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Understanding the Chronic Disease Management Programs: A Comprehensive Literature Review

[1]Grace A. Gbigbi-Jackson; [2]John Chika Aguguo MD; [3]Okelue.E. Okobi MD; [4]Oluwatosin B. Iyun, MD, MPH; [5]Linda Angela Mbah, MD, [6]Oluwadamilola, Daniel Odutola, (MD/MBBS)

[1]All Saints University School of Medicine, Dominica
[2] University of Nigeria, Nsukka, Nigeria
[3] Larkin Community Hospital, Hialeah, Florida, USA
[4] University of Cape Town, Cape Town, South Africa
[5] VA Northern Indiana Healthcare, Fortwayne, Indiana, USA
[6] Department of Internal Medicine, Medical University of South Carolina, USA

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ABSTRACT

Chronic diseases, such as diabetes, heart disease, and chronic obstructive pulmonary disease (COPD), persist over a year and necessitate ongoing medical attention or limit daily activities, posing significant challenges to global healthcare systems and economies. Chronic disease management programs (CDMPs) aim to provide comprehensive, patient-centered care worldwide. This review synthesizes evidence from diverse studies, including observational research, systematic reviews, randomized trials, and retrospective analyses, to evaluate CDMP effectiveness across different populations and settings. Positive impacts include Chronic Disease Self-Management Education workshops reducing loneliness among older adults, eHealth interventions enhancing self-management skills and quality of life for chronic kidney disease patients, and lifestyle interventions benefiting cardiovascular health in low-income women. Technological innovations, such as personalized messaging systems, have improved engagement in diabetes prevention. CDMPs are pivotal in enhancing clinical outcomes, patient satisfaction, and reducing healthcare utilization through tailored, multidisciplinary approaches integrating technology. Challenges include ensuring consistent implementation and addressing access disparities. Future research should refine strategies, assess long-term sustainability, and explore innovative approaches to optimize chronic disease management globally. Continuous evolution of CDMPs is essential to mitigate chronic disease impacts, improving health outcomes and quality of life globally.

Keywords: Chronic diseases, CDMPs, patient-centered care, effectiveness evaluation, multidisciplinary approaches, global health

Introduction

Chronic diseases, broadly defined as conditions persisting for one year or more and necessitating ongoing medical care or significantly limiting daily activities, include diabetes, heart disease, and chronic obstructive pulmonary disease (COPD). These ailments are leading contributors to global morbidity and mortality, presenting substantial challenges to healthcare systems and economies alike.[1-2] Managing chronic diseases is inherently complex, demanding continuous, coordinated care to prevent complications, minimize hospitalizations, and enhance patients' quality of life. To tackle these challenges, chronic disease management programs (CDMPs) have been established and implemented worldwide.[3] These programs aim to deliver comprehensive, patient-centered care that addresses the diverse needs of individuals living with chronic conditions, thereby promoting better health outcomes and more efficient healthcare delivery.[3-8]

The effectiveness of CDMPs has been the subject of extensive research, with studies highlighting their potential to improve clinical outcomes, enhance patient satisfaction, and reduce healthcare costs. These programs typically encompass a range of interventions, including patient education, self-management support, regular monitoring, and coordinated care among healthcare providers. The holistic approach of CDMPs seeks to empower patients by equipping them with the knowledge and skills necessary to manage their conditions effectively, thereby promoting adherence to treatment plans and encouraging healthy lifestyle changes.[4-10]

Despite the promising evidence supporting CDMPs, the success of these programs can vary widely depending on several factors. These include the specific design and implementation of the program, the characteristics of the patient population, and the healthcare infrastructure in place. For instance, programs that integrate technology, such as telemedicine and mobile health applications, have shown increased patient engagement and improved outcomes. Additionally, the role of multidisciplinary teams, including physicians, nurses, dietitians, and social workers, is crucial in providing comprehensive and coordinated care.[11-13]

The growing prevalence of chronic diseases underscores the urgency of evaluating and optimizing CDMPs to ensure their effectiveness. Policymakers, healthcare providers, and researchers must collaborate to identify best practices and address barriers to successful implementation. This involves not only assessing clinical outcomes but also considering patient-reported outcomes, such as quality of life and satisfaction with care.[14-15]

