



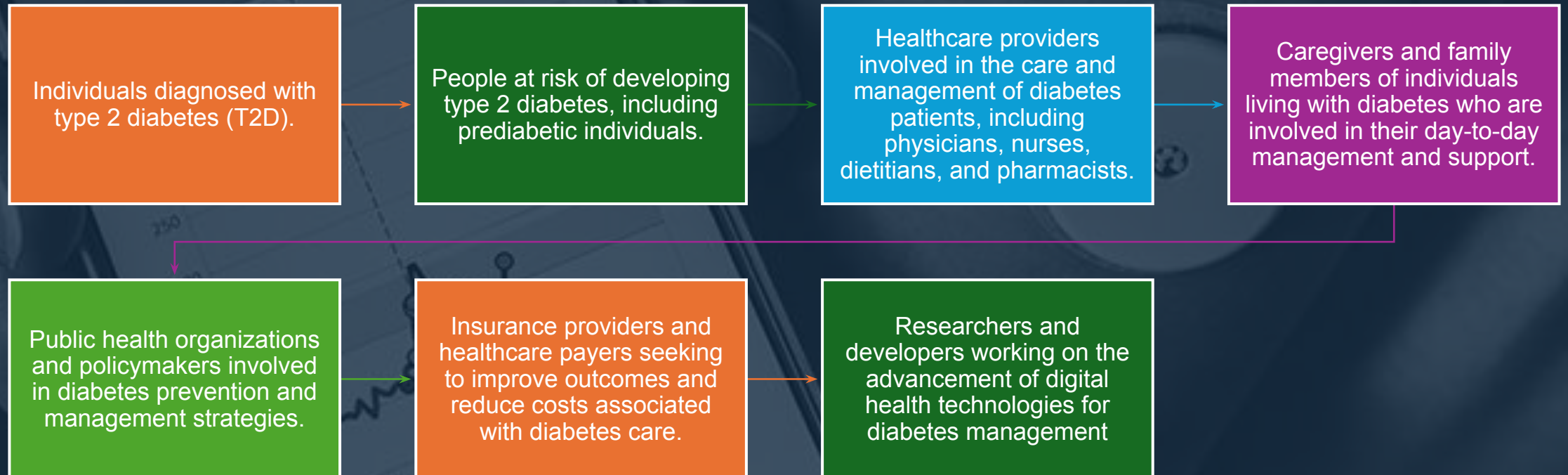
Maximizing prevention though informatics: In diabetic management

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Introduction

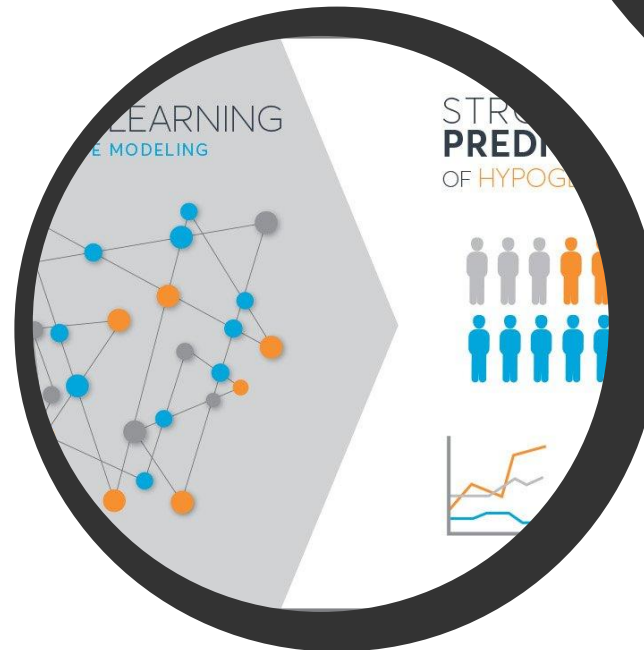
- Diabetes affects many people globally, mostly Type 2. Keeping blood sugar levels in check is crucial to avoid serious health problems and even death. But it's hard and expensive to do this all the time. We need new ways for people to take care of themselves better. Health technology, like apps and gadgets, can help make healthcare easier and cheaper. That's where digital health comes in. It uses technology to improve how we manage diseases like diabetes. This field is growing fast, with over \$4.5 billion invested in 2015.

