

Management of Disease State: Medications and therapy choices for managing long-term health issues like diabetes, high blood pressure, and asthma.

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Abstract

The management of chronic disease states such as diabetes, hypertension, and asthma is multifaceted, requiring a comprehensive approach that includes medication adherence, lifestyle modifications, and continuous monitoring. This review explores the pharmacological and non-pharmacological strategies employed in the long-term management of these conditions. For diabetes, treatment regimens often include insulin therapy, oral hypoglycemics, and newer agents like GLP-1 receptor agonists, combined with dietary and exercise interventions. Hypertension management typically involves a combination of antihypertensive medications such as ACE inhibitors, beta-blockers, and diuretics, alongside lifestyle changes like salt reduction and weight management. Asthma control is achieved through the use of inhaled corticosteroids, bronchodilators, and biologic agents, with an emphasis on avoiding triggers and adhering to an asthma action plan. Effective management of these chronic conditions relies on individualized treatment plans, patient education, and regular follow-ups to adjust therapy and ensure optimal outcomes.

Keywords: *diabetes, insulin therapy, oral hypoglycaemic agents, ACE inhibitors, beta-blockers, calcium channel blockers, and diuretics.*

1. Introduction

This necessitates a multifaceted approach that incorporates a combination of pharmacological treatments, lifestyle modifications, patient education, and regular monitoring. Diabetes management involves a delicate balance of blood glucose control through medications like insulin and oral hypoglycemic agents, complemented by dietary adjustments and physical activity (1). Hypertension, a leading cause of cardiovascular diseases, requires the use of antihypertensive drugs, alongside lifestyle interventions like sodium reduction and weight management. Asthma, characterized by chronic airway inflammation, is managed with inhaled corticosteroids, bronchodilators, and personalized asthma action plans to prevent exacerbations and maintain optimal lung function. The groundwork for a detailed examination of the medications and therapy choices essential for the effective management of these chronic diseases, highlighting the importance of individualized treatment plans and the integration of various therapeutic strategies to achieve the best possible outcomes for patients. Chronic diseases such as diabetes, high blood pressure, and asthma are prevalent health issues that require meticulous and ongoing management to prevent severe complications and maintain patients' quality of life. The effective management of these conditions involves a comprehensive approach that includes pharmacological therapies, lifestyle modifications, patient education, and regular monitoring. Diabetes management focuses on maintaining blood glucose levels within a target range through medications such as insulin and oral hypoglycemic agents, combined with dietary adjustments and physical activity. Effective hypertension management typically involves a combination of antihypertensive medications, including ACE inhibitors, beta-blockers, and diuretics, alongside lifestyle changes such as sodium reduction and regular exercise. Asthma management aims to control symptoms and prevent exacerbations through the use of inhaled corticosteroids, bronchodilators, and personalized asthma action plans that include trigger avoidance and adherence to prescribed treatments. The stage for a detailed exploration of the various medications and therapeutic strategies used to manage these chronic diseases, emphasizing the importance of individualized treatment plans and the integration of multiple approaches to achieve optimal health outcomes for patients.

