Internship Training

at

ZYLA HEALTH PRIVATE LIMITED, GURGAON

"To Assess the Role of Digital Engagement in the Management of Blood Sugar Levels in Patients with Diabetes Mellitus 2 using Chat-based Medical and Lifestyle Intervention"

by

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PG/18/81

Under the guidance of

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Post Graduate Diploma in Hospital and Health Management

2018-20

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ABSTRACT

To Assess the Role of Digital Engagement in the Management of Blood Sugar Levels in Patients with Diabetes Mellitus 2 through Chat-based Medical and Lifestyle Intervention.

Keywords: mHealth, Diabetes Management, Mobile Applications, Digital Engagement and Patients

Abstract- mHealth is a component of eHealth**,** which involves the use of mobile applications to improve health outcomes of the patients. mHealth has been used for many types of health problems and diseases like mental health problems and diabetes. Diabetes is a chronic disease cannot be cured but the high sugar levels can be managed through healthy diet and proper exercise. Managing sugar levels can reduce the risk of complications in the body. Diabetes management related mobile applications provide a dynamic health plan and personalized exercise plan, which allows the patients to stay fit and healthy. The exploratory descriptive study was done to understand the importance of mHealth and limitations and benefits of diabetes management digital service. The study depicts the role of mobile applications in managing the sugar levels of diabetes patients. It clearly emphasizes the fact that mHealth can play an important role in the delivery of care to the patients. Digital engagement over mobile applications has led to many advantages like reduction in the cost, speedy communication, paperless documentation that has not only saved the time of patients but for healthcare providers as well. Limitations of digital engagement include complexity of mobile applications, privacy concerns and technical glitches over the application. Digital engagement can help patients to manage their health as most of the people have their phones and use them on a daily basis. Digital Engagement can help patients with diabetes mellitus 2 to manage their blood sugar levels through small lifestyle changes by providing them personalized health plan and exercise plan over the application on the mobile phone. Medical and behavioral treatments are effective but only if patients change their behaviors successfully and permanently. Mobile technology offers enormous opportunities to integrate into the everyday lives of patients in ways that allow long-term behavioral change.

(Completion of Dissertation from the respective organization)

The certificate is awarded to

STUTI PATHAK

in recognition of having successfully completed her

Internship in the department of

Business Development

and has successfully completed her Project on

"To Assess the Role of Digital Engagement in the Management of Blood Sugar Levels in Patients with Diabetes Mellitus 2 using Chat-based Medical and Lifestyle Intervention"

Date: 05 May 2020

Organization: Zyla Health Private Limited

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavors.

Khushboo Aggarwal
Department Head

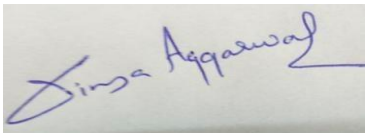
TO WHOMSOEVER IT MAY CONCERN.

This is to certify that **Ms. STUTI PATHAK** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at **ZYLA HEALTH PRIVATE LIMITED, GURGAON** from **3rd Feb 2020** to **3rd May 2020**.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.



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The following dissertation titled **"TO ASSESS THE ROLE OF DIGITAL ENGAGEMENT IN THE MANAGEMENT OF BLOOD SUGAR LEVELS IN PATIENTS WITH DIABETES MELLITUS 2 USING CHAT-BASED MEDICAL AND LIFESTYLE INTERVENTION."** at **"ZYLA HEALTH, GURGAON"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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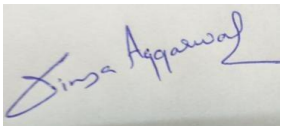
Ms. Divya Aggarwal	
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This is to certify that **Ms. STUTI PATHAK,** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled "**TO ASSESS THE ROLE OF DIGITAL ENGAGEMENT IN THE MANAGEMENT OF BLOOD SUGAR LEVELS IN PATIENTS WITH DIABETES MELLITUS 2 USING CHAT-BASED MEDICAL AND LIFESTYLE INTERVENTION**" at "**ZYLA HEALTH,GURGAON**" in partial fulfillment of the requirements for the award of the **Post-Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge, no part of it has been reproduced from any other dissertation, monograph, report or book.

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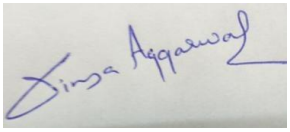
Director



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Signature

FEEDBACK FORM

Name of the Student: Stuti Pathak

Dissertation Organisation: Zyla Health Private Limited

Area of Dissertation: To understand the role of digital engagement in the management of blood sugar levels of patients with Type 2 diabetes.