The objective of this article is to review the role of CDMPs in improving clinical outcomes and patient-centered measures for individuals with chronic conditions such as diabetes, heart disease, and COPD. By reviewing current evidence, we aim to identify the key components of successful CDMPs and understand the factors that contribute to their efficacy. This includes examining interventions such as patient education, self-management support, regular monitoring, and the integration of multidisciplinary care teams. Additionally, we seek to highlight the role of technology in enhancing patient engagement and program outcomes. The article also addresses the challenges and limitations encountered in the implementation of CDMPs. Through this comprehensive evaluation, our goal is to provide actionable insights and recommendations for healthcare providers, policymakers, and researchers to optimize chronic disease management and improve the quality of care for affected individuals.

Method

This article employs a comprehensive literature review methodology to evaluate the effectiveness of chronic disease management programs. We have searched peer-reviewed journals, medical databases such as PubMed, and relevant gray literature to identify studies published in the last decade that assess CDMP outcomes. Inclusion criteria encompassed randomized controlled trials, cohort studies, and systematic reviews focusing on clinical outcomes (e.g., hospitalization rates, disease progression), patient-centered outcomes (e.g., quality of life, patient satisfaction), and the implementation of CDMP components (e.g., patient education, self-management support, multidisciplinary care). Guides and reports providing national data on chronic disease were also screened and included in this comprehensive review.

To ensure the comprehensiveness and relevance of the literature review on chronic disease management programs (CDMPs), the following exclusion criteria were applied: Articles published before 2010 were excluded to focus on recent and relevant findings. Non-English language papers were excluded due to translation resource constraints. Case reports, editorials, and commentaries were excluded. Studies that did not focus on adults with chronic diseases such as diabetes, heart disease, and chronic obstructive pulmonary disease (COPD) were also excluded. Papers that did not specifically evaluate chronic disease management programs or components of these programs were excluded. Finally, papers without open access or free readable full text were excluded. Overall, we analyzed 27 papers.

These resources offer critical insights into the prevalence, management, and impact of chronic diseases across different populations. Data extraction focused on study design, population characteristics, interventions used, and measured outcomes. We performed a narrative synthesis of the 27 included studies to compare findings across different studies, identifying common elements of successful programs and noting variations in effectiveness based on program design and patient demographics. This method allows for a holistic understanding of the current landscape and efficacy of CDMPs.

Results

The review of CDMPs reveals significant improvements in clinical outcomes, such as reduced hospitalization rates and disease progression, alongside enhanced patient-centered outcomes, including increased quality of life and patient satisfaction. Key factors contributing to these successes include comprehensive patient education, effective self-management support, and the integration of multidisciplinary care teams.[16]

Noncommunicable diseases (NCDs) like cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes are major health challenges, causing 41 million deaths globally each year. Effective management of NCDs through early detection, screening, treatment, and palliative care is essential and can be implemented cost-effectively via primary healthcare systems. Chronic diseases are responsible for 86% of deaths in the WHO European Region, and while various interventions exist to mitigate their effects, isolated efforts are often insufficient.[17]

CHRONIC DISEASE BURDEN AND ASSOCIATED COST

Chronic diseases have a significant impact on the United States, constituting 7 of the top 10 causes of death and accounting for 90% of the nation's $4.5 trillion annual healthcare expenditures. Conditions like heart disease, cancer, diabetes, and chronic respiratory diseases impose a substantial disease burden, affecting millions of Americans. Annually, heart disease and stroke lead to 934,500 deaths, costing $407 billion in healthcare and lost productivity (Table 1). Cancer diagnoses exceed 1.7 million per year, resulting in over 600,000 deaths, with costs projected to reach $240 billion by 2030. Diabetes affects 38 million Americans and incurs costs of $413 billion. Obesity affects 42% of adults, and arthritis affects 53.2 million, further straining healthcare systems, costing $173 billion and $600 billion, respectively. Alzheimer's disease impacts nearly 7 million individuals, with care costs expected to approach $1 trillion by 2050. These chronic conditions lead to long-term health complications, reduced quality of life, and substantial healthcare expenses, necessitating effective prevention and management strategies to mitigate their impact on workforce productivity and disability rates.[18]