2. Literature survey

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The management of chronic diseases such as diabetes, high blood pressure, and asthma has garnered significant attention in the medical literature, reflecting the growing prevalence of these conditions and their impact on public health. Diabetes management has been extensively studied, with research by American Diabetes Association (2018) emphasizing the importance of individualized treatment plans that consider patient-specific factors, including age, comorbidities, and lifestyle. The introduction of continuous glucose monitoring systems and insulin pumps has revolutionized diabetes care, allowing for more precise control of blood glucose levels and improved patient outcomes (Buse et al., 2020). Similarly, the management of hypertension has evolved, with guidelines from the American College of Cardiology and American Heart Association (2017) recommending a combination of lifestyle modifications and pharmacotherapy tailored to the severity of the condition. Studies have shown that adherence to antihypertensive medications significantly reduces the risk of cardiovascular events, highlighting the need for effective patient education and support systems to enhance compliance (Whelton et al., 2018). Asthma management literature emphasizes the importance of a stepwise approach to therapy, as outlined by the Global Initiative for Asthma (2021). This approach involves assessing the severity of the disease and adjusting treatment based on symptom control and exacerbation history. Recent advancements in biologic therapies have provided new options for patients with severe asthma, demonstrating significant improvements in lung function and quality of life (Peters et al., 2019). Furthermore, the integration of digital health technologies, such as mobile applications and telehealth services, has been shown to enhance disease management by facilitating real-time monitoring and communication between patients and healthcare providers (Bashshur et al., 2020). Despite these advancements, challenges remain in the management of these chronic conditions. Research indicates that social determinants of health, including socioeconomic status and access to care, significantly influence treatment adherence and health outcomes (Gonzalez et al., 2018). Additionally, the need for personalized medicine is increasingly recognized, as genetic and environmental factors can affect individual responses to medications (Klein et al., 2019). As the healthcare landscape continues to evolve, ongoing research is essential to develop innovative strategies that address these challenges and improve the management of chronic diseases. This literature survey underscores the importance of a multifaceted approach that combines pharmacotherapy, patient education, and the use of technology to optimize treatment outcomes for individuals living with diabetes, high blood pressure, and asthma.

3. Existing systems and proposed system

Current systems for managing, and asthma primarily rely on traditional healthcare models, which include regular physician visits, manual tracking of symptoms and medication adherence, and reliance on paper-based records. Patients often use standalone applications or devices to monitor their conditions, such as glucose meters for diabetes or blood pressure cuffs for hypertension. However, these systems tend to operate in silos, lacking integration and real-time data sharing among healthcare providers, patients, and caregivers. Additionally, existing electronic health record (EHR) systems may not fully support comprehensive disease management, as they often focus on episodic care rather than continuous monitoring and proactive management. Patients may receive generic treatment plans that do not account for individual variations in response to medications or lifestyle factors. Furthermore, the lack of personalized insights can lead to suboptimal therapy choices, resulting in poor health outcomes and increased healthcare costs.

Proposed System

The proposed system for the management of disease states focuses on optimizing medication therapy and enhancing patient engagement for chronic conditions such as diabetes, high blood pressure, and asthma. By integrating a patient-centric database, clinical decision support, medication management tools, telehealth capabilities, and data analytics, this system aims to improve medication adherence, enhance patient outcomes, and empower patients to take an active role in managing their long-term health issues. Ultimately, this comprehensive approach will contribute to better health outcomes, reduced healthcare costs, and improved quality of life for patients living with chronic diseases.

4. Exercise for Obese Hypertensive Management

Aerobic activities such as brisk walking, swimming, and cycling help reduce blood pressure and improve cardiovascular health. Resistance training is also beneficial as it enhances muscle strength and metabolism. It's

important to start slowly and gradually increase intensity to avoid injury. Consulting with a healthcare provider before starting any exercise regimen is essential to ensure safety and effectiveness.

Medications and Therapy Choices

Managing long-term health issues in obese patients often requires a combination of medications and lifestyle interventions. For diabetes, medications like metformin, GLP-1 receptor agonists, and SGLT2 inhibitors are commonly prescribed alongside dietary changes and regular physical activity to control blood sugar levels. In hypertension management, medications such as ACE inhibitors, beta-blockers, diuretics, and calcium channel blockers are used to maintain blood pressure within a normal range. For asthma, inhaled corticosteroids, long-acting beta agonists, and leukotriene modifiers help manage symptoms and prevent exacerbations. In addition to medications, lifestyle modifications play a crucial role. Dietary changes, such as reducing sodium intake for hypertension or carbohydrate monitoring for diabetes, are vital. Weight management through a balanced diet and regular physical activity can improve overall health outcomes and reduce the severity of these chronic conditions. Behavioral therapies and support groups can also provide the necessary psychological support and motivation to adhere to treatment plans. Overall, a multidisciplinary approach involving healthcare providers, dietitians, exercise specialists, and mental health professionals is essential to effectively manage these chronic health issues and improve the quality of life for obese individuals.