Attendance:

Feb 2020: 1 leave
Mar 2020: 2 leave
Apr 2020: 0 leave

Objectives achieved: Have performed research on digital platforms in diabetes such as Zyla Health, ZocDoc, Talkspace, Apollo Sugar, Practo, Lybrate etc. It is been observed at Zyla the patient gets personalized and dynamic health plan based on his health conditions. Also patient has to share daily routine and vitals reporting on the basis of which regular guidance is been shared and improvement is seen.

Digital platform helps in managing sugar levels eventually leading to reduction of cost for patients, speedy communication leading to easy access for patients and their management, routine and vital sharing also helpful in lab test booking.

Deliverables: Two deliverables – (a) thesis report and (b) Participated in patient counselling

Strengths: Committed, Sincere & Diligent person

Suggestions for Improvement: Emotional strengthen

Khushboo Aggarwal
Organisation Mentor (Dissertation)

Date: 05May2020
Place: Gurgaon

ACKNOWLEDGEMENTS

Hard work, guidance and perseverance are the pre-requisite for achieving the success. Support from an enlightening source helps us to protect on the path to it. I wish to thank almighty who provided me energy for the successful completion of summer training at **Zyla Health Private Limited.**

I am thankful and obliged to my mentor at **Zyla Health Private Limited**, **Ms. Khushboo Aggarwal** for giving me an opportunity to work on this project. I also thank **Mr. Ashish Garg** for his continuous support, guidance, and perseverance during the course of the project. I would also thank my senior **Ms**. **Neha Mehra** at **Zyla Health Private Limited** for providing me immense support, knowledge and guidance.

I would also like to thank my mentor at **IIHMR Delhi, Ms. Divya Aggarwal** for showing support throughout my internship period and **Prof. Anandhi Ramachandran** for helping me to complete my project.

It has been my good fortune to be benefitted by their knowledge, guidance and deep insight without which this project would not have taken exact shape.

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LIST OF ABBREVIATIONS

3G- Third Generation

4G- Fourth Generation

BP- Blood Pressure

eHealth- Electronic Health.

FDA- Food and Drug Administration

FF- Fasting Blood Sugar Level

GOe- Global Observatory for eHealth

GPRS- General Packet Radio Service.

GPS- Global Positioning System

HbA1c- Glycated Haemoglobin

HP- Health Plan

mHealth- Mobile Health

PDA- Personal Digital Assisstants

PDF- Portable Display Format.

POC- Point of Care

PP- Post Prandial Blood Sugar Level.

SBMG- Self monitoring Blood Glucose

SMS- Short Messaging Service

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INTRODUCTION

AIM: **"To Assess the Role of Digital Engagement in the Management of Blood Sugar Levels in Patients with Diabetes Mellitus 2 using Chat-based Medical and Lifestyle Intervention"**

OBJECTIVES:

- To understand the importance of mHealth.
- To understand the benefits of Benefits and Challenges of Diabetes Management Digital Services.

OVERVIEW

Increasing numbers of digital services have been shown to improve health and lower the care costs .The creative healthcare companies are delivering these services as part of their new value-based treatment models to healthcare providers and patients. Their performance would inspire other companies to make similar health investments — payers, suppliers and employers. Thus, mHealth has now become very important for both patients and healthcare providers.

Diabetes is a chronic disease in which sugar levels in the blood rise due to inadequate production of insulin or insulin resistance by the cells. There are two types of diabetes- Diabetes mellitus 1 and Diabetes Mellitus 2. Diabetes Mellitus 1 is an auto-immune disease where the pancreas secretes inadequate amount of insulin which results in an increased amount of sugar levels in the blood and Diabetes mellitus 2 is a lifestyle-related disease in which there is an increase in blood sugar levels due to insulin resistance by cells

So, Diabetes Mellitus 1 can only be treated through physical monitoring by a doctor but Diabetes Mellitus 2 can be treated through various lifestyle interventions by making small changes in the daily routine of patient. Patients with Diabetes Mellitus 2 can be treated by providing a personalized and dynamic health plan and exercise plan to them and continuously monitoring their health through a chat option on the Mobile application and phone calls.

HbA1c is an average 3-month sugar level test which is used to determine the sugar levels in the blood in the past 3 months. It was one of the tests to determine whether the person is diabetic or not.

