



UTAS Telemedicine Clinic

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UTAS Telemedicine Clinic (UTAS Telemed)

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ABSTRACT

Telemedicine is a new technology in healthcare systems where it aims to create a channel of online communication between the patient and the healthcare provider. This technology offers healthcare services remotely for those who live far away from the healthcare center such as hospitals and clinics. The patient will have accessibility to healthcare services and acquire all the requirements to meet its need within its on resident.

The goal of our project is to build (UTAS Telemedicine System) for the campus clinic, which is an online medical system within all campuses of our university UTAS (University of Technology and Applied Science) in Oman, this system will connect all local clinics in UTAS campuses by one system of online medical services. So, each clinic in each campus will serve patients (students and staff) either physical diagnoses by the nurse or Telediagnosis (and Teleconsultation) by the doctor remotely via the nurse. These online medical services of this system will be conducted via a protected website to establish a live connection between the doctor, nurse, and the patient, and manage all other necessary related services such as reserve appointment, open medical visit, authorize sick leaves, and receiving monthly medicines.

This system (UTAS Telemed) will target the students and the administrative and academic staff of the University of Technology and applied science, it will save their time instead of going outside the university to the clinics or hospitals and spend a lot of time in waiting and transportation, also it will officially authorize the sick leaves for them. The patients (Student and staff) will have access to this website after they are creating (Registering) an official account for their profile, which will contain all the necessary information related to them, this system will be beneficial for both the patient and healthcare provider.

Keywords— Healthcare system, Telediagnosis, Online Medical System, Telehealth services.

1. Introduction

The term "Telemedicine" has a broad definition that includes all forms of remote medical care. Currently, the telemedicine system is widely used in Europe countries such as Norway, Australia, Britain, Switzerland, and Canada and some developing countries such as India, Korea, and China, Telemedicine, eHealth, eGovernment, eCommerce and eLearning are now part of 21st century life, many specialties are thriving in the U.S. by providing services through telecare. Currently, there are over 200 telemedicine networks, with more than 3,500 service sites in the U.S. There is a need to expand services of telemedicine in developing countries. Statistics shows the number of psychiatrists per 1,000 population in Pakistan and India are 0.31 and 0.30 respectively, which are significantly low figures [1].

The present analyses found a lack of innovation in the field of digital health in the Arab countries. Many gaps in research were found in Arab countries. Telemedicine research is still in its infancy in the Middle Eastern countries. Recommendations include diversification of the research landscape and interdisciplinary collaborations in this area [2].

The majority of telemedicine integration projects were applied during the clinical years. For instance, the University of Nebraska has integrated telemedicine into its doctoring stream, whereas the University of Maryland teaches fundamental telemedicine concepts during lecture time [3].

Telehealth can be used effectively for students in the schools and universities, Telehealth services can provide many benefits to student patients, including [4]:

- Improved access to and availability of different types of care. Students who are already attending school will have easy access to health care providers, including specialists.
- Reduced time away from class. Students can attend a telehealth appointment in the school environment and quickly return to class.
- Reduced time and travel costs for the parent or guardian. Patients will have to travel to their health care provider's office less frequently.

Telehealth has the potential to increase access to primary, specialty and mental health care for students, particularly marginalized youth that might otherwise go without access to care due to various socioeconomic factors. Transportation barriers are reduced for youth, parents, and guardians. Students and families whose primary language is not English may also be able to access more culturally and linguistically appropriate care through telehealth options. Telehealth can also

provide access to types of providers and specialists that may not be available in the immediate community [5].

2. Need for UTAS Telemed System

The health system is considered as one of the main services which should be available in high quality in many countries, and governments spend a big budget for it. Telehealth services are one option for supporting health systems in some countries especially those countries whose people majority live in remote or rural areas, or have limited mobility, time, or transportation, and Oman is one of these countries. Also, the restrictions of movement in many parts of the world due to COVID-19 has caused governments to recognize the potential of telehealth. [6]

The health center at your university might also offer telehealth services for students. This option means you can get the help you need at the right place and time without leaving your university and losing your lectures and time [7]. So, telehealth will keep people safe from infectious diseases by reducing the need for in-person visits.

One option of developing the health care system in Oman is to extend the use of Telemedicine, so we suggested this system that uses some Telemedicine services in the university campus, this system will enable students, teachers, and other employes of all branches of the university of Technology and Applied Sciences in Oman to get primary diagnosis and medication in their campus without going to the clinics outside the university and waste their time.