Target population



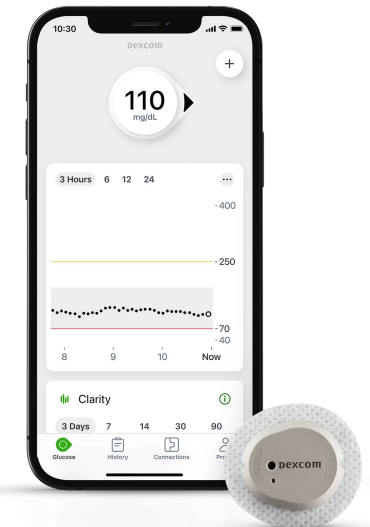
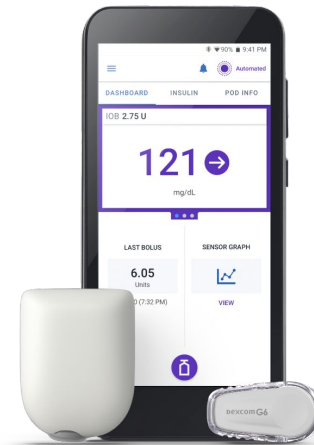
Different areas where we use HIT in diabetic care

- Mobile Applications and Personalizing Interventions for Lifestyle Modifications.
- Wearable Devices (Continuous Glucose Monitoring)
- Continuous Subcutaneous Injection
- Electronic Health Records (EHR)
- Telemedicine Platform for Diabetics
- Predictive Modeling
- Remote Monitoring Using Health Information Technology



CONTINUOUS GLUCOSE MONITORING

- Nowadays, many devices are being used CGM like Dexcom, Omnipod, and Tandem are among the popular choices.



How these tools impacting public health ??



REMOTE
MONITORING
AND
TELEMEDICINE



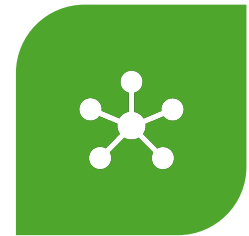
DATA ANALYTICS
AND DECISION
SUPPORT
SYSTEMS



PATIENT
EDUCATION AND
ENGAGEMENT



POPULATION
HEALTH
MANAGEMENT



INTEROPERABI
LITY AND CARE
COORDINATION

Key Research Insights

•Mobile health (mHealth) utilizes mobile technology to promote healthcare and encourage healthy lifestyle choices. This systematic review assesses the effectiveness of text messaging interventions on HbA1c levels in patients with Type 2 diabetes mellitus (T2DM). Eleven randomized controlled trials involving 1710 participants were included. Studies primarily focused on educational and motivational messages. Meta-analysis of nine studies showed a significant reduction in HbA1c levels by 0.38%. Lifestyle-focused text messaging proves to be a cost-effective strategy for motivating T2DM patients to adhere to healthy habits. Additionally, personalized interventions through health information technology, such as mobile apps for dietary tracking and physical activity monitoring, have shown promising results in achieving reductions in diabetic management.