Normal HbA1c levels: 4.6-6%
HbA1c levels between 6%- 6.4%: Pre-Diabetic conditions
HbA1c levels 6.5% or above: Diabetes mellitus 2

LITERATURE REVIEW

A mobile phone has the ability to perform various tasks apart from communication. Mobile technology is a new topic trending these days and people generally discuss about it's features, options, facilities most of the time. This technology brings in variety of applications and features that acknowledges the needs in different areas. The importance of mobile technology is rising every day. People use mobile phones for large number of activities like to watch movies, book train tickets, book airline tickets, play games, order food, do cashless payments, watch educational videos, improve health, book cab or an auto and much more. Mobile Phones are efficient and phenomenal devices which allows it's users to do all types of tasks from complicated ones to simple ones.

Mobile technology is also making it's way in healthcare industry. mHealth is defined as providing different healthcare services through mobile devices. The service ranges from very simple SMS mobile function to send alerts and reminders or usage of in-built sensors to capture and analyze the clinical data. mHealth is all about using mobile phones and wireless devices to improve health outcomes.

mHealth is a section of eHealth. There is no proper standard definition of mHealth as of now. The GOe has explained mHealth as a medical and public health task which is maintained by mobile devices like cell phones, devices for tracking patients, PDA and other wireless devices for the intention of conducting a survey. mHealth involves the usage of fundamental voice and short messaging utility of the mobile phone, as well as more complex features, functions and applications like GPS, Bluetooth Technology, GPRS and 3G and 4G mobile communications.

India has immense scope to utilize mHealth as a useful distribution platform for healthcare services. The major requirement for mHealth system aroused due to Structural, financial and behavioural variables. The accessibility to basic healthcare is difficult due to lack of infrastructure and services. India's healthcare ecosystem is constrained due to financial problems such as increasing healthcare costs and Limited allocation of budgets to healthcare by Government. The underlying problems are very crucial. Lifestyle related disorders have become more prevalent these days as people have adopted bad food eating habits. The specialists for lifestyle disorders are not much available as per the requirement and it's very difficult to reach them through the healthcare delivery methods which are very traditional. The population is becoming so technology oriented that they are looking for much better ways of getting treatment.

Mobile technology allows health care organizations to expand their health care horizon over a vast area by creating an atmosphere which is efficient enough to accomplish mHealth Targets. mHealth could really encourage patients to take part in health related processes. Introducing mHealth could make a drastic change in the delivery of the patient care services. It involves the competency of patients to handle the personal details and to communicate with the health care professionals as well as with other patients.

Modern apps give users different useful functions similar to those offered by programs in notebooks or desktops. Many health-related applications are available, and can be easily downloaded from well-known download sites. Apps may be designed to help health care workers enhance the effectiveness of their jobs, such as providing online access to patient records, medical imaging, and laboratory results. Drug calculators, physician or point-of - care (POC) resources, diet and/or exercise guide and calculator, electronic product manuals, methods for interpreting laboratory results and diagnostic research, and guidelines for differential diagnosis, among others .There are apps that allow patients to monitor their health using their smartphones, such as tracking their heart rate, blood pressure, and emergency unit support.

The most important advancement regarding the management of health information is the implementation of e-health. One of the advantages patients reap from e-health programs is more precise care, because it is possible to access different contextual information, including historical records, to generate diagnoses that are more accurate. e-health can minimize hospital admissions and emergency room visits, handle and monitor chronic disease easily, increase nurse efficiency that has an effect on the nursing staff shortage, minimize health-care costs, and provide access to treatment from anywhere at any time.. Some e-health benefits for health-care workers include efficient collaboration through multi-professional teams, ease of data management for patients, easy access to data / information when needed, and help with audit and research activities.

The healthcare atmosphere has been influenced by mHealth in developing countries has resulted in positive outcomes in India as well. This technology will aid in boosting efficiency, reduce health care costs and enhance the productivity of Health care professionals in India. However, there are number of barriers that lower the impact of mHealth on the Healthcare sector of India.

Lack of awareness

mHealth has actually made substantial impact in the nations even in the countries like India, Also, there are a number of existing mHealth apps which can make a difference. India's Government has initiated a number of mHealth initiatives. Yet lack of understanding is an immense deterrent. The need of the hour is to make this new medium and its advantages available to the public, including patients and providers.

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Poor infrastructure and security concerns

In India, lack of good infrastructure represents a major challenge. In many places basic infrastructure is also lacking.. Most of the poor population can't afford to buy a decent smartphone that will give them mHealth access The rural community has very low access to networks. Additionally, if there is an infrastructure, then security and privacy are major concerns. In the case of mHealth applications, there is no way to say if sufficient steps have been taken by the app developer to ensure protection and defend his / her app from malicious attacks.

Huge volume and fragmented market.

