ABSTRACT

- Social distancing and quarantining are now standard practices which are implemented worldwide since the outbreak of the novel coronavirus disease pandemic in 2019.

- The project is entitled **'COVID19 PATIENT MONITORING'.** This application is to monitor the COVID affected patients who have been isolated in their home and monitoring them remotely. The patients are undergoing treatment from their homes since there was scarcity for the beds in the hospitals.

- The application should send live monitoring data from the monitoring devices to the doctor portal i.e. If the pulse rate or blood pressure rate, body temperature not inline with the recommendable range should send the alert to the doctor portal.

CHAPTER 1
INTRODUCTION

1.1 Introduction

The project of "COVID19 PATIENT MONITORING SYSTEM" also called as "Intelligent hospital management ". Now-a-days consulting doctor is a quite obvious thing in our day-to-day life, but the availability of the doctor during the time of our requirement is unpredictable. In order to overcome this issue, the proposed web application is made.

This application enables user to express their symptoms and issues. It then processes user's issues and symptoms to check for various health issues that could be associated with the symptoms given by the user. It will provide a facility for all the patients to get monitoring through this site, and check patients health condition i.e.; Active patients or Inactive Patients.

Can choose the doctor by our choice. It will display all the personal information of doctors like mail id of the doctors, it also includes registration of patient and the doctor. The management of the hospital concerned with the increasing effort in keeping the record of patient and recording their activities.

The hospital also keeps the information of the Active patients, Inactive patients, Management and information system, which may keep the record of each patient, employee and health condition like Blood Pressure rate, Temperature, Pulse Rate, etc. The hospital treats both indoor and outdoor patients. It has to maintain full information of the indoor patients as well as outdoor patients for the purpose of historical use. The software has the facility to give a unique id to every patient and every doctor and store the detail of the patients and doctors in the system and to get appointments. The user can search the availability of the doctor and detail of the patient by using the particular id in the user login. The hospital management system can be entered using the user name and the password. It is accessible either by administrators or receptionist. Only they can add the data with the database.

1.2 Research Challenges

The COVID-19 crisis is a typical example of the impossibility of establishing a single global technological solution to a given problem. To increase acceptability of digital technologies, the different cultural, moral, and religious backgrounds of users should be considered. With priority given to collective public health benefit and maintaining local social order during the current emergency ,digital measures can be intrusive and can erode individual freedoms. In some countries, a strong digital divide persists today, and vulnerable populations may be overlooked during the implementation of digital approaches. Digital solutions may be less frequently understood and used by people with low health literacy levels or by specific subgroups such as minorities, older individuals, or people who live in rural or low-income areas . For all these reasons, digital approaches can be received in very different ways when they are applied in high-income, medium-income, or low-income areas or when they are deployed in individualistic versus collectivistic countries.

Regarding telehealth, the challenge of implementing feasible systems lies with governments in most cases, as billing systems must be adapted. Telemedicine consultations must also ensure patient security in terms of data protection. Hence, close collaborations between different actors, such as health care professionals, health technology companies, and health politicians, must be ensured . Once such a system is running, both patients and health care professionals can benefit from better allocation of resources and adequate care, all with reduced risk of exposure. Telemedicine and digital technologies such as apps can also play larger roles in the present crisis not only to fight COVID-19 but also to address the frequent health issues associated with isolation or quarantine, such as psychological needs, mental health conditions, and physical inactivity. Lastly, some developing countries face major obstacles to the effective delivery of digital health solutions in rural and remote locations, such as incomplete or insufficient basic digital infrastructures, lack of sustainable funding to develop, operate, and maintain digital platforms, and high telecommunication costs.

Despite the benefits of using technology and its capabilities, there are shortcomings associated with the emerging information and communication technology (ICT) sector in healthcare. There is also evidence indicating that the technology itself can also be part of the problem. Neglecting the complications and challenges of the use of emerging technology in the healthcare field may be dangerous and have irreparable results.

1.3 Motivation

- Supports an improved healthy lifestyle of users.
- To accommodate the uploading of symptoms affected by COVID-19 from the comfort of their respective homes
- By using this technology we can minimize the number of emergency department visits hospitalizations and duration of hospital stays.
- This allows doctor to know about patient and their current activities.

1.4 Problem Definition

1. Lack of immediate retrievals: -The information is very difficult to retrieve and to find particular information like- E.g. - To find out about the patient's history, the user has to go through various registers. This results in inconvenience and wastage of time.

2. Lack of immediate information storage:- The information generated by various transactions takes time and efforts to be stored at right place.

3. Lack of prompt updating: - Various changes to information like patient details or immunization details of child are difficult to makes paper work is involved.

4. Preparation of accurate and prompt reports: - This becomes a difficult task as information is difficult to collect from various registers.

1.5 Objectives

Covid19 Patient Monitoring system is a system-based software. The software will be done using Java, JSP, Mysql, Maven, STS, JavaScript, HTML. It can used in the system as a utility. The user need not depend on third party software's to download multiple level links etc. The software can be used to download any levels of link as per users' settings.

The software is for the automation of hospital management.

It maintains three modules of user: -

1. Administrator Module
2. Doctor Module
3. Patient Module

1. **Administrator Module:** The administrator is responsible for maintaining information of doctor profiles patient profiles monitored data.
2. **Doctor Module:** This module maintains the information about various patients. And current status of patient health condition.
3. **Patient Module:** The patient can register themselves and can choose the doctor by their own. If the pulse rate or blood pressure rate, body temperature not inline with the recommendable range should send the alert to the doctor portal.

