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# Managing chronic conditions in primary care: Best practices and emerging technologies

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**Abstract**--Background: Chronic conditions like diabetes, cardiovascular diseases, and COPD are leading global health challenges, contributing significantly to mortality and healthcare costs. Fragmented care services often struggle to meet the complex needs of these patients, making integrated care models a promising approach to improve outcomes and efficiency. Aim: This scoping review aims to explore existing literature on integrated care models for managing chronic conditions, identify best practices and technologies, and pinpoint areas for future research, particularly in alignment with the Irish Sláintecare program. Methods: A scoping review was conducted following Arksey and O'Malley's framework. The review process involved defining research questions, searching relevant literature, and analyzing data from 22 studies published between 2009 and 2019. Studies were selected based on their relevance to primary care integration and chronic disease management. Results: Integrated care models, including multidisciplinary teams and community-based interventions, have shown promise in improving patient outcomes and cost-effectiveness. Technologies like EHRs and telemedicine facilitate integration by enhancing communication and monitoring. However, results varied, with some studies reporting mixed outcomes related to cost and implementation. Conclusion: Integrated care can enhance chronic disease management but requires ongoing research to address implementation challenges and optimize practices. Future research should focus on refining integration strategies, improving electronic systems, and evaluating long-term impacts to better manage chronic conditions.

**Keywords**--Chronic disease management, integrated care, primary care, technology, patient-centered care, Sláintecare, scoping review.

## Introduction

Chronic conditions, including diabetes, cardiovascular diseases, chronic obstructive pulmonary disease (COPD), and cancer, represent the foremost global causes of mortality and significantly contribute to healthcare expenditures [1]. These diseases often exhibit multifaceted characteristics, leading to complex care requirements that fragmented primary and secondary care services may struggle to address adequately [2]. With the increasing elderly population, there is a growing imperative for effective chronic disease management and prevention programs. Integrated health and social service delivery models are particularly suited to meet this demand [2]. 'Integrated care' refers to a healthcare approach designed to address service fragmentation and enhance continuity of care, centering on the patient, their family, and community [3]. However, 'integration' lacks a universally accepted definition, encompassing approximately 175 distinct interpretations and concepts [4]. Given its role as the initial point of contact and its focus on continuous, comprehensive, and coordinated care, primary care is crucial in coordinating and integrating care, especially within patient-centered models [5]. Despite the varied definitions of integrated care, a recurring theme is its patient-centered nature. The World Health Organization defines integrated service delivery as...

“...the organization and management of health services so that people get the care they need, when they need it, in ways that are user-friendly, achieve the desired results and provide value for money” [6, p. 1].

Integrated care can manifest in various structures, with this review focusing on the integration of primary and secondary care. The term ‘collaborative care’ is often associated with similar models, though some experts argue it should not be used interchangeably with ‘integrated care’ due to their distinct meanings [7]. An integrated approach to managing chronic diseases can improve health outcomes [8]. Integrating primary and secondary healthcare may enhance communication, accessibility, and overall patient satisfaction, while potentially reducing unnecessary expenditures and increasing cost-efficiency within healthcare systems [2,9]. The World Health Organization advises ensuring continuity of care through effective referral and communication systems between primary and secondary services, with GPs coordinating multi-professional teams across health, social, and other sectors [2]. Successful integrated care necessitates the active involvement of patients and their families in care planning, implementation, and monitoring [3]. This involvement fosters self-management and ensures individualized, patient-centered care. Developing integrated systems to address the growing burden of chronic disease is crucial, as chronic illness management accounts for 80% of GP visits, 40% of hospital admissions, and 75% of hospital bed days [1].