Table 1: Impact of chronic diseases in United States: Disease burden and associated cost.[18-43]

Disease	Disease Burden (Incidence and Number of Deaths)	Cost
Heart disease and stroke	934,500 deaths annually	$251 billion per year (health care), $156 billion per year (lost productivity)
Cancer	1.7 million diagnosed annually, more than 600,000 deaths annually	$240 billion per year by 2030
Diabetes	38 million diagnosed, 98 million with prediabetes	$413 billion in 2022 (medical costs and lost productivity)
Obesity	Affects 20% of children and 42% of adults	$173 billion per year (health care)
Arthritis	Affects 53.2 million adults	$600 billion in 2019
Alzheimer's disease	Affects nearly 7 million Americans	$345 billion in 2023, projected nearly $1 trillion by 2050
Epilepsy	Affects 3 million adults and 500,000 children and teens	$13.4 billion in 2019, with $5.4 billion directly attributable to epilepsy
Tooth decay	1 in 6 children aged 6 to 11, 1 in 4 adults with untreated cavities	$46 billion in lost productivity annually

DISEASE MANAGEMENT PROGRAMS

Evidence synthesis[20] evaluated the effectiveness and efficiency of disease management (DM) programs. These programs showed improvements in process (69%), health services (63%), quality of life (57%), and health outcomes (51%). The conclusion drawn was that DM programs are effective and efficient but need tailored components for different contexts. A multidisciplinary approach is crucial for successful DM program implementation.

A systematic review[41] on COPD disease-management programs revealed improved exercise capacity, decreased hospitalization risk, and moderate quality of life improvement, although no change in mortality was observed. This review included 13 studies (9 RCTs, 1 controlled trial, 3 uncontrolled trials), highlighting the benefits of DM programs for exercise and quality of life in COPD patients without impacting mortality.

Another systematic review[44] assessed comprehensive care programs for children with medical complexity (CMC). The findings indicated that comprehensive care might slightly improve satisfaction but showed no significant improvements in child or parent health outcomes. The review emphasized the need for more trials with consistent follow-up and cost analyses to draw definitive conclusions.

Coordinated chronic disease management programs are more effective, though integrating these strategies across diverse healthcare providers and systems remains complex. In the United States, chronic diseases, including heart disease, cancer, and diabetes, are the leading causes of death and disability. Addressing these challenges requires comprehensive, coordinated efforts to enhance the management of chronic diseases across all care settings and providers, promoting better health outcomes and economic efficiency.[1,16-17] The table 2 summarizes various studies focused on the management of multimorbidity and chronic diseases. Each study's design, purpose, main findings, and conclusions are outlined to provide a comprehensive overview of the effectiveness of different interventions and programs.

Table 2: Summary of Studies on Multimorbidity Management and Chronic Disease Care