The Software include :-

- Maintaining patient detail.
- Providing and maintaining all kind of test for a patient.
- Maintenance record of indoor and outdoor patient.
- Result of health condition based on the patient input like Temperature, Blood Pressure rate, Pulse rate will be automatically updated in the database.
- Doctor or administrator can view the active patients and inactive patients based on the input value given by the patients.
- If the patient health condition is not inline it send a notification to the doctor portal.

- Information about the patient is done by signup and the patient can choose the doctor by his own choice while signup.
- Once the patient choose his doctor he cant modify/edit the doctor details.
- Information a about the doctor is also done by administrator. Only admin can insert the doctor values and can register a doctor.

CHAPTER 2
LITERATURE SURVEY

2.1 Overview

Software Engineering is about developing software that includes requirement documentation, design principles, and other artifacts required to make the software function as per the stakeholders' expectations. Software Requirement Specification (SRS) is a detailed description of the behaviour of a system to be developed which includes the set of requirements describing user interactions with the system. There are various ways in which these requirements can be specified and analysed that includes use case models, user stories, activity diagrams and formal languages.

Use case modelling is one of the specification documentation strategies that facilitates the developer to specify the intended user functionalities. Jacobson et al. introduced the concept of use cases that have later been adopted by Unified Modelling Language (UML). The purpose of use cases is to delineate the requirements such that people without high-level training can understand and review them. It usually consists of two parts – use case diagram and the use case textual descriptions. These two parts depict two different sentiments of the specification, the first shows the structural representation of the use cases, actors and the relations among them, and the second presents the behavioural representation of the use cases using structured text written in natural language.

2.2 Domain Introduction

World Health Organization (WHO) emergency guidelines recommend considering alternative quarantine methods, including homecare and isolation, for patients with COVID-19 who have mild symptoms in cases of insufficient hospitalization conditions or medical resources. However, these guidelines do not provide details on how this home quarantine should be conducted, nor do they offer instructions on what to do when patients' conditions become severe or critical. More concerningly, based on initial clinic symptoms and laboratory tests, it is difficult to distinguish patients whose conditions will later become severe or critical. For example, CT results were normal for 7/48 (15%) of the patients in our study during initial diagnosis, including 2 patients who were hospitalized.

Our results were consistent with the findings of Guan et al, who reported that CT images were normal for 17.9% of patients with mild conditions and 2.9% patients with severe conditions, respectively. Thus, it may be a common challenge to identify patients during an initial clinic screening whose conditions are prone to become severe or critical. Constant observation of home-quarantined patients by medical staff may therefore be of lifesaving importance.

The telemedicine model presented in this paper not only fills the gap in the WHO guidelines on home quarantine but also mitigates the subsequent threats of the disease caused by a lack of initial symptoms. Specifically, through the quarantine management assessment, the telemedicine system can complement the initial clinic screening and, hence, greatly increase the accuracy of diagnosis. Through the e-counselling system, the telemedicine system can detect any newly emerged symptoms; then, the multidisciplinary team can be promptly informed to make appropriate treatment decisions.

To demonstrate the merits of the telemedicine system, fever can be considered as an example. Current studies list fever as an indispensable or highly prevalent symptom during the initial phase of COVID-19 infection. However, in the study by Guan et al, fever was only present in about half (48.7%) of the patients during initial diagnosis. The telemedicine system proposed in this paper helped patients report their elevated body temperatures later to medical staff, who then could monitor the changes in body temperature over time to detect any alarming patterns. We found that hospitalized patients had elevated body temperature that was sustained considerably longer than that of non-hospitalized patients. In contrast, the body temperature of non-hospitalized patients returned to normal by day 4 to 5. This difference can be detected only through continuous observation implemented by the telemedicine system or another similar system. Thus, the telemedicine system greatly aids medical staff in making correct treatment decisions without being misguided by the initial clinic diagnosis.

The telemedicine system also contributes to clinical practice by identifying the key roles of dynamic changes in four diagnostic symptoms: fever, dyspnea, lack of strength, and muscle soreness. Dyspnea peaked on day 6 for non-hospitalized patients but persisted in hospitalized patients and was exacerbated over time. Similarly, both lack of strength and muscle soreness

returned to normal by day 4 for non-hospitalized patients but not for hospitalized patients. When a patient reported via the e-counselling system that she was still experiencing the symptoms listed above after day 4, the multidisciplinary team went on alert and paid closer attention to that patient.

Further, these symptoms have not been fully studied in the literature on COVID-19. Therefore, tracing dynamic changes in the abovementioned symptoms paves the way for future studies to investigate whether these time markers can serve as turning points of the disease. In comparison, we found that excessive laboratory data and physical examination were not strictly necessary to evaluate patients with mild symptoms. Instead, the evaluation could be performed through patients' subjective initiative and active participation through self-monitoring of the disease.

Another contribution of this telemedicine system is the quarantine management assessment scales. This set of scales provides hands-on and easy-to-use self-diagnosis tools for home-quarantined patients. It also helps medical staff obtain more details about the clinical symptoms of the patients without the need for close physical contact in a clinic. We found that the quarantine management assessment worked well in identifying patients with disease progression.