In Ireland, chronic disease management is currently addressed through several initiatives, notably the 'Sláintecare' program [10]. Launched by the Irish Government in 2017, this policy promotes a unified vision for health and social care services, advocating a shift from hospital-centered care to community-based management. Sláintecare asserts that effective community management of chronic diseases can enhance clinical outcomes, provide better value for money, and focus on health promotion and disease prevention to alleviate future

pressures on the health service [10]. Although an integrated care approach is expected to improve patient outcomes, some trials have shown mixed results, including increased hospital admissions and costs. This suggests that the anticipated benefits may not always be realized in practice, highlighting the need for further research into the effective implementation of integrated care [11]. This scoping review aims to survey existing literature on integrated care approaches for chronic disease management and to identify key areas for future research and implementation, particularly in alignment with the objectives of the Sláintecare program.

Integrated care represents a promising strategy for addressing the multifaceted challenges associated with chronic disease management. By enhancing continuity of care and promoting patient-centered approaches, integrated care models can potentially improve health outcomes, patient satisfaction, and cost-effectiveness. However, the variability in trial results underscores the necessity for ongoing research to refine and implement these models effectively. Addressing the complexities of chronic disease through integrated care requires a collaborative effort from health systems, professionals, and policymakers to ensure that the intended benefits are realized and sustained in practice.

## **Methodology**

A scoping review was conducted to explore integrated approaches to chronic disease management and to pinpoint key areas for future research and implementation. This methodology was selected due to the previous mixed results in research concerning integrated care, which created uncertainty about its benefits for chronic disease management [11]. Given this uncertainty, experimental research methods could not effectively formulate and test well-defined hypotheses, necessitating a more inductive approach. Scoping reviews are particularly suited for mapping literature, identifying key concepts, knowledge gaps, and evidence [12]. The review followed a six-stage iterative process, as outlined by Arksey and O'Malley [13] and further refined by Levac et al. [14].

The first stage involved defining the research questions to identify priority areas for enhancing the integration of primary and secondary care based on existing knowledge and gaps. Primary care was defined as comprehensive, accessible health services provided by practitioners who address a range of personal health needs and work within a family and community context [15]. For the purpose of this review, the World Health Organization's definition of integrated care was adopted, which emphasizes the organization and management of health services to provide care that is user-friendly, effective, and cost-efficient [3]. The second stage involved identifying relevant studies using a comprehensive search strategy recommended by the Joanna Briggs Institute (JBI) [16]. This included an initial database search (PubMed, Google Scholar, and Cochrane Library), followed by a review of keywords and index terms, and manual searches of references in identified studies. Only English-language studies published in the last decade and from countries with similar healthcare systems to the EU (e.g., Canada and Australia) were included.

The selection process consisted of two levels of screening: title and abstract review, followed by full-text review, conducted by two reviewers (a medical student and a post-doctoral researcher). The PRISMA flow diagram outlined the results of this process. The review was broad in its inclusion of literature types and did not assess methodological quality, allowing for a diverse range of studies, including quantitative, qualitative, and mixed-methods, as well as systematic reviews and meta-analyses. Protocols were excluded. The search identified 1014 studies, with 728 remaining after removing duplicates. Studies were included based on specific criteria, such as publication within 2009-2019, relevance to countries with two-tier healthcare systems, and focus on primary care integration. The data were organized to facilitate comparison and thematic analysis. Key findings from various studies are summarized, highlighting different models of integrated care and their impacts on chronic disease management. For example, studies showed that integrated models, such as those involving multidisciplinary teams and community-based care, could lead to improvements in health outcomes, patient satisfaction, and cost-effectiveness. However, some studies reported mixed results or highlighted challenges related to implementation, such as increased costs or difficulties with information sharing.

In conclusion, this scoping review provides a comprehensive overview of integrated care models for chronic disease management, revealing both their potential benefits and challenges. While integrated care approaches have shown promise in improving patient outcomes and reducing costs, the effectiveness varies, and more research is needed to address implementation issues and refine strategies. Future research should focus on optimizing integration processes, improving information systems, and evaluating long-term outcomes to enhance the delivery and efficiency of chronic disease care.