Sr. no	Author Name, Year	Study Design	Study Purpose	Study Main Findings	Conclusion
1	Smith ML et al. 2023	Observational Study[19]	To assess the impact of Chronic Disease Self-Management Education (CDSME) on loneliness among older adults.	Significant reductions in loneliness scores post-workshop ($p < 0.001$).	CDSME workshops effectively reduce loneliness due to their interactive format and shared experiences.
2	Hisashige A 2012	Evidence Synthesis[20]	To evaluate the effectiveness and efficiency of disease management (DM) programs.	Improvements in process (69%), health services (63%), quality of life (57%), and health outcomes (51%).	DM programs are effective and efficient; the focus should shift to identifying the best components for each context.
3	Solanes I et al. 2018	Quasi-experimental Design[21]	To evaluate the effectiveness of two COPD management interventions (integrated management vs. isolated interventions).	Reduced smoking rates, improved inhaler use, fewer exacerbations, and fewer hospital admissions with integrated management.	Both interventions improved outcomes, but integrated management had more significant effects.
4	Nica AE et al. 2024	Observational Study[22]	To explore the utility of Sudoscan in detecting CKD among patients with T2DM.	Moderate correlations between Sudoscan scores and traditional CKD markers (eGFR and albuminuria).	Sudoscan is a promising tool for early CKD detection, particularly in resource-limited settings.
5	Rodriguez DV et al. 2024	Observational Study.[23]	To evaluate a personalized automatic messaging system (PAMS) to increase engagement in digital diabetes prevention programs (dDPPs).	High predictive accuracy (over 90%) for user engagement using machine learning models.	ML-based personalization can improve engagement and adherence to digital health programs.
6	Daniels J et al. 2024	Pre- and Post-comparison Study.[24]	To assess the effectiveness of cardiovascular disease interventions for low-income, uninsured women in Nebraska.	Significant improvements in hypertension control, weight loss, healthy eating, and physical activity.	The program effectively improved chronic health conditions and reduced cardiovascular disease risks.
7	Calvert B et al. 2024	Observational Study.[25]	To evaluate the effectiveness of a Community Paramedicine (CP) program in managing stroke outcomes in rural Georgia.	Reduction in stroke mortality rates among participants.	CP programs are effective in managing stroke risk factors and improving outcomes.
8	Barragan NC et al. 2024	Team-Based Hypertension Management Program (QueensCare Health Centers).[26]	Develop and launch a team-based hypertension management program led by clinical pharmacists	Improved hypertension management through system, provider, and patient-level interventions	Team-based care can be optimized at Federally Qualified Health Centers
9	Shen H et al. 2024 [27]	eHealth CKD Self-Management (China).[27]	Develop a tailored eHealth self-management intervention for CKD patients in China	Enhanced self-management skills, improved health status and quality of life for CKD patients	Culturally tailored eHealth interventions can optimize self-management and health outcomes in CKD patients
10	Steinman L et al. 2024	Remote EBP Evaluation (Older Adults).[28]	Evaluate changes in remote EBP participants' health and well-being	Statistically significant improvements in health, energy, sleep quality, loneliness, depressive symptoms, and	Remote EBPs can improve health, social, and technological outcomes for older adults and providers

Sr. no	Author Name, Year	Study Design	Study Purpose	Study Main Findings	Conclusion
			during COVID-19	technology anxiety	
11	Tang M et al. 2024	Frailty in CHF Patients.[29]	Investigate frailty status of inpatients with CHF and analyze influencing factors	High prevalence of frailty, identified risk (age, self-care ability, nutritional risk, kinesiophobia, NT-proBNP) and protective (albumin, LVEF) factors	Early identification and intervention can delay frailty and reduce adverse clinical events
12	Woods-Giscombe CL et al. 2024	HARMONY Study (African American Women)[30]	Test a culturally tailored mindfulness-based stress management intervention to address stress-related CM conditions	Addressing culturally-nuanced stress, enhancing protective factors against chronic stress-induced biobehavioral morbidity	Culturally tailored stress management can reduce CM risk among African American women
13	Mathews M et al. 2024	Primary Care Diabetes Support Programme (PCDSP)[31]	Evaluate health system impacts of PCDSP using a quadruple-aim approach	Support for replication and scalability of community-based, interprofessional primary care-led transition clinics	Innovative approach to diabetes care for high-risk populations can improve health system impacts
14	Hong HC, Kim YM. 2024	Population-based cross-sectional study[32]	Assess multimorbidity prevalence, examine associated factors, and identify patterns among Korean shift workers	Overall prevalence of multimorbidity was 13.7%; factors influencing multimorbidity included age, income, regular work, and obesity; identified three multimorbidity patterns: cardiometabolic, musculoskeletal, and unclassified diseases	Several socioeconomic and behavioral factors are associated with multimorbidity; policy development and interventions are needed
15	Dalakoti M et al. 2024	Real-time dashboard development[33]	Improve upstream primary prevention of cardiovascular disease (CVD) using AI to identify and manage at-risk patients	Created CardioSight dashboard, combined with CHAMP, to identify at-risk patients and track outcomes effectively	AI tools can close the gap between risk identification and effective patient care management
16	Chan JC et al. 2024	Cross-sectional survey[34]	Analyze patient-reported outcomes in people with type 2 diabetes to understand treatment adherence	Treatment adherence influenced by age, disease duration, diabetes education, HbA1c levels; major barriers included treatment duration, regimen complexity, disruption of routines; habit formation was a key enabler	Patient-centered education and support programs might improve glycemic control by promoting empowerment and developing new routines
17	Iyngkaran P et al. 2024	Systematic review protocol[35]	Determine the effectiveness of chronic disease self-management (CDSM) programs for patients with congestive heart failure (CHF)	Protocol described to collate and synthesize evidence on CDSM programs' effectiveness for CHF patients	CDSM programs are a vital component of CHF management, and a systematic review will clarify their effectiveness
18	Ou TY et al. 2024	Temporal trend analysis[36]	Assess burden of chronic liver disease (CLD) deaths attributable to HBV and HCV, predict trends by 2030	HCV-related CLD deaths surpassed HBV-related deaths in 2019 and expected to continue; highest burden observed in East Asia, Western, and Eastern Sub-Saharan Africa	Number of CLD deaths will increase until 2030; strengthened vaccines, screening, and treatment are needed
19	Mehta SJ et al. 2024	Randomized clinical trial[37]	Evaluate effectiveness of remote BP monitoring and social support in improving BP control	No significant difference in systolic or diastolic BP at 4 months between remote monitoring (RM), social support (SS), and usual care (UC) groups	Neither remote BP monitoring nor remote BP monitoring with social support improved BP control compared with usual care