From the resource management perspective, the telemedicine system enabled management of 188 individuals initially and 74 patients later by a team consisting of only 7 medical workers. None of the patients died, and none of the multidisciplinary team members were infected with COVID-19. Efficiency is important for regions whose medical workforce has been impacted by medical worker infection. Many infected medical workers were required to remain at home for at least two weeks after recovery. One merit of the telemedicine system is that medical staff who have recovered from COVID-19 and are self-quarantined can be enlisted to help. Thus, the shortage in the medical workforce can be alleviated, and other medical workers can be freed to fight COVID-19 on the front line. In conclusion, the implementation of such a system can optimize the usage of local medical resources and reduce cross-infection among medical workers and patients.

2.3 Principal Findings

Maradugu Anil Kumar et al have proposed a system for monitoring the above said parameters. The physician/doctor can be able to track the record of patient as the data is stored in a server.

Ufoaroh S.U et al have proposed a system which monitors the heart rate of a patient and sends an SMS alert to the concerned person and medical personnel if the value exceeds a set threshold through GSM. The heart rate is also displayed in an LCD screen.

Along with monitoring of the parameters related to health there is a need to store that data in a cloud platform and make the entire system connected to IOT. Such system is proposed by Ngo ManhKhoi et al. As the data generated will be huge in this paper authors have studied the bandwidth requirements and volume of data that is generated at every single point of time using protocols like CoAP, MQTT and HTTP.

AyushBansal et al have discussed a system that could trace a person's ECG that will be sent to a server where analysis is done on the data and corresponding graphs will be given to the concerned person and doctor. This system helps in detecting any cardiac problems.

KaleemUllah et al have found out that in the existing methods of providing patient details and monitoring that patient namely e-health and m-health there is no involvement of mobile in sensing the parameters of the body. So they have proposed a system that looks into the aforesaid issue.

CHAPTER 3
EXISTING SYSTEM

3.1 Remote monitoring of COVID-19 positive high-risk patients in domestic isolation: A feasibility study

3.1.1 Introduction:

Infections with severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) threaten to overburden public health systems in many countries.

In developed countries, a vast majority of SARS-CoV-2-positive patients are placed in home isolation immediately after diagnosis. In Germany, e.g., this rate is around 90%. A considerable number of these patients in domestic isolation will develop a severe course of the disease, especially patients with risk factors such as advanced age, cardiovascular, pulmonary, or metabolic diseases.

Effective self-monitoring in domestic isolation is rather unfeasible. Some health authorities recommend that affected patients take their temperature two to three times a day and document their self-perceived symptoms regularly. Recording of objective parameters such as SpO2, heart rate or the respiratory rate, which are proven to lower mortality if monitored early, is not performed. The lack of objective vital parameters can result in delayed emergency hospital admission of patients with progressive disease .

If admission is delayed because the transition into a severe course is not recognised in time, the non-invasive supportive measures may not be sufficient and the patients will require intensive care. The stay in the intensive care unit (ICU) can last for weeks and the chances for survival is significantly reduced. Especially, if a patient needs invasive ventilation, the prognosis is considered poor. Thus, it is therefore highly desirable to avoid such costly, often unsuccessful course.

To relieve health care systems and to improve the overall prognosis of COVID-19 patients, it is urgently needed to identify patients at an early stage of disease progression so that they can be admitted to hospital in a timely manner.

A continuous monitoring of vital parameters in high-risk patients in domestic isolation would pave the way to objectively assess the condition of the patient. An affordable monitoring system that is easy to use at home could fill a crucial gap in managing COVID-19 patients.

In this paper, we present such a remote monitoring system that is low cost and practical, by using resources that are readily available. The aim of this paper is to demonstrate the technical and logistical feasibility of this Tele covid system.

3.1.2 Performance Analysis

Methods and Metrics:

Study population:

Between April 2020 and April 2021, patients with a positive SARS-CoV-2 PCR test were included if they were older than 60 years of age or if they fulfilled at least one of the following conditions: pre-existing disease (cardiovascular, pulmonary, immunologic), obesity (BMI >35), diabetes mellitus, hypertension, active malignancy, or pregnancy.

In-ear monitoring device:

A plethora of different non-invasive devices for monitoring bio signals are available, including wearables of all kinds (smartwatches, smartphones, etc.) and so-called skin-attachable electronics. The aim of our study was to reliably and continuously monitor bio signals relevant to the course of an infectious disease. The necessary in ear devices were purchased; the company had no further involvement in our study. The advantage of the in-ear device is its position in the external ear canal which provides protection from disturbing stray light and a relatively stable position for the sensor. Besides that, the body temperature can be reliably taken in the external ear canal.

Fig 3.1 In-ear Monitoring Device

3.1.3 Result:

A total of 20 patients (13%) were referred to hospital by the Tele covid team. The interval between the positive SARS-CoV-2 PCR test and hospital admission was 6 days on average (median, IQR 3–11). Patients were hospitalized for a median of 10 days (IQR 4–19 days, maximum 41 days). 13 out of the 20 patients were managed at the normal ward with supportive measures alone.

3.2 An efficient health monitoring system with temperature and heart rate sensors using IOT

3.2.1 Introduction:

The authorities of healthcare are planning to provide advanced treatment in clinical organizations. Similarly, the features of Electronic Health applications and E -Health are used by many people to improve their healthcare. The SMS is submitted to the person. A health monitoring system is to be designed which monitors the symptoms like heart rate, oxygen saturation percentage and temperature of the body in IoT network. Internet of things is a technology which enables things around the world to connect with each other using internet. In this technology there will not be human intervention in connecting the things together which is a unique feature of it. The framework of IoT consists of three layers. Control layer, Device layer and Transport layer. Control layer is a method of security that can be used to control and manage the resources in a system. Device layer consists of various devices, types of sensors and many controllers. Transport layer will focus on communication at end-to-end providing features like high reliability, avoiding congestion and assuring that packets will be reached.