5. Exercise for the Obese Hypertensive

Exercise is a cornerstone in the management of diabetes, particularly in individuals with obesity. Regular physical activity improves insulin sensitivity, aids in weight loss, and enhances cardiovascular health, which is crucial for managing diabetes and its complications. Exercise, combined with a healthy diet, can significantly reduce blood glucose levels and improve overall metabolic control. For individuals with diabetes and obesity, a comprehensive management plan often includes medications and lifestyle modifications. Common medications include metformin, which improves insulin sensitivity and reduces hepatic glucose production, and newer classes of drugs such as glp-1 which promote weight loss and cardiovascular benefits. Insulin therapy may also be necessary for those with advanced diabetes or when other medications are insufficient to control blood sugar levels in addition to pharmacotherapy, lifestyle interventions are essential (5). Structured exercise programs tailored to the individual's capabilities and preferences, such as walking, swimming, or resistance training, are recommended. These programs should aim for at least 150 minutes of moderate-intensity aerobic activity per week, along with muscle-strengthening activities on two or more days per week. Managing and asthma in patients with diabetes and obesity requires an integrated approach. Antihypertensive medications, such as ace inhibitors or angiotensin ii receptor blockers, are often prescribed to manage blood pressure and protect kidney function. For asthma, inhaled corticosteroids and bronchodilators are commonly used to control symptoms and prevent exacerbations. Ultimately, a multidisciplinary approach that combines medication, lifestyle changes, and regular monitoring is essential for effectively managing diabetes in individuals with obesity

Exercise for Diabetes in Obesity

Environmental health and safety compliance is a crucial aspect of pharmacy security services, ensuring that pharmacy operations not only protect patients and staff but also adhere to regulatory standards and promote a sustainable environment. This involves following strict guidelines for the storage, handling, and disposal of hazardous materials, including pharmaceuticals, to prevent contamination and environmental harm. Pharmacies must implement protocols for the safe disposal of expired or unused medications, utilizing take-back programs or partnering with certified disposal companies to ensure these substances do not end up in landfills or water supplies. Compliance with Occupational Safety and Health Administration (OSHA) standards ensures a safe working environment, requiring the use of personal protective equipment (PPE), proper ventilation systems, and ergonomic workspaces to prevent injuries and health issues among staff. Regular training and audits help maintain adherence to these standards, ensuring that all employees are aware of and follow safety procedures (6). By maintaining rigorous environmental health and safety compliance, pharmacies can mitigate risks, protect public health, and contribute to environmental sustainability, while ensuring operational integrity and regulatory compliance.

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6. Dietary Measures for Hypertension Management in Obesity

Managing hypertension in individuals with obesity requires a multifaceted approach, where dietary measures play a pivotal role alongside medications and other therapies. A diet tailored to reduce blood pressure and support weight management is crucial. The Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes high intake of fruits, vegetables, whole grains, and lean proteins while reducing sodium, saturated fats, and added sugars, is particularly effective. High potassium foods such as bananas, spinach, and sweet potatoes are also beneficial as potassium helps counteract the effects of sodium and supports cardiovascular health. In conjunction with dietary changes, medications are often necessary to control blood pressure. Commonly prescribed antihypertensives include diuretics, which help reduce fluid retention; which relax blood vessels; and calcium channel blockers, which also help to lower blood pressure. These medications can help manage hypertension and prevent complications related to cardiovascular health. Lifestyle interventions such as regular physical activity are also critical. Exercise not only supports weight loss but also improves cardiovascular function and helps regulate blood pressure. A combination of aerobic exercises and resistance training is recommended to achieve and maintain a healthy weight and enhance overall health. For individuals managing additional a comprehensive treatment plan is essential. For diabetes, medications such as metformin and lifestyle modifications help manage blood glucose levels. For asthma, inhaled corticosteroids and bronchodilators are used to control symptoms and prevent exacerbations. Ultimately, a holistic approach integrating dietary measures, medications, exercise, and ongoing monitoring is vital for effective management of hypertension in obese individuals.