Sr. no	Author Name, Year	Study Design	Study Purpose	Study Main Findings	Conclusion
			and medication adherence		
20	Roche N et al. 2024	Retrospective database study[38]	Assess medico-economic impact of PRADO COPD program	PRADO improves care quality but doesn't significantly reduce mortality or rehospitalization; costs are higher for PRADO group	PRADO COPD improves care quality, not rehospitalizations/mortality, costs are higher
21	Hearn R et al. 2024	Mixed-methods single case experimental design[39]	Investigate effectiveness of person-centred active rehab for CTE symptoms	Mixed results; some improvement in cognitive function and mood, context affects perceived effectiveness	Active rehab potentially beneficial, person-centred approach valuable
22	Burke JF et al. 2024	Simulation analysis[40]	Explore BP control's impact on ASCVD and dementia	Tighter BP control reduces ASCVD events, improves brain health, but might increase dementia prevalence	Tighter BP control beneficial, unlikely to reduce dementia prevalence, might increase dementia cases
23	Peytremann-Bridevaux I et al. 2008	Systematic Review[41]	To evaluate the effectiveness of COPD disease-management programs.	Improved exercise capacity, decreased hospitalization risk, and moderately improved quality of life. No significant change in all-cause mortality.	COPD disease-management programs are beneficial for exercise capacity and quality of life but do not affect mortality.
24	Reilly R et al. 2016	Systematic Review[42]	To examine the effectiveness, cost-effectiveness, and acceptability of CKD management programs for Indigenous peoples.	Clinical effectiveness, cost-effectiveness, and qualitative evidence on barriers and enablers.	CKD programs for Indigenous peoples are effective and acceptable when integrated within existing services and culturally appropriate.
25	Adamopoulos S et al. 2024	Review article[43]	Discuss challenges in predicting and managing right heart failure (RHF) post-LVAD implantation	Predicting RHF post-LVAD is difficult unless RV is overtly dysfunctional; optimization of RV function and careful perioperative management are crucial	Evaluation and treatment of RV function should be multidimensional and multidisciplinary
26	Harvey AR et al. 2024	Systematic review[44]	Assess effectiveness of comprehensive care programs for CMC	Comprehensive care may not significantly improve child/parent health, but slightly improves satisfaction	Insufficient evidence to draw strong conclusions; more high-quality trials needed
27	Golabi P et al. 2024	Literature review[45]	Review global perspective on NAFLD and NASH	NAFLD/NASH prevalence varies globally; high economic impact	Risk stratification algorithms recommended for timely intervention