2. UTAS Telemed Objectives

The proposed system in this research is a management medical system that enables students, staff, employees in UTAS university to rely on for many medical services, diagnosis, and consultations, they can do all these services in the clinic inside their university campus online without visiting the doctor in the hospital or his clinic and spend all their day in transportation and waiting in the hospital for simple medical cases. This system will be saving time for students and teachers, handling emergency cases, online communicating patients with doctor, and provide students with medicine and sick leave officially.

3. A Proposed Model for UTAS Telemed

To overcoming the waste of the time in waiting or moving from the university to the clinics and hospitals and saving effort on patients and to avoid infection from social closeness in times of

disasters and pandemics, we have proposed in this paper a prototype design of a Telemedicine system that provides students, teachers and employees with advanced online diagnosis with the doctors while they are in their work in university campus without need to move outside the university for the hospital and wait a long time and will be affected by the Infectious diseases, as well as to issue sick leave to them officially. In the following we will try to explain the components, structure, and communication concepts of this system:

3.1. UTAS Telemed Description

The system will focus on establishing a direct connection from the campus clinic via nurse between the UTAS patient (students and employees) and doctors remotely for telediagnosis, or between the nurse and doctor for teleconsultation daily for difficult medical cases or emergency cases, these connections will enable patients to obtain medical care without the need for hospitalization.

Through this system the patients of UTAS can contact the clinic inside the university branch and do diagnosis with the nurse of the branch and he can contact online with the doctor via the nurse workstation and make telediagnosis and he can get the medicine from the Mini pharmacy of the branch. While if the case of the patient needs specialist the doctor can referral him to the specialist in the polyclinic or hospital and fix the date and time.

3.2. UTAS Telemed Architecture and Network

Consider our suggested system's prototype in figure (1), which consists of several Campus Clinics moderated by the nurse in each campus, with one doctor dealing with those nurses, the doctor can refer difficult cases to the specialists in the hospital. All parties are connected via internet-based telemedicine applications, and all data is shared via a central database. In the following sections we will describe the components and users of this system. This section will explain the prototype that proposed (UTAS Telemed) which can be used in the university to provide patients with high quality online medical services and to compensate for the shortfall in the medical care system. Figure-1 explains the prototype and figure -2 explains the context data flow diagram of the system. In this system, the nurse and doctor can communicate with each other either for telediagnosis or for teleconsultation, doctors and nurses can update the medical file of the patient. In the following we will explain the role of each user of this system:

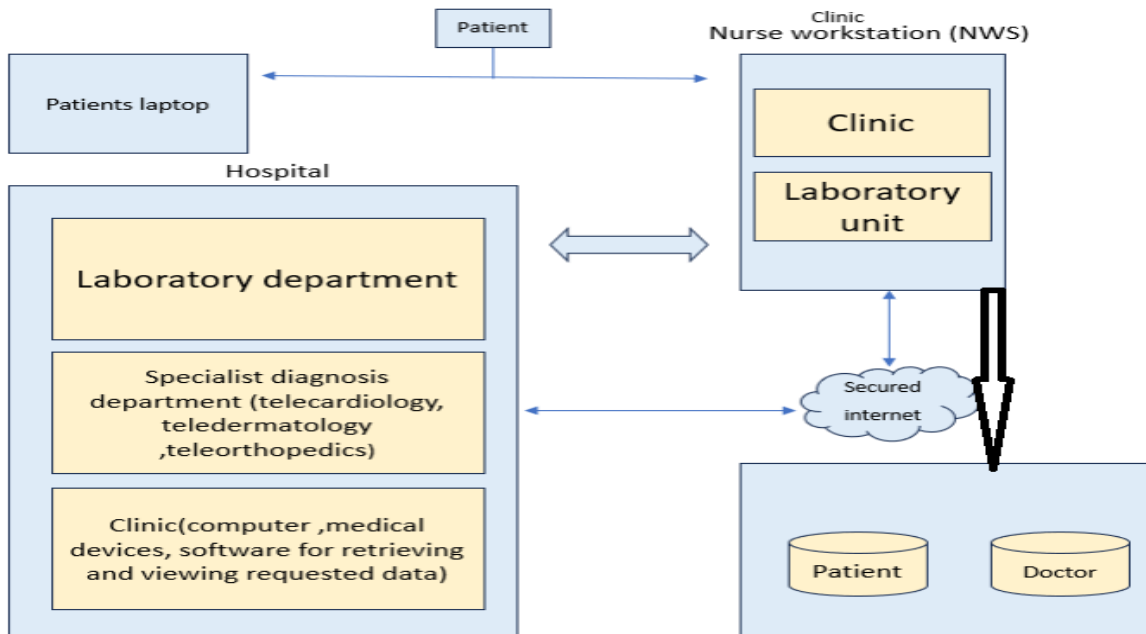


Figure (1): UTAS Telemed prototype design

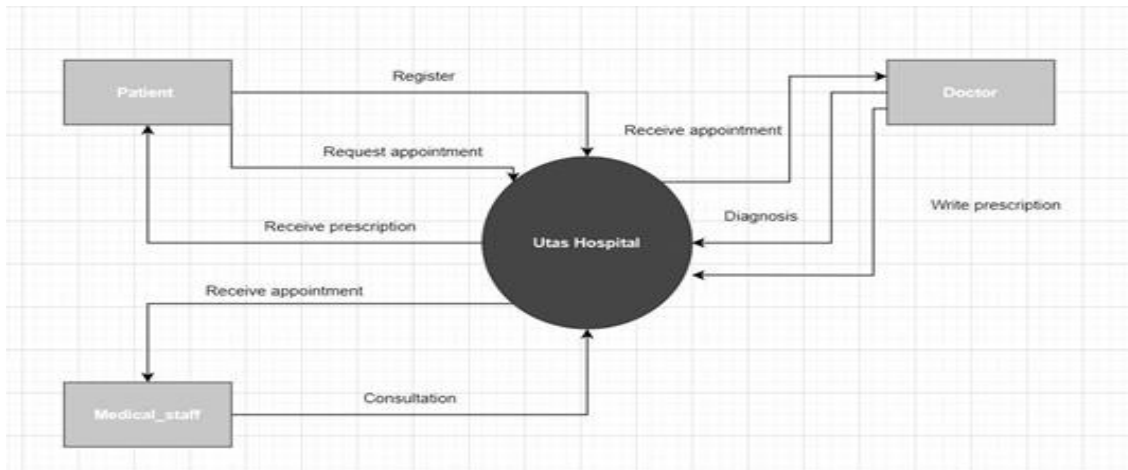


Figure (2): Context data flow Diagram for UTAS Telemed

1) Patient:

He is the student, academic staff, administrative staff in the campus, he can sign up to be a patient and receive a username and password, he can log in at any time to the patient interface and perform a variety of the tasks assigned to him, such as: update personal information, book an appointment with a nurse, communicate with the nurse, print reports, authorize sick leave, request monthly medicine, and more services as shown in the patient use case diagram in figure-3.