7. Key Components of Effective Lifestyle Interventions for the Management of Disease States

Effective lifestyle interventions are crucial for managing. These interventions focus on modifying daily habits to improve overall health and complement pharmacotherapy.

1. Diet: A balanced, nutrient-rich diet is foundational. For diabetes, this includes managing carbohydrate intake, choosing high-fiber foods, and avoiding sugary snacks. The DASH diet is recommended for hypertension management, emphasizing fruits, vegetables, whole grains, and lean proteins while reducing sodium. A diet tailored to individual needs, often incorporating principles from the Mediterranean or low-carbohydrate diets, can also support weight management and improve blood pressure and glucose levels.

2. Physical Activity: Regular exercise is essential for managing these chronic conditions. For diabetes, consistent physical activity helps improve insulin sensitivity and blood glucose control. Aerobic exercises, such as walking or swimming, combined with resistance training, are recommended. For hypertension, exercise helps lower blood pressure and improve cardiovascular health. Patients with asthma should engage in activities that do not trigger their symptoms, with proper management to ensure safety.

3. Weight Management: Achieving and maintaining a healthy weight is critical, particularly for obesity-related conditions like diabetes and hypertension. Lifestyle interventions focusing on caloric control, balanced nutrition, and physical activity are key strategies (7). Weight loss can significantly improve blood glucose control and reduce blood pressure, leading to better overall health.

4. Stress Management: Techniques such as mindfulness, meditation, yoga, and relaxation exercises can help manage stress levels and improve overall well-being. Stress reduction can lead to better adherence to treatment plans and improved health outcomes.

5. Smoking Cessation and Alcohol Moderation: Avoiding tobacco and limiting alcohol intake are crucial for managing these conditions. Smoking cessation improves cardiovascular health and reduces the risk of complications in diabetes and hypertension. Moderate alcohol consumption is advised as excessive intake can adversely affect blood glucose levels and blood pressure.

6. Regular Monitoring and Education: Ongoing education about managing these conditions and regular monitoring of health parameters are vital. Patients should be encouraged to regularly check their blood glucose, blood pressure, and weight, and adjust their lifestyle and treatment plans as necessary.

Integrating these lifestyle interventions with appropriate medications and therapy choices creates a comprehensive management plan.

8. Quality Control and Assurance

Managing, and asthma often requires a comprehensive approach that includes medications, therapy, and lifestyle changes such as weight loss. Effective weight management is crucial as it can significantly impact these conditions. For diabetes, medications such as metformin, GLP-1 receptor agonists, and SGLT2 inhibitors are commonly prescribed, often in conjunction with lifestyle changes that include diet and exercise. High blood pressure management typically involves antihypertensive medications like ACE inhibitors, beta-blockers, and calcium channel blockers, alongside weight loss to reduce cardiovascular risk. Asthma management includes the use of inhaled corticosteroids, long-acting beta agonists, and leukotriene modifiers, with weight loss potentially improving lung function and reducing symptom severity. Increased physical activity, behavioral therapy, and sometimes pharmacotherapy or bariatric surgery. Continuous support and monitoring by healthcare providers are essential to ensure the effectiveness and sustainability of these interventions (8). By addressing weight alongside medical treatment, individuals can achieve better control of their conditions and improve their overall quality of life.