The iTunes and Android app stores sell more than 1,65,000 mHealth applications.. From both a clinical and a technological viewpoint, the applications may or may not work. Most mHealth apps are of questionable origin and abandoned by the developer after initial release or upgrade .A prospective consumer has no way of knowing which apps can be trusted. The number of downloads can be a parameter, but it's certainly not a reliable one because most mHealth apps can't keep their users. Additionally, most reviews of the mHealth app are received in the app store by users. Consequently, scores tend to be based on personal experiences (e.g. user interface ease of use and intuitive) rather than clinical results assessed by clinical trials, evidence-based outcomes or even professional feedback. User reviews rarely evaluate technical factors such as pace of updates and bug fixes, interoperability, and adherence to standards of technology, privacy, and safety concern

Low Expectations

As there is no large-scale successful precedent in the Indian context,the main stakeholders in the healthcare sector are unable to understand mHealth 's potential.. The patient population is losing interest if they experience an unpleasant mHealth app. The reluctance to change and to embracing modern technologies is immense .Additionally, only fitness apps are of interest to a wide portion of the population. The low expectations can be due also to a lack of awareness of the tremendous cost benefits. The Indian Government has started to look at mHealth applications as a way of improving treatment quality.

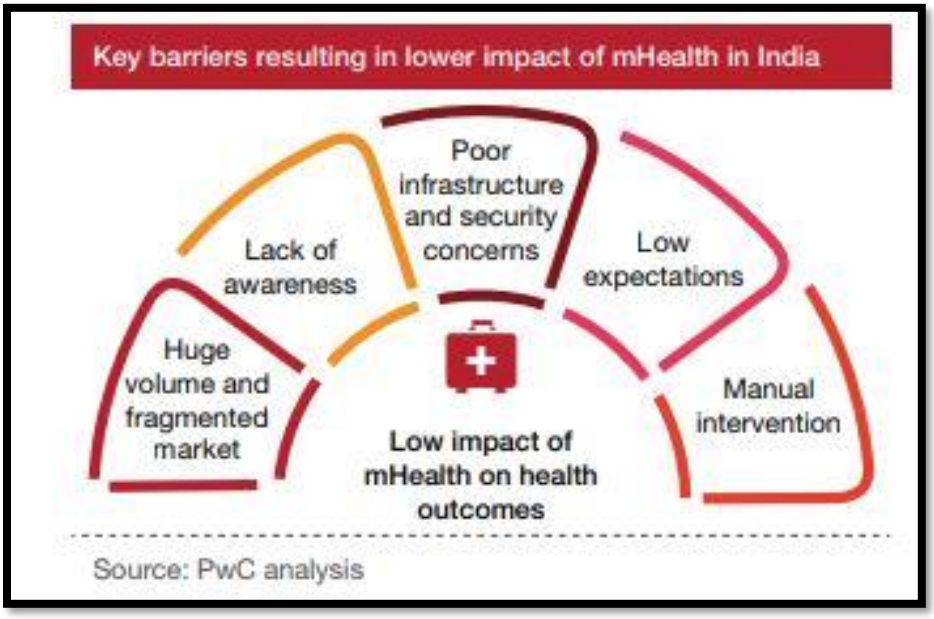


Figure 1 Main Barriers which lower mHealth effect in India

Source: https://www.pwc.in/assets/pdfs/publications/2017/how-mhealth-can-revolutionise-the-indian-healthcare-industry.pdf

mHealth- Diabetes Management-

In recent decades, mobile healthcare which is the use of mobile technology in healthcare and public health has been developed continuously. It has recently been used to treat various acute and chronic diseases such as diabetes, obesity, mental health and secession to smoking, with diabetes being the most common disease among them.

Self-management is very critical for diabetes patients, and health care delivered by mobile applications (apps) has a great benefit when applied to diabetes patients; adherence to diabetes management practices, such as daily medication and insulin injection, blood glucose self-monitoring (SMBG), diet , and exercise, can be improved by mobile apps. The fact that since 2010 the Food and Drug Administration (FDA) has given clearance and approval for the use of such diabetes control apps as medical devices indicates that mobile health care is regarded as effective in controlling diabetes.

Diabetes treatments done through mobile phones has benefits like tracking and monitoring blood glucose levels and making life style improvements.

METHODOLOGY

Methodology is characterized as a method for the identification, collection, processing and analysis of knowledge about a subject.

- **Type of Study**: Descriptive study.
- **Type of Literature Review**: Exploratory
- **Type of Data**: Secondary Data
- **Data collection Method**: Research papers and websites from the Internet
- **Target Population**: People between 25 yrs. to 65 yrs.
- **Inclusion Criteria**: Study on Mobile Applications and it's features.
- **Exclusion Criteria**: The study does not include the Type 1 Diabetes Patients.