3.2.2 Performance Analysis

Methods:

Node MCU

Node MCU is basically a firmware developed for the chip ESP8266 Wi-Fi SOC and hardware is the ESP-12 module. Node MCU is commonly available as development kits where it can be used to build prototypes for IOT applications. Its pin out consists of 3.3V voltage pins, Ground pins to provide power supply and ground to the board. The board also consists of GPIO pins where they can be used to provide input or output to or from the board. Along with these pins

RST pin is reserved for reset where it resets the whole program whenever required. Some other pins are Master Out Slave-In(MOSI), Master In Slave-Out(MISO), Serial Clock(SCK) and Chip Select(CS) which indicates that it follows an SPI protocol for establishing a serial communication with the peripheral devices.

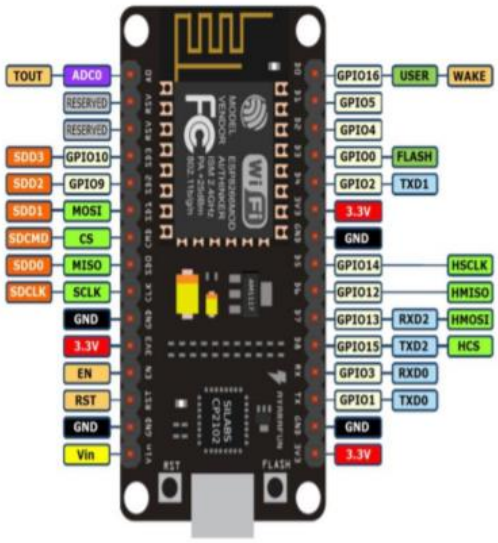

Fig 3.2.1 Node MCU

Temperature Sensor

LM 35 series temperature sensors are popularly used for sensing the temperature of the near surroundings. This sensor outputs an analog voltage proportional to the temperature in Celsius. It consists of 3 pins namely Vcc, Gnd and Vout where Vcc and Gnd are used to provide the necessary power supply to the device and as the name itself suggest Vout is the pin from where we get the output voltage that is to be provided to any development board like Arduino, Raspberry Pi, Node MCU in this case etc. As this sensor offers advantages like low sensitivity, précised output, elimination of external circuitry etc. it is mostly being used in all the projects where temperature measurement is a concern.

Fig 3.2.2 Temperature Sensor

Heart Rate Sensor

As heart rate is one of the important features for estimating one's health condition there is a need to measure the same. Here in this research we present a pulse sensor which measures the pulse of a person. In today's wearable devices heart rate sensors are inbuilt so that they measure the heart rate. This sensor could be also used to trace out if any person feels anxious, it tracks the sleeping pattern of an individual which are used to detect the ailment of a person in some situations. Pulse sensor used which consists of 3 pins namely Vcc, Gnd to provide power supply to the device and a signal pin which gives out the heart rate of a person that is connected to any one analog pin of arduino A0-A5.

Fig 3.2.3 Heart Rate Sensor

3.2.3 Result

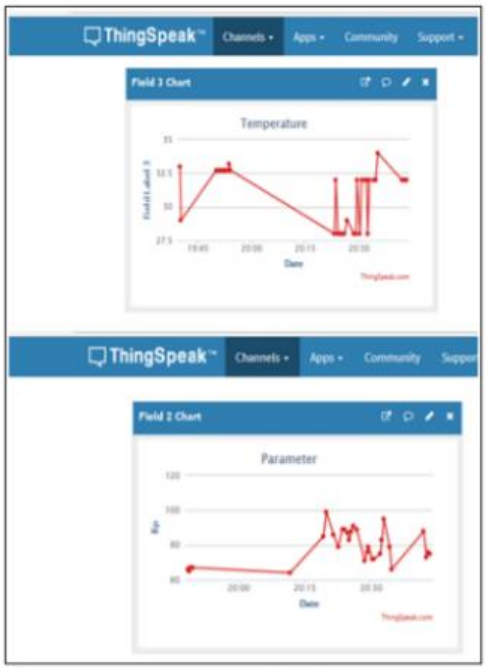

Fig 3.2.4 Temperature values in Thing speak

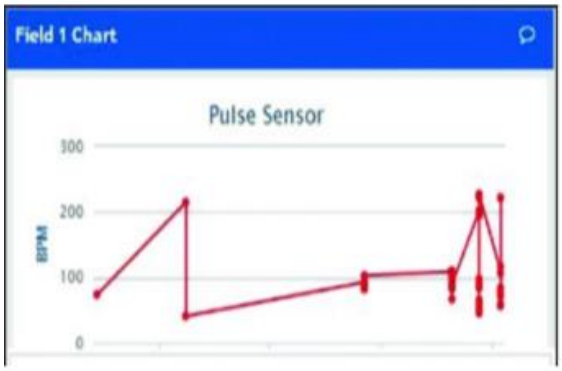

Fig 3.2.5 Pulse rate sensor values in Thing speak

As shown in figures the temperature and pulse sensor values are stored in cloud platform like thing speak where these values can be used for further analysis.