Abbreviations: CDSME - Chronic Disease Self-Management Education COPD - Chronic Obstructive Pulmonary Disease CKD - Chronic Kidney Disease T2DM - Type 2 Diabetes Mellitus eGFR - Estimated Glomerular Filtration Rate PAMS - Personalized Automatic Messaging System dDPPs - Digital Diabetes Prevention Programs ML - Machine Learning CP - Community Paramedicine EBP - Evidence-Based Practice CHF - Congestive Heart Failure NT-proBNP - N-terminal pro b-type Natriuretic Peptide LVEF - Left Ventricular Ejection Fraction CM - Cardiometabolic PCDSP - Primary Care Diabetes Support Programme AI - Artificial Intelligence CVD - Cardiovascular Disease CHAMP - Cardiovascular Health and Monitoring Program HbA1c - Hemoglobin A1c BP - Blood Pressure ASCVD - Atherosclerotic Cardiovascular Disease CLD - Chronic Liver Disease HBV - Hepatitis B Virus HCV - Hepatitis C Virus RM - Remote Monitoring SS - Social Support UC - Usual Care PRADO - Programme de Retour À Domicile (Homecoming Program) CTE - Chronic Traumatic Encephalopathy RV - Right Ventricle LVAD - Left Ventricular Assist Device CMC - Children with Medical Complexity NAFLD - Non-Alcoholic Fatty Liver Disease NASH - Non-Alcoholic Steatohepatitis

Discussion

CHRONIC DISEASE SELF-MANAGEMENT

Multiple studies evaluated the effectiveness of self-management programs for chronic diseases. An observational study[19] focused on Chronic Disease Self-Management Education (CDSME) workshops for older adults. The study found significant reductions in loneliness post-workshop ($p < 0.001$). The interactive format and shared experiences of the workshops were identified as key factors in reducing loneliness. Participants were mostly female (83%) with an average age of 74.3 years.

A systematic review protocol[35] aimed to determine the effectiveness of CDSM programs for congestive heart failure (CHF) patients. While the protocol is designed to collate and synthesize evidence on these programs, it underscores the importance of CDSM in CHF management despite recent guidelines downgrading it due to a lack of gold-standard evidence.

CARDIOVASCULAR AND HYPERTENSION MANAGEMENT

Cardiovascular interventions for specific populations were also evaluated. A pre- and post-comparison study[24]

assessed cardiovascular disease interventions for low-income, uninsured women in Nebraska. The program led to significant improvements in hypertension control, weight loss, healthy eating, and physical activity. This intervention effectively reduced chronic conditions and cardiovascular disease risks among 2,649 participants, with 57.3% engaging in lifestyle interventions.

A team-based hypertension management program[26] was developed and launched at QueensCare Health Centers. Led by clinical pharmacists, the program improved hypertension management through system-level (self-monitored BP values, clinician retraining), provider-level (community health workers, clinical pharmacists), and patient-level (tailored education, support, BP cuffs, pedometers) interventions. This approach optimized team-based care at Federally Qualified Health Centers.

A randomized clinical trial[37] evaluated the effectiveness of remote blood pressure (BP) monitoring and social support in improving BP control and adherence. The study found no significant BP difference at 4 months between the remote monitoring, social support, and usual care groups. The trial included 246 patients using home BP monitors and text messaging, with intervention groups receiving EHR nudges, but neither intervention showed superior BP control compared to usual care.

A simulation analysis[40] explored the impact of BP control on atherosclerotic cardiovascular disease (ASCVD) and dementia. The findings indicated that tighter BP control reduces ASCVD events and improves brain health but may increase dementia prevalence. Despite the benefits in stroke and myocardial infarction-free years and optimal brain health, tighter BP control is unlikely to reduce dementia prevalence and could potentially increase cases. This analysis was based on SPRINT-based BP treatment protocols.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) MANAGEMENT PROGRAM

The effectiveness of integrated versus isolated COPD management interventions was evaluated in a quasi-experimental design.[21] Integrated management reduced smoking rates, improved inhaler use, and led to fewer exacerbations and hospital admissions. Both interventions improved outcomes, but integrated management had more significant effects. The study involved 393 COPD patients with an average follow-up of 31.2 months.

A retrospective database study[38] assessed the medico-economic impact of the PRADO COPD program. The study found that PRADO improved care quality without significant reductions in mortality or rehospitalization but resulted in higher costs. It focused on PRADO BPCO patients and used National Health Insurance data, highlighting the balance between enhanced care quality and increased costs.