RESULTS/FINDINGS

Patient's Mobile Application Journey-

1. Patient downloads the Diabetes Management Application

2. Patient sees the Preliminary Questions

3. Generally, there are 8-10 Questions

4. Company looks at the questions filled by the patient and
Calls the patient.

5. Company calls the patient to enrol him/her to the program and

6. After enrolling in the program, an app chat is activated.

7. App chat is a mixture of bot and human.

8. Patient provides details like vitals on the App chat.

9. A health assessment call is initiated by the nutritionist to know the specific details regarding the health of the patient.

10. Clinical Documentation (detail assessment) is made by a nutritionist along with the health plan.

11. This clinical documentation is send to the patient for review.

12. Any changes required in the clinical documentation is done by nutritionist there itself as requested by the patient but if the request for the changes is made by the patient later then it is not made in the document to avoid tampering with the data. The change is noted somewhere else.

13. The care manager is responsible for bridging the gap between the patients and the doctors.

14. The care manager is provided to the patients to guide them about their plan.

15. Main Aim of Diabetes Management Application is to improve the health of the patients through a customized diet plan.

16. Three main pillars of Diabetes Management are Nutrition, Exercise and Medicines.

17. First Main aim is to Provide nutrition to the patient so that the energy levels of the patient Are maintained.

18. Second, Exercise is very important

19. Third, If the patient doesn't improve through a customized diet plan provided to them, Then medicines are prescribed.

20. The program structure basically includes a call which lasts for 30-40 mins with the The medical team will ask medical team and medical history of the patient.

21. Personalized HP will be provided to the patient.

22. Patient is asked to observe the symptoms and sugar levels for one week and a call is made to the patient according to his / her availability after one week to check the improvement in the patient's health.

23. On the 21st Day of the month, a call will be initiated to check the improvement in the Patient's health once again.

24. A call will be initiated with the nutritionist and physiotherapy team after every consecutive 15 days. After 15 days a call for the patient is initiated with the nutritionist Team and after 15 days then with the physiotherapy team.

HBA1c Table:

BLOOD GLUCOSE		STATUS	HBA1c	
mmol/L	Mg/dL		%	mmol/mol
5.4	97	**Normal**	5	31
7.0	126		6	42
8.6	155	**Pre-diabetic**	7	53
10.2	184	**Diabetes**	8	64
11.8	212		9	75
13.4 and more	241	**Diabetes**	10	86

Table 1: Blood glucose and Hba1c levels.

Patients generally want to manage their sugar levels at home because it becomes difficult to go to the doctor again and again due to the unavailability of time. It has been observed that patients are so much preoccupied with their work and family issues that they don't get time for themselves. They forget about the fact that their health is important and should be their priority. So, Digital platforms can help patients with type-2 diabetes mellitus to manage their blood sugar levels without going to the doctor.

HbA1c generally gets reduced after they follow a personalized and dynamic health plan and exercise plan. Patients feel more energetic, healthy and motivated to do their work after they follow the health plan and exercise plan.