3.3 COVID-19 home monitoring program: Healthcare innovation in developing, maintaining, and impacting the outcome of SARS-CoV-2 infected patients

3.3.1 Introduction:

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) caused the current pandemic since its emergence in December 2019 in Wuhan city, China. Three months later, initial cases of the Coronavirus Disease 19 (COVID-19) were reported in the Arabian Gulf Countries. Similarly, the first case in the Kingdom of Saudi Arabia (KSA) was reported on March 2nd, 2020 and since then the number of COVID-19 cases increased over the following months and peaked in June–July 2020. As precautionary measures, all returning travelers to KSA were required to be quarantined in designated hotels. Such quarantine was very demanding with low positivity rates. One study from KSA showed that 1.2% of 1918 returning travelers tested positive for SARS-CoV-2. Similarly, in another study from Bahrain, 0.6% of 10,449 travelers who entered quarantine facilities tested positive for SARS-CoV-2. In KSA, initial cases of SARS-CoV-2 patients were required to be admitted to the hospital irrespective of the presence or absence of symptoms. Globally, COVID-19 had also resulted in a great disparity in the outcome as it relates to gender and minorities in addition to the unique characteristics of COVID-19 patients in rural and urban communities. At a time when the pandemic is raging in several parts of the world with overcrowded hospitals and scarce beds, many of the patients with high risk factors for progression but not sick enough to be in the hospital may benefit from home monitoring. Patients being discharged from the hospital could also be ideal candidates for such approach. Moreover, the majority of COVID-19 cases are either asymptomatic or have mild symptoms. Thus, there is a need for a new strategy to manage those patients and to ensures all COVID-19 cases appropriately followed up to receive proper medical and psychological support, and to comply with the isolation guidelines in order to prevent the spread of the infection. Thus, KSA allowed patients who did not need admission for clinical indications to be managed at home. In this study, we describe the characteristics and outcome of COVID-19 patients who were managed at home. In addition, we aimed to describe the differences between asymptomatic and those with mild symptoms.

3.3.2 Performance Analysis

Methods and Metrics :

The study included all positive SARS-CoV-2 patients who were diagnosed in the ambulatory setting as well as in the emergency department and were deemed not needing admission at the time of the presentation. The study took place at the Johns Hopkins Aramco Healthcare (JHAH). JHAH provides medical care to about 200,000 eligible medical recipients including Saudi Aramco employees and their dependents. Home monitoring program for COVID-19 positive cases at JHAH was launched on 8th June 2020. The program was a physician-led service with a team including other physicians, case manager, registered nurses, and admin personnel. Upon the receipt of the laboratory results of SARS-CoV-2 PCR tests, these results were forwarded to the case-management admission team for assessment of the patients and to determine suitable disposition. The case management admission team used pre-defined criteria for the disposition of patient. In addition, patients with chronic diseases were assessed for home monitoring isolation program on case-by-case basis. Home monitoring program was considered for all COVID-19 positive patients who were asymptomatic or had mild symptoms and thus deemed at low-risk of complications.

Patients were regularly followed up to ensure they remained stable and suitable for home isolation. Suitability is determined by the patient's medical condition, other household members' medical conditions, whether home environment is suitable for home isolation, and the ability to download and use the required MOH smart phone applications such as Tatamman (meaning be sure) App and Tawakkalna App (an App that was developed by the National Information Center in collaboration with MOH to aid in the prevention of the spread of COVID-19). These applications help in tracking patients' symptoms and show the status of the individual in relation to the need for quarntine and immunity. The follow-up of patients was conducted via either a telephone consultation or through MyChart visit (part of the electronic medical record (EPIC)). Patients typically received a call on day 1 of enrollment

into the program to assess symptoms, medical conditions, home situation, and to ensure they have downloaded relevant smart phone applications.

Patients concerns and questions were addressed, and an explanation was given on what to expect whilst under home monitoring service. Patients received a daily questionnaire via MyChart asking about their symptoms and they were contacted if they answer "yes" to any of the listed symptoms. On day 10, and if they remained asymptomatic for at least 72 h, they were discharged from the service and the patient was issued a clearance as well as his/her status was changed on the MOH database from "Active" to "Recovered".

Statistical analysis was performed using JASP (an open-source project supported by the University of Amsterdam). We utilized descriptive analysis for demographics and patients' clinical characteristics and these were expressed as frequencies and percentages for categorical data and mean and standard deviation (SD). Comparison of asymptomatic and mildly symptomatic disease was done using chi square ($\chi 2$) test or Fisher exact test as appropriate for categorical outcomes. Significant factors were then entered into a logistic regression analysis to determine significance. The Odds Ratio (OR) and 95% confidence intervals (95% CI) were presented. A Boxplot of the age was presented as a comparison between different groups (asymptomatic vs. symptomatic, and those who were admitted or continued in home monitoring program). A P value ≤ 0.05 was considered significant. The study was approved by the IRB of the Johns Hopkins Aramco Healthcare (IRB # 20-43)

3.3.3 Result

During the study period from June 8 to October 18, 2020, there was a total of 5368 COVID-19 positive cases who were referred to the home isolation/monitoring program. The mean age (±SD) was 37.7 ± 19.4 years and 2397 (45%) were female and 2971 (55%) were male. The distribution (percentage) of cases in reference to age group . The majority of cases were between 21 and 60 years of age with 20% being 31-40 years and 17% being 20-31 years of age. Of the total cases, 295 (5%) required hospital admission, 45 (1%) were admitted to zone 2, and the majority 5028 (94%) continued home monitoring till clearance of infection.