DIABETES MANAGEMENT

The utility of personalized automatic messaging systems (PAMS) in digital diabetes prevention programs (dDPPs) was evaluated in an observational study.[23] Machine learning models achieved high predictive accuracy (>90%) for user engagement. The study concluded that ML-based personalization significantly improves engagement and adherence to digital health programs, identifying six distinct user engagement profiles using large datasets.

A cross-sectional survey[34] analyzed patient-reported outcomes in people with type 2 diabetes to understand treatment adherence. Factors influencing adherence included age, disease duration, education, and HbA1c levels, with barriers identified as treatment duration, complexity, and routine disruption. Habit formation emerged as a key enabler of adherence. The study included 2,475 patients from 13 countries, using structured questionnaires and natural language processing (NLP) for analysis. The findings suggest that patient-centered education and support programs may improve glycemic control and empower patients.

The Primary Care Diabetes Support Programme (PCDSP)[31] was evaluated using a quadruple-aim approach. The program supports replication and scalability of community-based, interprofessional primary care-led transition clinics, demonstrating an innovative diabetes care approach for high-risk populations that improves health system impacts. The study utilized multiple methods in a convergent parallel design, analyzing five studies (case, patient, provider, complications, cost-effectiveness) qualitatively and quantitatively.

CHRONIC KIDNEY DISEASE (CKD) MANAGEMENT

The effectiveness of eHealth self-management interventions for CKD patients in China was assessed in an observational study.[27] The tailored interventions enhanced self-management skills and improved health status and quality of life for CKD patients. The culturally tailored approach integrated intervention mapping, systematic reviews, and qualitative studies, adapting international models to the Chinese context.

A systematic review[42] examined the effectiveness, cost-effectiveness, and acceptability of CKD management programs for Indigenous peoples. The review found clinical effectiveness and cost-effectiveness, with qualitative evidence on barriers and enablers. Effective programs included nurse-led care, intensive follow-up, and community involvement, emphasizing the importance of integration and cultural relevance for CKD management in Indigenous populations.

The utility of Sudoscan in detecting CKD among T2DM patients was explored in an observational study.[22] The study found moderate correlations between Sudoscan scores and traditional CKD markers (eGFR, albuminuria), indicating promise for early CKD detection, particularly in resource-limited settings. The study involved 271 patients with a CKD prevalence of 26.5%.

TRENDS AND IMPLICATIONS OF CHRONIC LIVER DISEASES

A temporal trend analysis[36] assessed the burden of chronic liver disease (CLD) deaths attributable to HBV and HCV, predicting trends by 2030. The study found that HCV-related CLD deaths surpassed HBV in 2019 and are expected to rise, with the highest burden in East Asia, Western, and Eastern Sub-Saharan Africa. The analysis indicated that CLD deaths are projected to

increase by 2030, necessitating stronger vaccines, screening, and treatment. No region is on track to meet the WHO target of a 65% reduction in HBV and HCV mortality by 2030, based on Global Burden of Disease data from 2019.

A review article[45] provided a global perspective on non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH). The prevalence of NAFLD/NASH varies globally, with significant economic impacts. The review highlighted the importance of risk stratification algorithms for timely intervention, noting high prevalence in South America and the Middle East/North Africa. The projected cost of NAFLD/NASH exceeds $1.5 trillion over the next two decades.

REMOTE INTERVENTIONS AND TECHNOLOGY

The impact of remote Evidence-Based Practices (EBPs) during COVID-19 on older adults' health and well-being was evaluated in an observational study.[28] Statistically significant improvements were observed in health, energy, sleep quality, loneliness, depressive symptoms, and technology anxiety. The study evaluated five EBPs (self-management, falls prevention, physical activity) across diverse delivery modes and organizations, using mixed methods for outcome evaluation. Remote EBPs were found to improve health, social, and technological outcomes for older adults and providers.

The development of a real-time dashboard[33] aimed at improving upstream primary prevention of cardiovascular disease (CVD) using AI was another significant technological advancement. The CardioSight dashboard, combined with CHAMP, effectively identified at-risk patients and tracked outcomes. AI tools bridged the gap in risk identification and patient care management, utilizing the Endeavour AI system and large language model tools. The dashboard captured CVD risk factors at both individual and geographical levels.