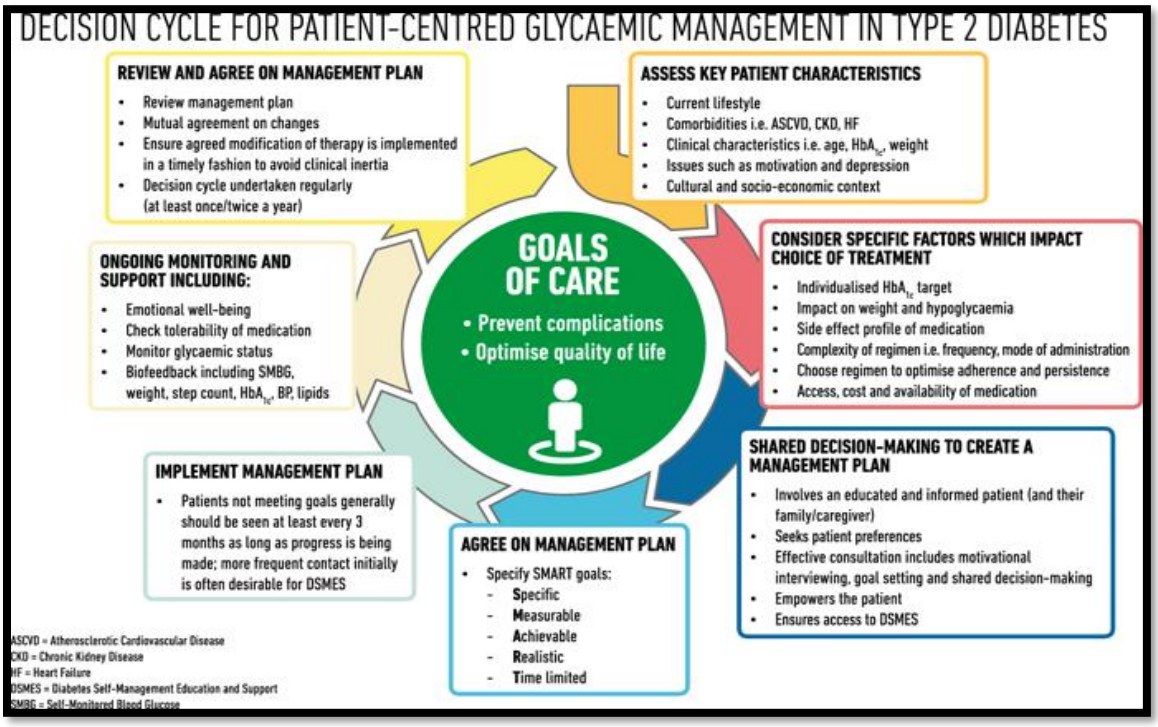


Figure 2: Type 2 Diabetes decision process for patient-centered Glycaemic Management
Source: https://care.diabetesjournals.org/content/41/12/2669

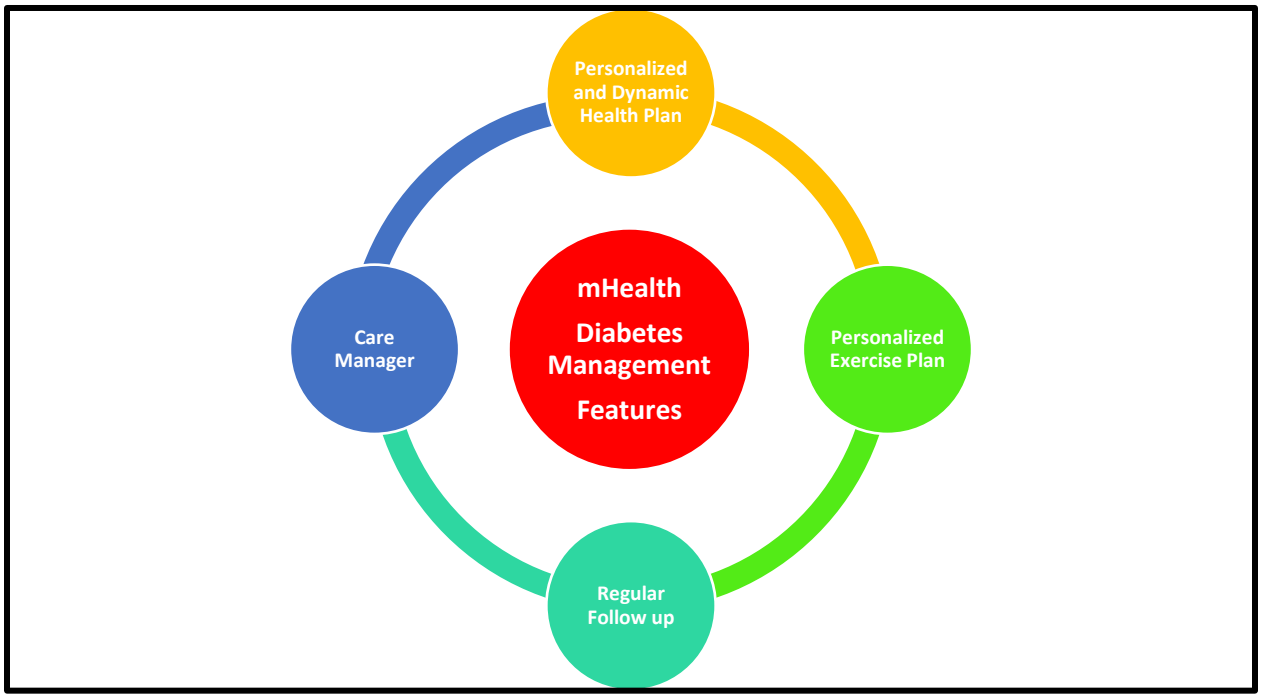
Various Zyla mobile application options observed are as follows:

1. **Share my Routine**: It is an option to share the daily routine. Patients fill their Breakfast, Lunch and Dinner meals and Exercise plans with respect to their timings.
2. **Share my Vitals**: It is an option in the application that allows the patients to fill their Blood Pressure, Blood Sugar Readings and Weight measurements.
3. Health Goals.
4. **Microphone Option**: Microphone option allows the patients to ask questions on the application if they find difficult to type on the application.
5. **Chat option**: Chat option allows the Patients to clear the doubts regarding their health problems Personal Care manager is assigned.
6. **Camera Option:** Camera Option allows patient to click photos of their prescriptions and reports so that they can easily send it over the application.
7. **Vital Graphs:** Vitals graphs are automatically generated according to the readings filled by the patient over the application.
8. **Play Meditations:** Meditations can be played over the Application

9. **Upload PDF**: Patients can upload their prescriptions and reports in PDF format over the Application.
10. **Upload Images**: Patients can upload the images of their reports and prescriptions which are stored in their phone's gallery
11. **Book Lab Tests:** Patients can book their lab tests to get their overall body check up done.
12. **Buy Sugar/BP monitor:** Patients can buy Sugar/BP monitor online through application whenever they feel it's necessary.
13. **Refer Friends and Family:** Patients can refer their family and friends about the application and can get discount on their program.
14. **Blog**: Blogs contain many information regarding the Diabetes and it's complication which can help patients to gain knowledge and awareness about Diabetes and how it impacts their health.
15. **TV**: TV includes all the important videos which guides patients about the application and gives information regarding diabetes and it's complications

Figure 3. Various options over Zyla Application

Source: https://play.google.com/store/apps/details?id=com.zylahealth.zylapatient&hl=en_IE



Fig, 4 Main features of mHealth Diabetes Management

Benefits of a digital engagement or digital platforms in managing blood sugar levels of patients.

1. **Affordability,Accesibility and Availability:** Patients don't have to physically visit the doctors, they can use their mobile phones to get assistance as to how to control their blood sugar levels or manage their overall health. This makes the service affordable to them. They can use their mobile phones anytime and anywhere which makes the digital service accessible and available.

2. **Speedy Communication**: Patients can communicate on the chat application anywhere and anytime they want and they get a real-time response too.

3. **Easy Health Tracking**: Health of the patient is tracked easily through share my routine and share my vitals options on the applications. Patients can fill their daily routine and their blood pressure readings and sugar readings, which helps healthcare professionals to track health of the patients easily.

4. **Paperless Medical documentation**: Patients do not have to submit any hard copy of prescriptions and reports. Patients can send their reports and prescriptions in the form of PDF or images over the application. Patients get their HP from medical professionals over the application itself.

Challenges of Digital engagement to manage blood sugar levels are as follows:

- **Technical glitches over the Applications:** Technical glitches over the application will pose a hindrance to diabetes management over the application and hence the patient won't be able to communicate over the application.

- **Complexity:** Patients of age group between 45-65 yrs of age sometimes find it very difficult to use the application as they are not used to handle the mobile application.

- **Security Threat:** The mobile technology involves the transfer of data from one device to another device through wireless atmospheric media in the form of radio signals, which are prone to theft, distortion, modification and loss.

DISCUSSION

Patient Care- Diabetes Management related Digital services.

- **Zyla-Control your diabetes:** Zyla is an application to treat diabetes that aims to lower the sugar levels of patients across India. It also focuses on a holistic approach to health management in which Zyla takes care of organ to organ health, liver health, blood pressure, kidney health, heart health and patient weight by providing patient-centered advice, personalized and dynamic health plan, and personalized exercise plan. Zyla also provides the patients with unlimited chat options so they can ask any questions during the program whenever they wish.

    - **FEATURES**
        - **Personalized and Dynamic Health Plan** – It's a medical and nutritional guide which is given to the patient over the application so that they can follow the guide and manage their blood sugar levels.
        - **Care manager** – A care manager is personally assigned to the patient to clear all his doubts regarding his health, disease and it's complications
        - **Regular follow-up** – Regular follow up is done to send reminders and guide the patients about the exercise and Health plan in detail. Follow up is also done to track the patient's health status over the period of time.

- **Apollo Sugar**-Apollo Sugar app helps deliver superior and positive patient outcomes with glucose tracking, and self-management of blood glucose levels. The approach is based on connected diabetes care and technology with a human touch that keeps you always in good hands and can help patients achieve control of Diabetes (HBA1c, FF, PP).
    - **FEATURES**
        - With this app, Patients can now access your Prescriptions, Lab Reports, and Vitals and get support whenever you need to understand these results and the related treatment plan.
        - Diabetic Patients also get to chat with a personalized Health Coach, get personalized educational information on diabetes, and access personalized tips and reminders on the diet, medication compliance and activity tracking. The app is a complete solution, a seamless extension of our expert clinics, to enable you as a patient to comply with treatment, interact with health coaches, and maintain optimum blood glucose levels.