The mean age and SD of those who required hospital admission was 56.2 + 15.8 days and was more than those who were discharged (36.7 + 19.1) or cared for in zone 2 (33.6 + 15.5) (P value < 0.001)

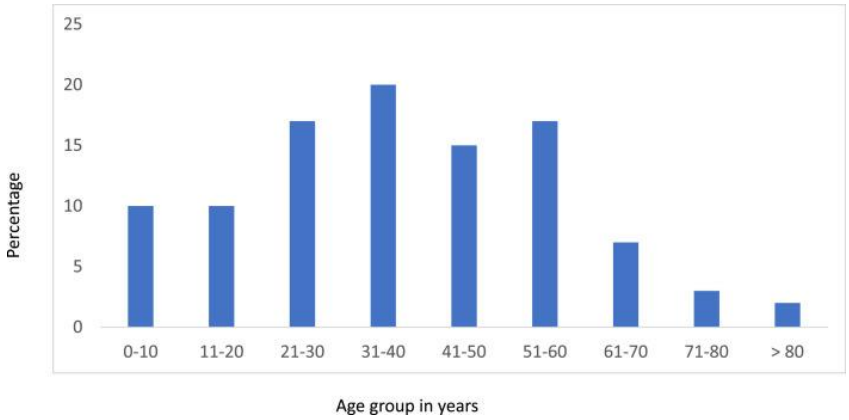

Fig 3.3.1 The percentage of cases in reference to age group (N=5368)

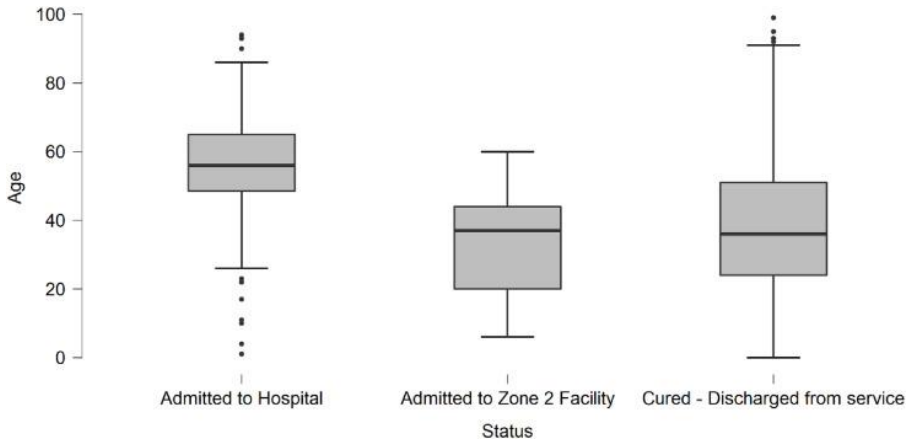

Fig 3.3.2 The Boxplot of age of patients who required hospital admission and those who remained in home monitoring.

Of the total cases, 3137 (59%) were asymptomatic and the remaining 41% were symptomatic. A comparison between these two groups. Asymptomatic patients tend to be younger with mean age (±SD) of 31.5 (18.6) and 46.45 (17.1), respectively ($P < 0.001$). In addition, there were significant differences between asymptomatic and symptomatic patients in relation to gender, being healthcare workers, and presence of significant medical conditions. However, a logistic regression analysis showed that only age and presence of diabetes mellitus were associated with the presence of symptoms.

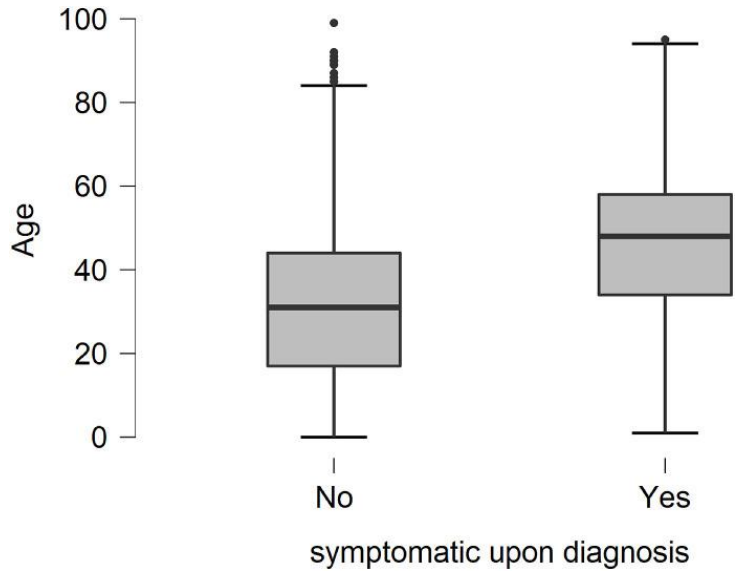

Fig 3.3.3 A Boxplot of patient who are asymptomatic and symptomatic upon diagnosis

3.4 Comparison of Existing Models

Existing Models / Contents	**Remote monitoring of COVID-19 positive high-risk patients in domestic isolation: A feasibility study**	**An efficient health monitoring system with temperature and heart rate sensors using IOT**	**COVID-19 home monitoring program**
Implementation	In-ear monitoring device	Node MCU , Temperature Sensor and Heart Rate Sensor	SARS-CoV-2 Test
Domain	Sensors	Internet of Things	Manual Monitoring
Advantages	No extra training required	Requires minimum effort	Easy to implement
Disadvantages	Not cost effective	Problem with maintenance	Data Handling problem

CHAPTER 4
PROPOSED SYSTEM

4.1 Introduction

The new system is to control the information of patients as well as doctors. These services are to be provided in an efficient, cost effective manner, with the goal of reducing the time and resources currently required for such tasks. The complete set of rules & procedures related to Hospitals day to day activities and generating report is called "Smart health consulting System". It is a computerized management system. This system also keeps the records of hardware assets besides software of this organization. The proposed system will keep a track of Doctors, Patients & Receptionist. This project has html, bootstrap, java script-based software that will help in storing, updating and retrieving the information through various user-friendly menu-driven modules.