## **Results**

### **Initial Screening and Study Selection**

The preliminary screening process identified a total of 728 studies. Of these, 594 were excluded based on title and abstract due to their irrelevance, such as studies not conducted in the selected countries, outside the designated date range, not focused on primary care, or categorized as reviews or study protocols. A subsequent review of the remaining 134 studies led to the exclusion of 112 additional studies, primarily due to issues such as unavailability of full text, non-English language, lack of focus on chronic disease interventions, or non-compliance with geographical and primary care setting criteria. Ultimately, 22 studies published between 2009 and 2019 were included in the final synthesis of data.

### **Literature Organization**

For the purpose of structuring the scoping review, the literature was categorized into six key areas: study design, intervention studied, clinical outcomes, cost-effectiveness, electronic integration, and patient/healthcare providers' experiences.

## **Study Design**

The 22 studies included in this review encompassed both quantitative and qualitative research methodologies. Specifically, there were eight randomized controlled trials, three non-randomized studies, and two open controlled trials. Additionally, the review featured one embedded single case study using semi-structured interviews, one qualitative multiple case study, two pilot evaluations, and one post-intervention study. The remaining four studies employed qualitative approaches.

## **Population**

Among the included studies, 20 focused on specific chronic illnesses, while two addressed multiple chronic conditions [22,27]. Diabetes was the most frequently studied condition, with 12 of the 22 studies examining diabetic populations [18,23,26,30,31,33,34,35,36,37,38,39]. Five studies focused on patients with COPD [20,21,24,25,29], two investigated Parkinson's disease [19,20,21,22,23,24,25,26,27,28], and one study involved cancer patients [32].

## **Intervention Studied**

A common feature across the majority of studies was the integration of multidisciplinary teams in the care interventions. The composition of these teams varied according to the health conditions addressed, typically including professionals suited to managing the respective conditions. Many teams were led by general practitioners [18,30,39] or coordinated by nurses [28]. Most studies demonstrated that regular meetings and/or remote communication between primary and secondary care providers effectively facilitated transitions between care levels, thereby enhancing patient safety and continuity. Some studies also incorporated educational components, particularly for diabetic patients [22,25,32,35,38]. Interventions ranged from short-term randomized controlled trials to extensive long-term pilot programs, with durations spanning from several months to multiple years. It was suggested that some expected outcomes were not achieved due to insufficient time for interventions to fully develop [33,39].

## **Clinical Outcomes**

Clinical outcomes varied significantly among studies. Certain studies reported notable improvements, such as fewer severe exacerbations [25], reduced preventable hospitalizations [23], and better disease-specific markers [30]. Conversely, other studies observed minimal or no significant changes in clinical outcomes, which were sometimes attributed to a lack of uniformity in intervention approaches [24] or inadequate focus on individual patient needs [21].

## **Cost-Effectiveness**

Many studies supported the notion that integrated healthcare models are more cost-effective, attributed to more efficient resource utilization or reduced hospital admissions [18,35]. Nevertheless, some studies that anticipated higher cost-

effectiveness found negligible differences between intervention and control groups [19,24].

### **Electronic Integration**

The integration of electronic health records was a prevalent theme among the studies, facilitating communication among healthcare professionals and across different levels of care. This integration ensured that all patient information was centralized, aligning with the patient-centered approach of integrated care interventions. However, studies that failed to effectively implement IT systems often experienced negative outcomes or unplanned losses [26,35,36]. Ineffective electronic integration processes were noted to impede the seamless interaction between primary and secondary care, with patients sometimes acting as intermediaries for information transfer.

### **Patient/Professional Experience**

Many studies reported that patients experienced improvements in quality of life with integrated primary and secondary care systems [19,25,28,32]. Even in cases where clinical outcomes or cost-effectiveness did not show positive results, patient experiences were generally favorable, with support for the continued use of integrated care models [21,34]. Improvements in patient self-efficacy, autonomy, and confidence in managing their conditions were noted [30,32,38]. Healthcare professionals also demonstrated strong communication and positive interactions within multidisciplinary teams, although some challenges were observed in transitioning from clearly defined roles to a less structured integrated system [27,31,32,37].