The screenshot shows the PubMed website interface. At the top, there's a navigation bar with the NIH logo and 'National Library of Medicine' text. Below this is a search bar with the PubMed logo and a 'Search' button. The main content area displays the article title 'Mobile phone text messaging in improving glycaemic control for patients with type 2 diabetes mellitus: A systematic review and meta-analysis' by Rabbia Haider, Likhitha Sudini, Clara K Chow, and N Wah Cheung. The article is categorized as a 'Meta-Analysis' and is from 'Diabetes Res Clin Pract'. The abstract is visible, starting with 'Background: Mobile health is the use of mobile technology in developing healthcare, with the aim of reminding and motivating patients to adopt a healthy lifestyle. We conducted a systematic review assessing the effectiveness of text-messaging interventions on HbA1c in patients with Type 2 diabetes mellitus (T2DM). Methods: Two authors independently searched MEDLINE, Embase, CINAHL, Cochrane Register of Randomized Control Trials and PsychInfo. The review included randomized control trials with at least 4 weeks follow up, evaluating the effect of text messaging on HbA1c, in patients with T2DM. Trials involving participants with Type 1 diabetes mellitus, pre-diabetes or gestational diabetes, or...'. On the right side, there are links for 'FULL TEXT LINKS', 'ACTIONS' (Cite, Collections), 'SHARE' (Twitter, Facebook, LinkedIn), 'PAGE NAVIGATION' (Title & authors, Abstract, Similar articles), and 'Display options'.

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Meta-Analysis > Diabetes Res Clin Pract. 2019 Apr;150:27-37.
doi: 10.1016/j.diabres.2019.02.022. Epub 2019 Feb 26.

Mobile phone text messaging in improving glycaemic control for patients with type 2 diabetes mellitus: A systematic review and meta-analysis

Rabbia Haider¹, Likhitha Sudini², Clara K Chow³, N Wah Cheung³

Affiliations + expand
PMID: 30822496 DOI: 10.1016/j.diabres.2019.02.022

Abstract

Background: Mobile health is the use of mobile technology in developing healthcare, with the aim of reminding and motivating patients to adopt a healthy lifestyle. We conducted a systematic review assessing the effectiveness of text-messaging interventions on HbA1c in patients with Type 2 diabetes mellitus (T2DM).

Methods: Two authors independently searched MEDLINE, Embase, CINAHL, Cochrane Register of Randomized Control Trials and PsychInfo. The review included randomized control trials with at least 4 weeks follow up, evaluating the effect of text messaging on HbA1c, in patients with T2DM. Trials involving participants with Type 1 diabetes mellitus, pre-diabetes or gestational diabetes, or

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Data mining softwares in diabetes management

CART Data Mining Analysis: Age and Glycemic Control in Diabetes Patients

- Researchers used CART data-mining software to analyze data from 15,902 diabetes patients.
- Age emerged as the most significant factor associated with poor glycemic control (HbA1c >9.5).
- Surprisingly, patients younger than 65.6 years old showed worse glycemic control compared to older individuals.
- This discovery highlights the importance of targeting specific age groups in clinical interventions for better glycemic control.

Miyaki et al, 2002 ¹⁵	Science research	Feature selection	T2DM	165 patient's records	Classification/CART	SPSS Answer Tree 2.1 (IBM, Chicago, IL)	Best predictor
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- Data-Forest Software

- DataForest software used to predict next-morning fasting blood glucose (FBG).
- Study involved four type 1 diabetes mellitus (T1DM) patients over 150 days.
- Classification techniques applied to data including FBG, metabolic rate, food intake, and physical condition.
- Physical condition emerged as most correlated and predictive of FBG levels.
- Highlights importance of monitoring and addressing physical condition in managing FBG among T1DM patients.

Network analysis



Healthcare Flow Analysis:

Identifying system inefficiencies in diabetes care delivery.
Improving patient access and treatment timelines.



Adverse Drug Effect Analysis:

Assessing safety and effectiveness of diabetes medications.
Informing patients and providers about potential risks.



Insurance Fraud Detection:

Identifying fraudulent activities in healthcare claims.
Preventing financial losses and misuse of resources.



Clinical Guidelines Enrichment:

Updating treatment protocols with data-driven insights.
Tailoring guidelines for personalized patient care.