❖ **Goals of proposed system**

i. The system should be easy to operate.

ii. The working in the organization will be well planned and organized.

ii. The level of accuracy in the proposed system will be higher.

iv. The reliability of the proposed system will be high due to proper storage of information.

v. Provide quick and efficient retrieval of information.

Advantages:

1. Low maintenance cost.
2. Volume of data is not an issue.
3. Data can be converted easily to information.
4. Data cannot be corrupted easily with proper backup.
5. It can be expanded as well as data communication is possible.

Disadvantages:

1. High starting cost requires.
2. Additional manpower is necessary.

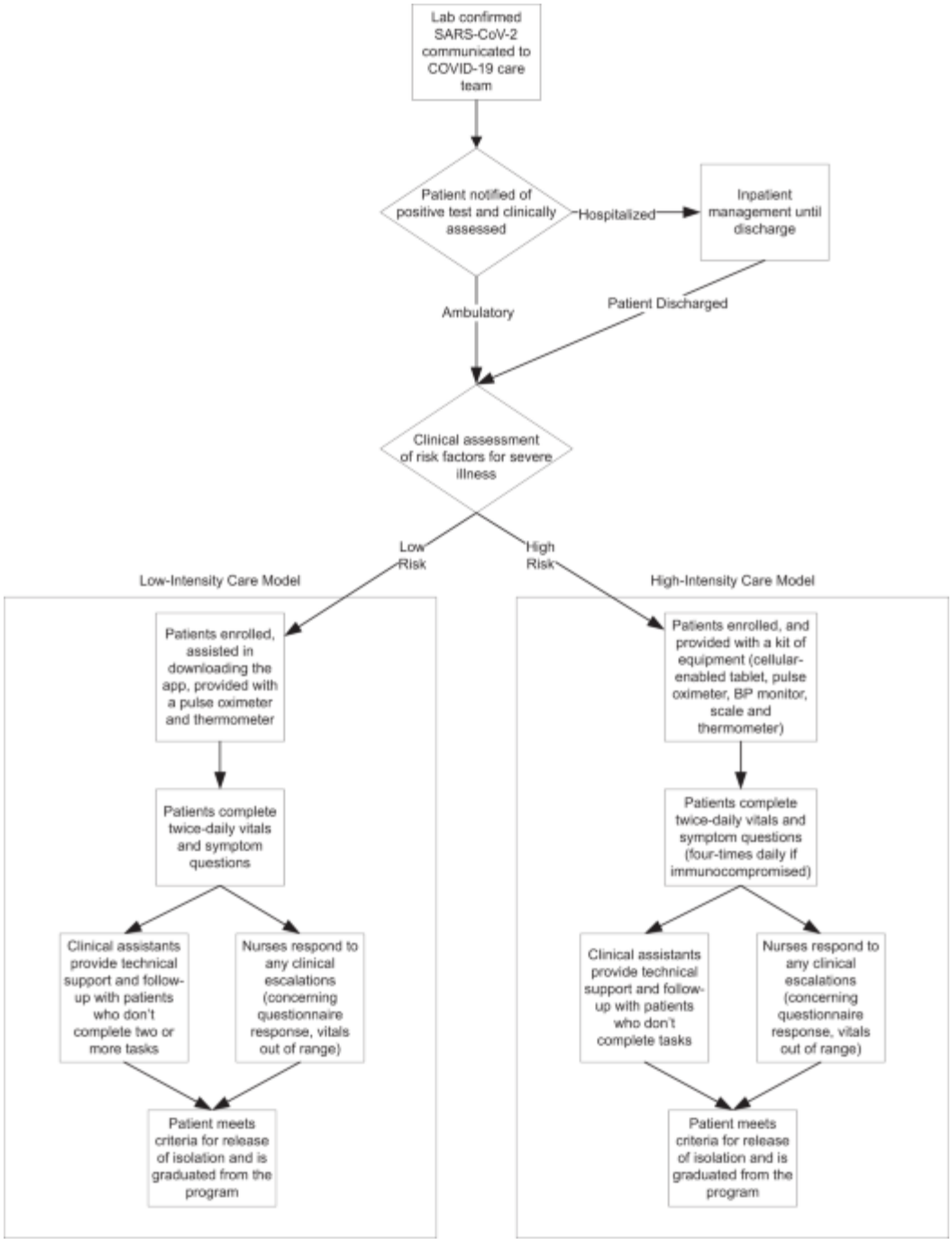

Fig 4.1 Architecture

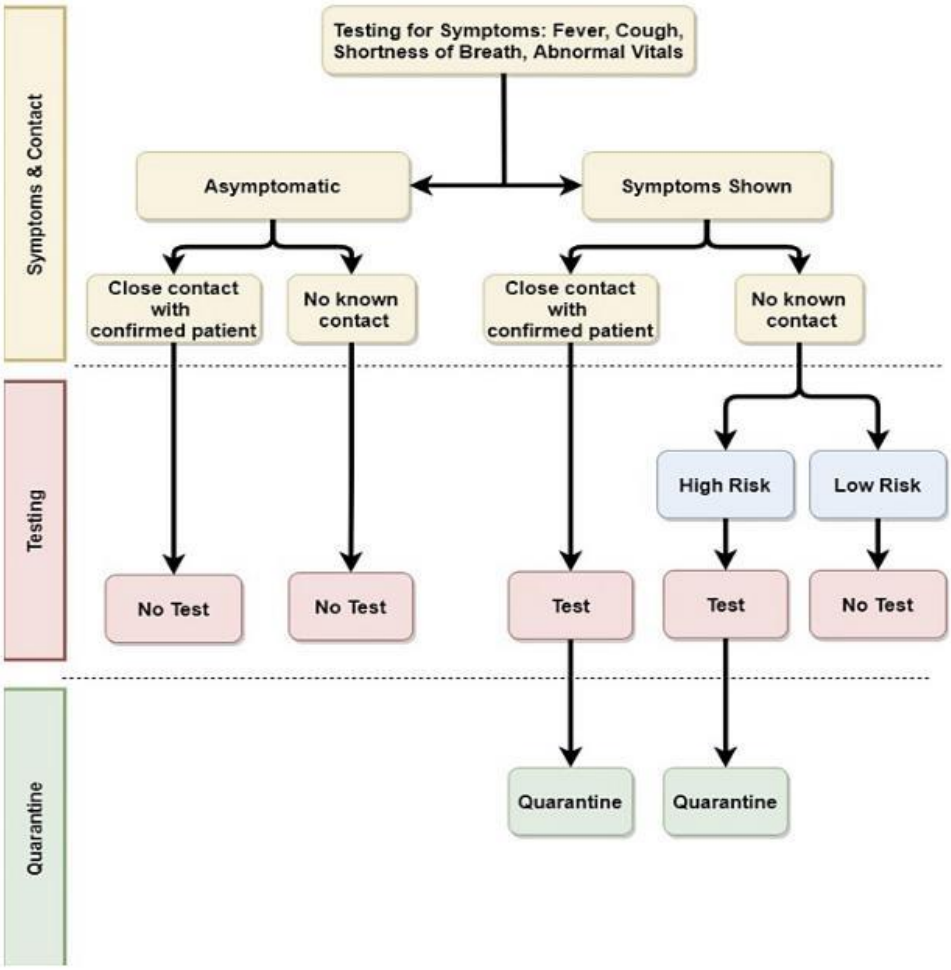

Fig 4.2 Flow Chart

CHAPTER 5

CONCLUSION AND FUTURE WORK

- The new system Time is key to fight COVID-19, and digital health solutions provide the opportunity to buy time and human resources. As the COVID-19 pandemic is the first true global health crisis in the digital era, we. have observed and will observe a plethora of digital solutions. This pandemic has at least demonstrated the usefulness and reactivity of digital health solutions and constitutes an opportunity to insert these solutions into our health care systems in the long term. This creates an urgent need for policy makers, researchers, and health professionals to collectively and efficiently implement digital solutions into practice without further fragmenting the existing landscapes of care. We now call for more concerted measures to have an optimal impact on the epidemic and to address the most strategic needs to ease the life of people who are at the forefront of the COVID-19 crisis
- This would enable to improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information.
