Available: <https://www.investopedia.com/terms/h/healthinsurance.asp>, Mar 06, 2022,
- [2] American Heart Association. *Why is Health Insurance Important?*, Available:  
<https://www.heart.org/en/health-topics/consumer-healthcare/why-is-health-insurance-important>, Dec 3, 2020.
- [3] Policybazaar Insurance Brokers. Available: <https://www.policybazaar.com/health-insurance/health-insurance-india/> , 2020.
- [4] *Telehealth - Wikipedia*, From Wikipedia, the free encyclopedia.
- [5] World Economic Forum. *How has technology changed - and changed us - in the past 20 years?*  
Available: <https://www.weforum.org/agenda/2020/11/heres-how-technology-has-changed-and-changed-us-over-the-past-20-years/>, Nov 18, 2020.
- [6] Elbeddini, A., & Yeats, A. Pharmacist intervention amid the coronavirus disease 2019 (COVID-19) pandemic: from direct patient care to telemedicine, *Journal of pharmaceutical policy and practice*, **13**, 1-4 (2020).
- [7] Liezl van Dyk, *A Review of Telehealth Service Implementation Frameworks*, Jan 23, 2014. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3945538/>