Prediction of Early Mortality:

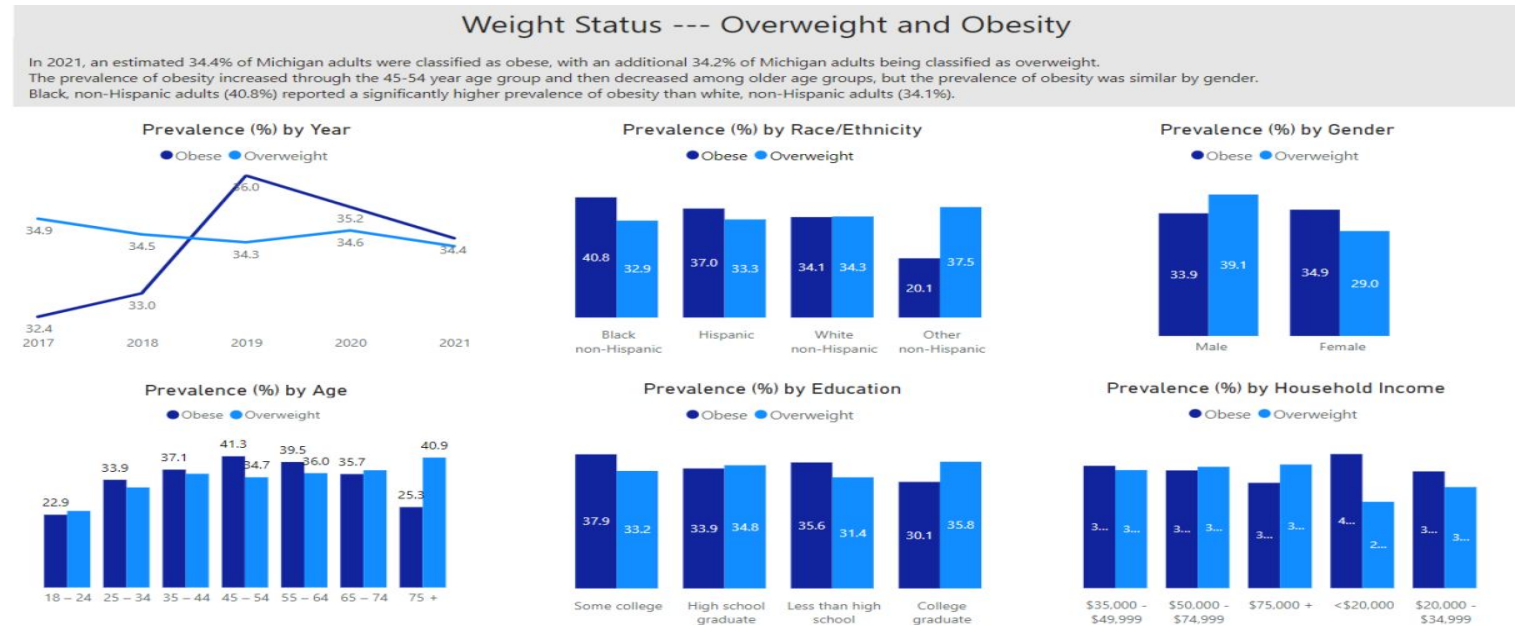
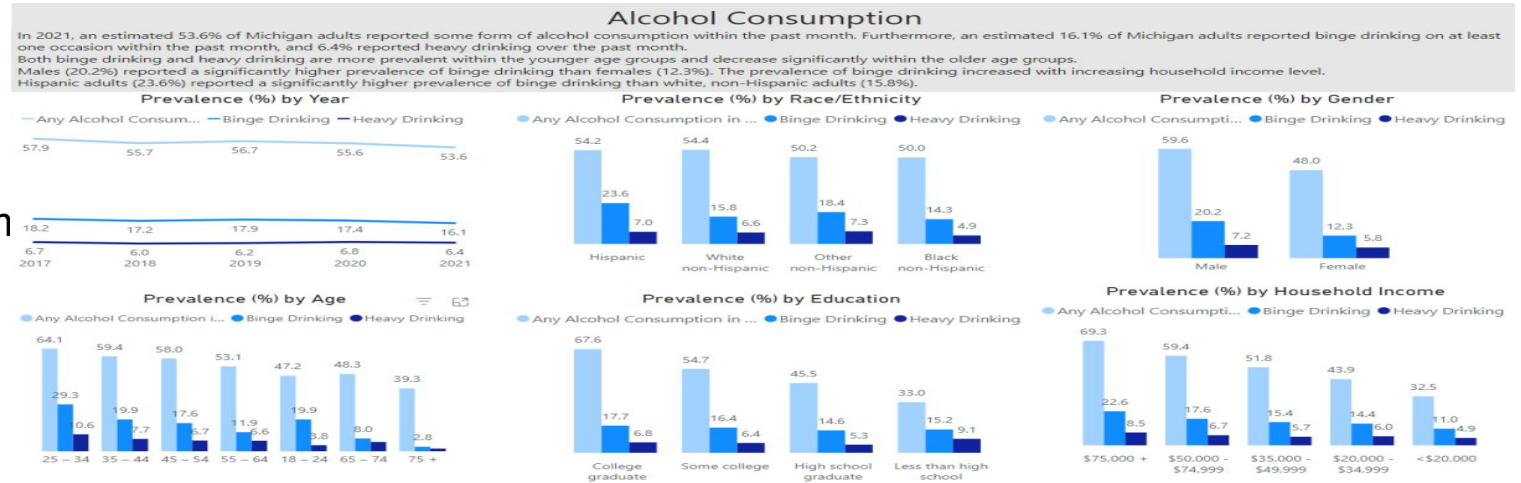
Identifying factors linked to increased mortality risk.
Enabling early intervention to improve patient outcomes.