- Hence our project, “COVID19 PATIENT MONITORING SYSTEM” browser allows you to open the website from internet and you can get consult with doctor by registration.

CHAPTER 6
REFERENCES

REFERENCES

[1] Ho Sung Lee, Seung Hun Park and Eung Je Woo, "Remote patient monitoring service through WorldWide Web," Proceedings of the 19th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. 'Magnificent Milestones and Emerging Opportunities in Medical Engineering' (Cat. No.97CH36136), Chicago, IL, USA, 1997, pp. 928-931 vol.2, doi: 10.1109/IEMBS.1997.757822.

[2] M. A. Kumar and Y. R. Sekhar, "Android based health care monitoring system," 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, 2015, pp. 1-5, doi: 10.1109/ICIIECS.2015.7192877.

[3] Ufoaroh S.U ,1 Oranugo C.O, 2 Uchechukwu M.E," HEARTBEAT MONITORING AND ALERT SYSTEM USING GSM TECHNOLOGY" 2015 , International Journal of Engineering Research and General Science Volume 3, Issue 4, July-August, 2015 ISSN 2091-2730,pp. 26-34 4.

[4] Ngo ManhKhoi, S. Saguna, K. Mitra and C. Åhlund, "IReHMo: An efficient IoT-based remote health monitoring system for smart regions," 2015 17th International Conference on E-health Networking, Application & Services (HealthCom), Boston, MA, 2015, pp. 563-568, doi: 10.1109/HealthCom.2015.7454565.

[5] K. Mandula, R. Parupalli, C. A. S. Murty, E. Magesh and R. Lunagariya, "Mobile based home automation using Internet of Things(IoT)," 2015 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT), Kumaracoil, 2015, pp. 340-343, doi: 10.1109/ICCICCT.2015.7475301.

[6] A. Bansal et al., "Remote health monitoring system for detecting cardiac disorders," in IET Systems Biology, vol. 9, no. 6, pp. 309-314, 12 2015, doi: 10.1049/iet-syb.2015.0012 7.

[7] Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, China Novel Coronavirus Investigating and Research Team. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med 2020 Feb 20;382(8):727-733.