Managing and asthma requires a multifaceted approach, with weight loss playing a pivotal role. For diabetes, medications such as metformin, inhibitors are commonly prescribed to help control blood sugar levels. When combined with a healthy diet and regular exercise, these medications can be more effective. High blood pressure management often involves antihypertensive medications, including ACE inhibitors, beta-blockers, and calcium channel blockers. Weight loss can enhance the effectiveness of these medications and lower cardiovascular risk. Asthma management typically includes inhaled corticosteroids, long-acting beta agonists, and leukotriene modifiers. Weight loss can lead to better lung function and reduced severity of asthma symptoms. Long-term weight loss strategies include dietary changes, increased physical activity, behavioral therapy, and sometimes pharmacotherapy or bariatric surgery. Continuous support and monitoring from healthcare providers are essential to ensure these interventions are effective and sustainable. By integrating weight management with medical treatments, individuals can achieve better control of their conditions and improve their overall health and quality of life.

9. Dietary Prescriptions

Managing, and asthma involves a combination of medications, therapy, and dietary prescriptions. For diabetes, a diet low in refined sugars and high in fiber, combined with medications like metformin, A heart-healthy diet rich in fruits, vegetables, whole grains, and lean proteins is crucial for individuals with high blood pressure, complementing medications and calcium channel blockers to effectively lower blood pressure (9). For asthma, reducing intake of foods that can trigger inflammation, such as processed foods and those high in trans fats, can support medications like inhaled corticosteroids and long-acting beta agonists in managing symptoms. Additionally, weight loss through proper diet can improve overall outcomes for these conditions. Nutritional counseling and tailored dietary plans provided by healthcare professionals can ensure adherence and effectiveness. Integrating dietary changes with medical treatments helps achieve better control of these chronic diseases, enhancing overall health and quality of life.

Weight loss counselling in the clinic setting

Weight loss counselling in the clinic setting is an essential component for managing Effective weight management can significantly enhance the efficacy of medications and other therapies. For diabetes, medications like metformin, GLP-1 receptor agonists, and SGLT2 inhibitors work better when combined with a structured weight loss program, which helps in maintaining optimal blood sugar levels. In managing high blood pressure, antihypertensive medications and calcium channel blockers are more effective when patients achieve and maintain a healthy weight. For asthma, losing weight can improve lung function and reduce the severity of symptoms, enhancing the effectiveness of inhaled corticosteroids and long-acting beta agonists. Weight loss counseling typically includes personalized dietary advice, physical activity recommendations, behavioral therapy, and ongoing support to ensure sustainable lifestyle changes. Healthcare providers play a crucial role in monitoring progress, adjusting treatment plans, and providing motivation. Integrating weight loss counseling with medical treatments in the clinic setting helps patients achieve better control over their chronic conditions, improving their overall health and quality of life.

10. Newer treatment modalities

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Newer treatment modalities for managing diabetes and asthma offer promising advancements in medications and therapies. For diabetes, innovative treatments like glucose monitoring (CGM) systems and advanced insulin pumps provide real-time data and precise insulin delivery, enhancing diabetes management. In the realm of high blood pressure, novel therapies like angiotensin receptor-neprilysin inhibitors (ARNIs) and renal denervation are emerging, providing more effective blood pressure control for patients resistant to traditional medications such as ACE inhibitors and beta-blockers. For asthma, biologics such as monoclonal antibodies (e.g., omalizumab, mepolizumab) target specific pathways in the inflammatory process, offering relief for severe asthma that is not responsive to conventional inhaled corticosteroids and long-acting beta agonists (10). Additionally, the use of smart inhalers equipped with digital technology to monitor usage patterns and adherence is improving asthma management. These newer treatment modalities, when integrated with personalized medical care and lifestyle interventions, enhance the control of chronic diseases, improving patient outcomes and quality of life.