- **Intellin-Diabetes Management and Risk Predictor-** Intellin was developed in the UK with passion from clinicians and people with diabetes. Intellin has made Diabetes management easy, for free! Intellin is the most comprehensive way to live well with diabetes and it makes the patient understand their risk of developing complications. Intellin gives personalized predictions on patient's highest risk areas and provides tips on how to prevent these complications.
    - **FEATURES**
        - Patients can Easily log their blood pressure, activity, body mass index, insulin dose, blood glucose levels and more
        - Patients can See blood sugar level trends

- Patients can Understand highest risk areas and how to manage them
- Patients can Get reminders and tips on how to look after your blood pressure, diet, exercise, feet, eyes, kidneys and cardiovascular risks
- Patients can Manage their Type 1 and Type 2 diabetes with motivating trends and feedback
- Daily, weekly, monthly and yearly analysis
- Secure data backup

- **Glucose Buddy**- It is the most common application used by Android and Apple users to control diabetes. This free app is a data storage tool that allows users to enter glucose levels, carb intake, insulin dosages and activity manually, and then display their online account log. Push reminders help ensure transparency for users.

The main three points derived from the Literature Review are as follows.

- Diabetes Management Digital services allow patients to become aware of their bad food habits and their sloppy lifestyle, which has made them diabetic. It also makes them gain knowledge about the Diabetes and its complications.

- mHealth has actually contributed a lot in the management of blood sugar levels and in the patients with diabetes mellitus 2. Patients experience significant improvement in their blood sugar levels after following the Health plan and exercise plan over the application.

- mHealth has played a major role in providing healthcare services, which are affordable, accessible and available to all the people who are in need for healthcare services.

CONCLUSION

The basic concepts of m-health approaches used for digital diabetes treatment and self-management are based on the following tasks currently embedded in most existing smartphone devices.

I. Remote blood glucose level monitoring and recording self-measurements;

II Enhanced diet and a balanced lifestyle;

III. Better Physical exercise

IV. Consistency with the medicines;

V. Knowledge and understanding of disease and its complications;

VI. Calculation of the Insulin dosage;

VII. Real time input and sharing of information between patient and physician.

The clinical advantages of diabetes self-management for both patients and healthcare providers are well-known. These can be summed up as

I. To provide guidance to the diabetic patients as to when and where to self –monitor blood glucose and other variables like Blood pressure, weight and diet.

II .Encouraging diabetic patients to manage their Blood sugar levels by inculcating the self-efficacy.

III. . To accomplish pre-set treatment goals and provide patients and doctors with direct input on progress and Compliance to therapy.

IV. To encourage doctors to enable self care of patients for improved results with probable reduction in costs

It has been seen that digital platforms play an important role in the lives of many people. It provides them with various kinds of information and keeps the people updated on a day to day basis. People get information, entertainment, music videos, audios to listen and much more. Health is a very big concern and needs to be looked upon on a regular basis. Digital platforms or digital engagement can help patients to manage their health as most of the people have their phones and use them on a daily basis. Digital Engagement can help patients with diabetes mellitus 2 to manage their blood sugar levels through small lifestyle changes by providing them personalized health plan and exercise plan over the application on the mobile phone.

Diabetes Management Digital services allow patients to become aware of their bad food habits and their sloppy lifestyle, which has made them diabetic. It also makes them gain knowledge about the Diabetes and its complications.

The bot is seen from the user's perspective as an expert in a particular domain, with a personality and human-like features. Through the passage of time, when the user communicates socially with the bot, the user becomes attached to the bot in almost the same way they would with a friend or family member. This social relation creates accountability and engagement between the user and the bot. The bot is responsible for the needs of the user and thus the user is obliged to meet the expectations of the bot.

Each year diabetes affects a large number of people. Medical and behavioral therapies are beneficial but only if patients modify their habits effectively and permanently. Mobile technology offers an enormous opportunity to integrate into the daily lives of patients in ways that allow long-term change in behaviour. The current mobile applications, however, have minimal functionality and are not accessible to a wide segment of the population.

SUGGESTIONS FOR IMPROVEMENT

- App Training should be given to all the patients to make them access the Application. Application training helps the patients to use the application in an efficient way.

- Scheduled Maintenance of the application to avoid technical glitches. Technical Glitches in the application pose a hindrance in the digital engagement between the patients and healthcare professionals.

- **Data security**: Data security is very important to avoid the risk of the leakage, distortion and manipulation of the data by the hackers. Patients personal health information needs to be secured and there are some ways by which this can be done like encryption and safeguarding

INTRUMENTATION

- Mobile Applications.
- Internet
- Research papers from websites
- Articles from websites

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