Temporal analysis

- Prevalence Estimates for Risk Factors (2017-2021): Insights into health trends and challenges faced by the Michigan population.

❖ Common Risk Factors:

- Obesity
- Sedentary Lifestyle (No Leisure Physical Tin
- Alcohol Consumption
- Cigarette Smoking
- Hypertension Awareness
- Lack of Routine Checkups
- Age (Risk Increases with Age)
- Metabolic Syndromes
- Ethnicity (Certain Groups at Higher Risk):
- African Americans
- Hispanic/Latino Americans
- Native Americans
- Asian Americans



michigan.gov/mdhhs/keep-mi-healthy/chronicdiseases/diabetes/michigan-diabetes-statistics-and-reports

Health & Human Services

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Michigan Diabetes Statistics and Reports

Home > Keeping Michigan Healthy > Chronic Diseases > Diabetes > Michigan Diabetes Statistics and Reports

A number of data sources are available to and through the Diabetes Prevention and Control Program about:

- Diabetes burden
- Diabetes-related indicators
- Complications
- Mortality

These sources include:



❖ Michigan DPCP's Five-Year Plan:

Enhancing diabetes care through collaborative efforts

Primary Focus Areas:

- **State Leadership Objective:**
 - Establishing partnerships and supporting professionals.
- **Diabetes Prevention Goals:**
 - Enhancing accessibility of prevention programs.
 - Improving policies for prediabetes interventions.
 - Implementing early detection systems.
- **Diabetes Management Targets:**
 - Enhancing medical coverage and assistance.
 - Utilizing technology and motivating healthcare providers.
- **Emphasis on Health Equity:**
 - Prioritizing communities with the greatest needs.



The Burden of Diabetes in Michigan

Diabetes is an epidemic in the United States. According to the Centers for Disease Control and Prevention (CDC), over 34 million Americans have diabetes and face its devastating consequences. What's true nationwide is also true in Michigan.

Michigan's diabetes epidemic:

- Approximately **912,794 people** in Michigan, or 11.5% of the adult population, have **diagnosed diabetes**.
- An additional **239,000 people** in Michigan have diabetes but don't know it, greatly increasing their health risk.
- There are **2,701,000 people** in Michigan, 34.7% of the adult population, who have **prediabetes** with blood glucose levels that are higher than normal but not yet high enough to be diagnosed as diabetes.
- Every year an estimated **69,534 people** in Michigan are diagnosed with diabetes.

Diagnosed diabetes costs an estimated \$9.7 billion Michigan each year.

The serious complications include heart disease, stroke, amputation, end-stage kidney disease, blindness—and death.