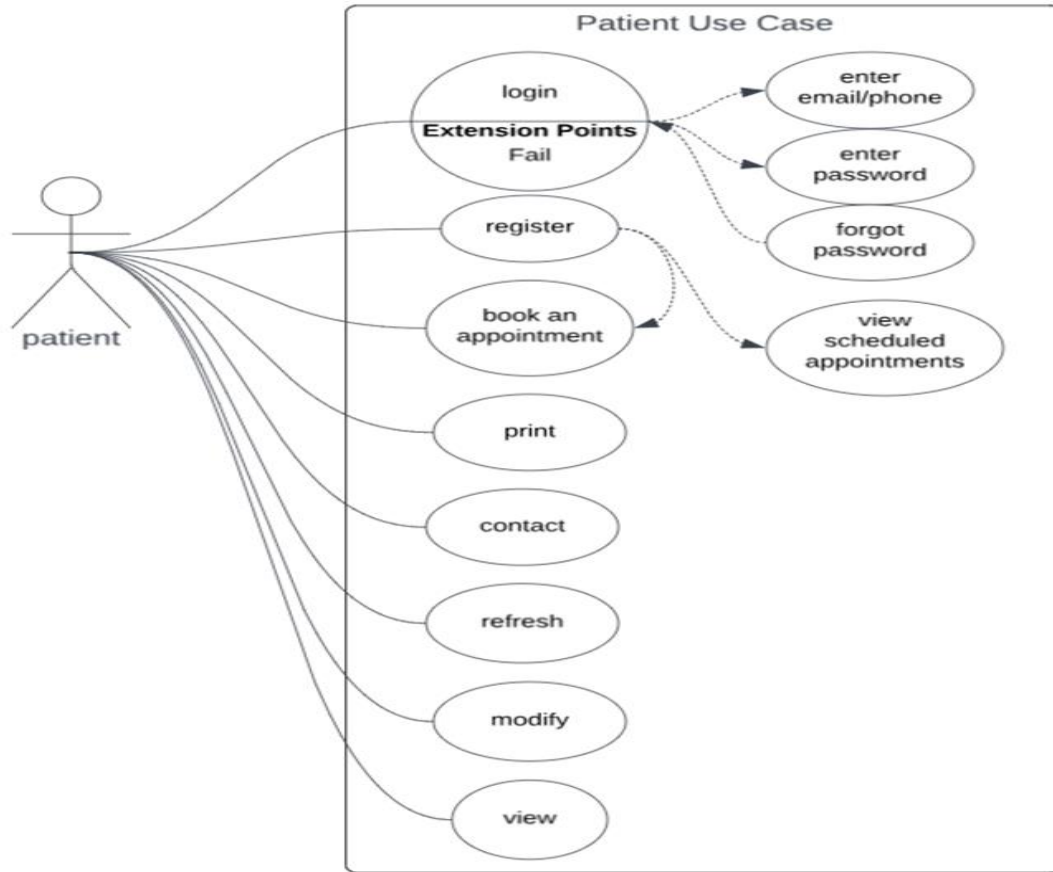


Figure (3): Patient Use Case Diagram in UTAS Telemed

2) Nurse:

She is the person in charge of the campus clinic, the administrator has registered her with a username and password, she can perform a variety of functions (such as modifying personal information, writing reports, contacting the doctor, scheduling a consultation and telediagnosis with the doctor, and so on).

3) Doctor:

The doctor in the clinic of the main campus communicating and controlling all nurses in the different campuses, he can perform a variety of functions (such as modifying personal information, writing consultation reports and prescription, contacting the nurse, scheduling a consultation and telediagnosis with the nurse, authorize sick leave, and so on) as shown in the doctor activity diagram in Figure-4.