SPECIAL POPULATIONS AND CONDITIONS

The frailty status of in patients with CHF was investigated in an observational study [29]. The study found a high prevalence of frailty and identified risk factors (age, self-care ability, nutritional risk, kinesiophobia, NT-proBNP) and protective factors (albumin, LVEF). Early identification and intervention can delay frailty and reduce adverse events. The study highlighted the importance of addressing multidimensional frailty through exercise, nutrition, psychology, and disease treatment.

The HARMONY study[30] tested a culturally tailored mindfulness-based stress management program to address stress-related chronic medical conditions (CM) among African American women. The study addressed culturally nuanced stress and enhanced protective factors against chronic stress-induced biobehavioral morbidity. The two-arm RCT included mindfulness, exercise, and nutrition education, concluding that culturally tailored stress management can reduce CM risk in this population.

A population-based cross-sectional study[32] assessed multimorbidity prevalence, associated factors, and patterns among Korean shift workers. The overall multimorbidity prevalence was 13.7%, with factors including age, income, regular work, and obesity. The study identified cardiometabolic, musculoskeletal, and unclassified disease patterns, emphasizing the need for policy and interventions to address socioeconomic and behavioral factors associated with multimorbidity. The study used data from the Korea National Health and Nutrition Examination Survey (2016-2020).

A mixed-methods single case experimental design[39] investigated the effectiveness of person-centered active rehabilitation for chronic traumatic encephalopathy (CTE) symptoms. The study found mixed results, with some cognitive and mood improvements, but noted that context affected perceived effectiveness. Active rehabilitation was potentially beneficial, and a person-centered approach was valuable, but factors like COVID-19 and participant motivation impacted outcomes.

Strengths and limitations

The reviewed studies exhibit several strengths, including the use of diverse methodologies such as observational studies, randomized clinical trials, and systematic reviews, which provide a comprehensive understanding of chronic disease management programs across various contexts and populations. The emphasis on tailored, multidisciplinary, and technology-driven approaches highlights the potential for personalized care and improved health outcomes. Moreover, the inclusion of culturally sensitive interventions and community-based programs demonstrates a commitment to addressing the needs of vulnerable populations. However, there are notable limitations, such as the predominance of observational studies, which may be subject to bias and lack the rigor of randomized controlled trials. Additionally, some studies report on small sample sizes or short follow-up periods, limiting the generalizability and long-term applicability of the findings. The variability in study designs and outcome measures also poses challenges in synthesizing and comparing results across different studies. Despite these limitations, the collective evidence underscores the critical role of innovative and inclusive approaches in chronic disease management.

Future direction and recommendation

Future directions for CDMP should prioritize personalized, patient-centered approaches that integrate advanced technologies and interdisciplinary collaboration. Tailoring interventions to individual needs and leveraging digital health solutions, such as telemedicine and mobile applications, can enhance accessibility and engagement. Additionally, fostering partnerships between healthcare providers, community organizations, and policymakers is crucial for comprehensive care delivery and sustainable health outcomes. Evaluating the long-term effectiveness and cost-effectiveness of CDMPs across diverse populations will be essential to inform policy decisions and resource allocation. Furthermore, promoting health literacy and empowering patients to actively participate in their care through education and support networks can improve adherence and outcomes. Addressing social determinants of health and disparities in healthcare access is paramount for equitable delivery of CDMPs. By advancing these strategies, CDMPs can effectively reduce the burden of chronic diseases, enhance patient well-being, and optimize healthcare system efficiency.

Conclusion

In conclusion, the studies reviewed underscore the critical role of tailored, multidisciplinary, and technology-driven approaches in optimizing chronic disease management. These approaches, including personalized care, early intervention, and ongoing evaluation, have demonstrated significant improvements in patient outcomes and healthcare delivery. Programs like CDSME and AI-driven health monitoring show promise in enhancing self-care behaviors and reducing disease burden, particularly among vulnerable populations. Community-based and culturally sensitive models have also proven effective in promoting engagement and adherence to health interventions. Moving forward, continued research and innovation are essential to validate and expand upon these findings, ensuring equitable access to effective chronic disease management globally. By leveraging evidence-based practices and fostering collaborative efforts across healthcare sectors, we can address the evolving challenges of chronic diseases and improve the overall health and well-being of individuals worldwide.

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