Diabetes is expensive:

People with diabetes have **medical expenses approximately 2.3 times higher** than those who do not have diabetes.

- Total **direct medical expenses** for diagnosed diabetes in Michigan were estimated at **\$7 billion** in 2017.
- In addition, another **\$2.7 billion** was spent on **indirect costs** from lost productivity due to diabetes.

Improving lives, preventing diabetes and finding a cure:

In 2021, the **National Institute of Diabetes and Digestive and Kidney Diseases** at the National Institutes of Health invested **\$81,411,492** in diabetes-related research projects in Michigan.

The **Division of Diabetes Translation** at the CDC provided **\$3,710,018** in diabetes prevention and educational grants in Michigan in 2018.

Diabetes Improvement Plan 2021-2025

Executive Summary

The Diabetes Prevention and Control Program (DPCP) at the Michigan Department of Health and Human Services has created this five-year Diabetes Improvement Plan in collaboration with partners who represent many facets of diabetes experience, care, and advocacy. It reflects the priorities expressed by these partners, and our commitment to Michigan residents with diabetes.

In the plan that follows, the DPCP outlines the following three priority areas and their goals:

State Leadership	Diabetes Prevention	Diabetes Management
Enhance network partnerships.	Reduce barriers to Diabetes Prevention Program (DPP) participant engagement and success.	Enhance medical coverage of Diabetes Self-Management Education and Support (DSMES).
Engage leaders.	Enhance policy and coverage for prediabetes and the DPP.	Increase utilization of technology.
Drive innovation and expand cross-program collaboration.	Build systems to support "Screen, Test, Refer" for prediabetes.	Increase incentives for health care providers.
Provide support and educational opportunities for diabetes professionals.		Advance care for people living with diabetes.

Many of the strategies we will use to address these goals highlight health equity. The impact of diabetes varies greatly between communities, and ensuring that increased resources are directed to those with greatest needs can reduce diabetes disparities and improve population health for Michigan residents.

This plan is not meant to represent all the work being done by the Diabetes Prevention and Control Program or our partners. We are funded through multiple sources, including the Centers for Disease Control and Prevention, and our work is far-reaching and complex. The goals in the Diabetes Improvement Plan represent our commitment to improve access to diabetes prevention and management resources in communities that need them most, and to advance in the areas that are most relevant to our partners.



Challenges

- Data privacy and security concerns.
- Interoperability issues between different health information systems.
- Integration into existing healthcare workflows and infrastructure.
- Limited access to technology among certain patient populations.
- Ensuring the accuracy and reliability of data collected through informatics tools.
- Cost-effectiveness and financial sustainability of implementing informatics solutions.
- Training and education of healthcare professionals and patients on how to effectively utilize these tools.
- Overcoming resistance to change and adoption of new technologies within healthcare organizations.
- Addressing disparities in access to healthcare and technology among different socioeconomic groups.
- Regulatory challenges and compliance with healthcare laws and standards.

Opportunities for new areas of research



Data Integration and Interoperability: Improve system compatibility for seamless data exchange in diabetes management.



Personalized Medicine: Utilize health informatics for tailored treatment plans considering individual factors.



Clinical Decision Support Systems (CDSS): Assess CDSS impact on evidence-based care, diagnosis, and medication management in diabetes.



Patient-Centered Outcomes Research: Engage stakeholders in analyzing patient-reported outcomes for improved diabetes care.



Conclusion

- In short, using technology to manage diabetes looks promising. It helps doctors get patient information quickly, allows for remote monitoring, and supports making better treatment decisions. But there are problems like keeping data safe and making different systems work together. Despite these issues, technology can make a big difference in improving patient health and reducing differences in healthcare. To make it work well, doctors and patients need proper training, and the technology needs to fit into existing routines. Even though there are challenges like privacy concerns and not enough money, technology can help manage diabetes better by improving things like blood sugar levels (HbA1c) and complications like type 2 diabetes. In the future, we need to keep improving usage of health informatics tools for better diabetes care management.

Citations

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THANK YOU