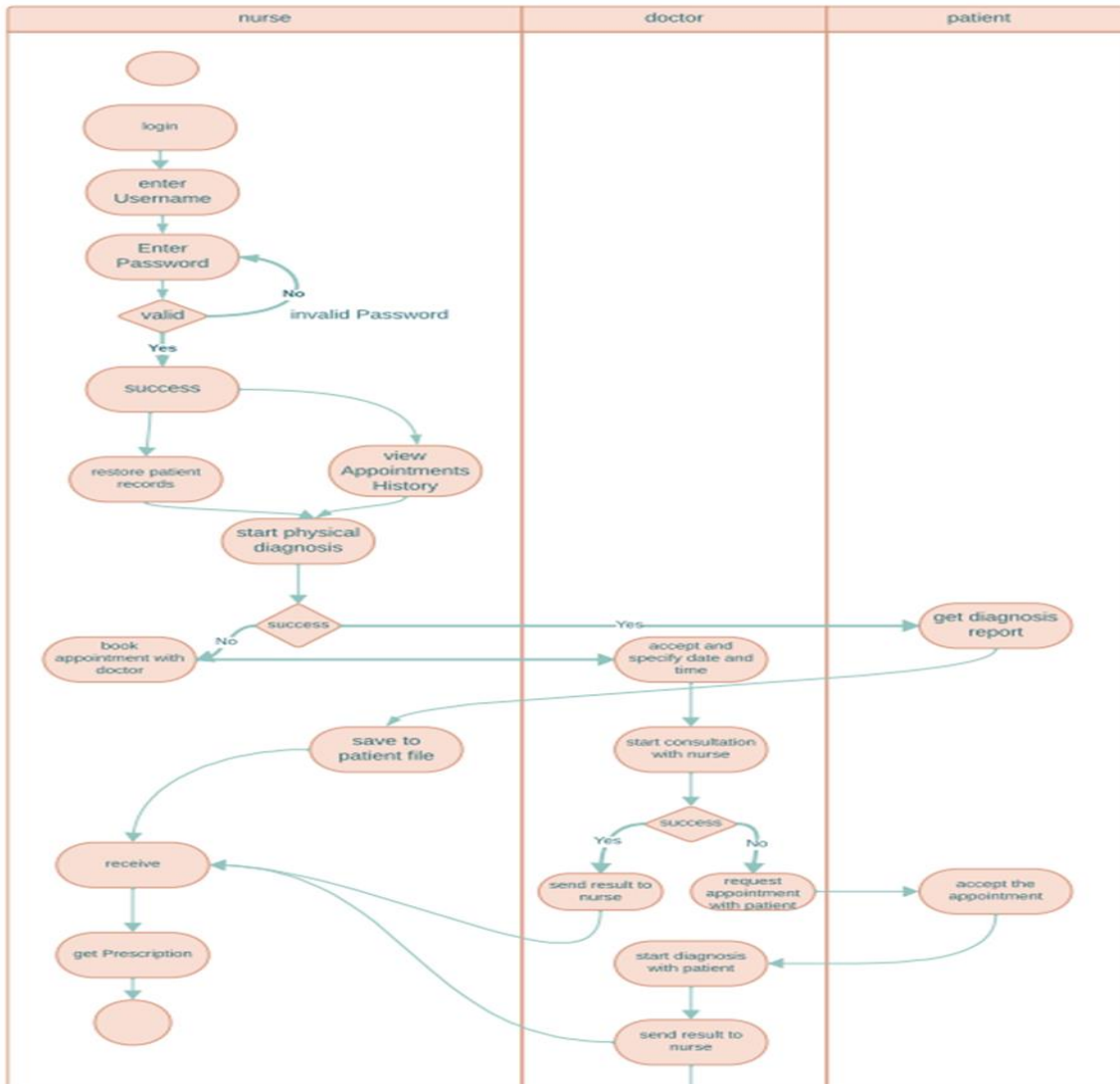


Figure (4): Doctor Activity Diagram of UTAS Telemed

4) Admin:

The principal person who is answerable of the system creation, protection, maintenance and add doctors, nurses, branches, and other main services and management.

3.3. UTAS Telemed Functionality and Services

The Functional Requirement demonstrates how the software will be able to operate the obligated functions to meet the user's need. In this case the system should be able to execute a set of function to deal with patient and medical staff (Doctor and Nurse) need such as, providing a secure channel to store patient information in the system and book an appointment online to have, these functions

are directly related to the system behavior , so the patient shall be capable of having a direct connection with the medical providers, booking and cancelling an appointment, capable of submitting, modifying, and deleting information, and the medical providers (doctor and nurse) shall be capable of conducting and executing several operations for the system and patient.

The following services can be provided to patients directly or indirectly in the university campus via using this system:

- booking appointments with nurse and conduct virtual visit via nurse.
- Saving patients from attending the clinic to forbid spreading contagious germs.
- Telediagnosis through the nurse on the campus.
- Teleconsultation will be easily conducted between the doctor and nurse.
- Getting the monthly medicine and authorizing sick leave.

4. Results and Discussion

The UTAS Telemedicine System (UTAS Telemed) aims to optimize the time of university students and staff, particularly during crucial periods like exams. By providing telehealth services, it eliminates the need for transportation and waiting in external clinics, ensuring efficient use of time. This system addresses various medical concerns remotely, including cold or flu symptoms, skin rashes, stomach aches, headaches, pink eye, prescription refills, stress, anxiety, and inquiries about COVID-19 and vaccinations. Through these telehealth visits, users can receive timely medical assistance, reducing disruptions to their schedules and enhancing overall productivity and well-being.

This system can be identified as multi-agent telemedicine system which has a good benefit, recently, the agents played essential roles in the practical programs of E-health, which includes the diagnosing system, facilitating and accelerating the treatment process and avoiding disorganized data system [7].

5. Conclusion

Since the time of students and staff inside the university is very important and critical, especially during the exams. So, to set up a telehealth visit and make online visit successful for sick students and staff and to get high benefits from the campus clinic in UTAS instead of going outside the university for hospitals and spend a lot of time waiting in the hospital and transportation we suggested this Telemedicine UTAS clinic. With this system the patients inside UTAS can get the

diagnosis and medication remotely from the central online clinic in Muscat. This project will exhibit a designed website which will carry the lead on creating a direct connection between the healthcare provider and the patient (remotely) by providing the services that the patient (student, teacher, employee) in UTAS campuses required from the healthcare provider via this designed website.

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