Physical activity

Incorporating physical activity into the management of diabetes and asthma significantly enhances the effectiveness of medications and therapy choices. Regular exercise helps improve insulin sensitivity and blood glucose control in diabetes patients, complementing medications like metformin, GLP-1 receptor agonists, and SGLT2 inhibitors. For individuals with high blood pressure, engaging in aerobic and resistance training can lower blood pressure levels and enhance the efficacy of antihypertensive medications such as ACE inhibitors, beta-blockers, and calcium channel blockers. Physical activity also aids in weight management, which is crucial for controlling both diabetes and hypertension. For asthma, regular exercise can strengthen respiratory muscles, improve lung function, and reduce the frequency and severity of asthma attacks. This supports the effectiveness of inhaled corticosteroids and long-acting beta agonists. Tailored exercise programs, developed with healthcare providers, ensure that patients engage in safe and effective physical activity suited to their conditions. By integrating physical activity with medical treatments, patients can achieve better control over their chronic diseases, improving their overall health, fitness, and quality of life.

Maintaining long-term weight control

Maintaining long-term weight control is crucial for effectively managing chronic health issues such as diabetes, high blood pressure, and asthma, as it enhances the benefits of medications and other therapies. For diabetes, consistent weight management can improve insulin sensitivity and glucose control, making medications like metformin, GLP-1 receptor agonists, and SGLT2 inhibitors more effective. In managing high blood pressure, sustained weight loss can significantly lower blood pressure levels, augmenting the impact of antihypertensive drugs such as ACE inhibitors, beta-blockers, and calcium channel blockers (11). For asthma, maintaining a healthy weight can improve lung function and reduce the severity and frequency of asthma attacks, thus supporting the effectiveness of inhaled corticosteroids and long-acting beta agonists. Strategies for long-term weight control include a balanced diet, regular physical activity, behavioral therapy, and, in some cases, pharmacotherapy or bariatric surgery. Continuous monitoring and support from healthcare providers are essential to help patients adhere to their weight management plans. By integrating weight control with medical treatments, individuals can achieve better disease management, improved health outcomes, and enhanced quality of life.

11. Conclusion and future work

In conclusion, the management of long-term health issues such as diabetes, high blood pressure, and asthma presents significant challenges that require a comprehensive and patient-centered approach. Traditional healthcare models, while foundational, often fall short in providing the personalized care and continuous monitoring necessary for effective disease management. The integration of advanced technologies, including Artificial Intelligence and data analytics, offers a promising pathway to enhance the management of these chronic conditions. Implementing an integrated system that facilitates real-time monitoring, personalized treatment plans, and seamless communication among patients and healthcare providers, we can significantly improve health outcomes and quality of life for individuals living with these diseases. Empowering patients with the tools and resources they need to actively participate in their care is essential for fostering adherence to treatment and making informed decisions about their health. As we move forward, it is crucial to address the barriers to implementing such innovative solutions, including ensuring data privacy, enhancing accessibility, and promoting health literacy among patients. Ultimately, a shift towards a more proactive and personalized approach in managing chronic diseases will not only improve individual

health outcomes but also contribute to the overall efficiency and sustainability of healthcare systems. By embracing these advancements, we can pave the way for a future where long-term health issues are managed more effectively, leading to healthier populations and reduced healthcare costs.

Future Work

Future work in the management of chronic diseases such as diabetes, high blood pressure, and asthma will likely focus on personalized medicine, technological advancements, and integrative healthcare approaches. Personalized medicine, including pharmacogenomics, will tailor treatments to individual genetic profiles, enhancing medication efficacy and minimizing side effects. Technological innovations such as advanced continuous glucose monitors, smart inhalers, and wearable fitness trackers will provide real-time health data, improving disease management and patient adherence. Integrative healthcare approaches that combine medical treatments with holistic lifestyle interventions, such as digital health platforms offering personalized diet and exercise plans, will become more prevalent. Research into novel therapies, including new drug classes and biologics, will continue to expand treatment options. Additionally, greater emphasis on patient education and support through telemedicine and digital health tools will empower patients to take an active role in managing their health. By leveraging these advancements, future strategies will aim to achieve more precise, effective, and sustainable management of chronic diseases, ultimately enhancing patient outcomes and quality of life.

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Conflicts of interest

The authors have no conflicts of interest to declare

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