## **Discussion**

### **Key Findings**

This study aimed to systematically review literature on the integration of primary and secondary care for chronic disease management, aligning with the objectives of the Irish healthcare policy, Sláintecare. The review highlighted that integrating primary and secondary care can improve clinical outcomes and is cost-effective for patients with specific chronic conditions such as diabetes, COPD, and Parkinson's disease. Key interventions identified include multidisciplinary teams, healthcare professional education, and e-health initiatives. Notably, there is a scarcity of research focusing on whole populations with chronic conditions, specific integrated care interventions, and studies originating from Ireland.

### **Relation to Existing Literature:**

In 2011, the World Medical Association advocated for the integration of chronic disease prevention and control strategies into national healthcare policies and emphasized the need for primary care training that incorporates integration and continuity [40-41]. Since then, various models have emerged to integrate secondary healthcare with primary, community-based care for chronic disease management. These models typically involve staff education and the

establishment of multidisciplinary teams. This review identifies key areas for future research to improve integration between primary and secondary care. It is evident that no single intervention model produced uniform results across all populations and settings, underscoring the need to consider specific population characteristics and the broader economic, social, and healthcare contexts when evaluating intervention success.

The variability in cost-effectiveness results suggests that policymakers and healthcare professionals should not expect significant short-term savings from interventions like multidisciplinary teams, staff education, and electronic data exchange. However, some studies did indicate potential long-term savings, which might have been more apparent with extended intervention durations. It is also crucial to interpret cost-effectiveness findings cautiously, as they can vary significantly. Positively, most studies reported improved patient outcomes or satisfaction, reflecting better clinical results, quality of life, or perceived quality of care.

Despite the extensive literature on integrated care, there is a limited number of studies exploring specific interventions. The reviewed studies often lacked detailed analysis of communication strategies between primary and secondary care, such as referral procedures and service agreements. This gap limits the ability to inform future research and practice, as effective communication is critical for successful integrated care models [2]. Furthermore, only two studies addressed multiple chronic diseases, revealing a need for more research on interventions that can simultaneously manage various chronic conditions in primary care settings. For instance, interventions might include integrating chronic disease prevention and management services into primary care or providing educational initiatives for primary care practitioners.

### **Implications for Research, Education, and Practice:**

While extensive research exists on various integrated care interventions, there is a lack of specific studies on integrating primary and secondary care for chronic illness. There is no conclusive evidence on the success of particular intervention types or components (e.g., communication strategies), with outcomes varying across different settings and populations. Additional research is needed to determine best practices for integrating primary and secondary care in chronic disease management. Identifying common intervention elements, such as multidisciplinary teams and healthcare professional education, is crucial. The identified care models were often disease-specific, suggesting a need for more research on effectively managing multiple chronic diseases within integrated care settings. Only two studies investigated multiple chronic conditions, with mixed results regarding the interventions' efficacy [22,27]. This raises questions about whether certain care models facilitate or hinder integration. Further research is warranted to explore the treatment of multi-morbid conditions in integrated settings. Additionally, the scarcity of studies from Ireland highlights a potential priority area for future research. Findings from this review underscore the importance of the social and economic context in intervention success, indicating that successful interventions in one country may not translate to another. More research on integrated care models for chronic illnesses within the Irish

healthcare context is needed to support the implementation of Ireland's Sláintecare program and to develop effective integrated care solutions for the Irish healthcare environment.

### **Methodological Considerations**

Employing a scoping review methodology was advantageous for this study, allowing a comprehensive mapping of the literature on integrated care for chronic diseases. This approach provided a broad overview of the research landscape, characterized by diverse and sometimes inconsistent findings. The use of Arksey and O'Malley's scoping review framework ensured a rigorous process for research development, study selection, and data interpretation. However, some limitations must be acknowledged. The scoping review methodology inherently lacks an assessment of study quality, focusing instead on the breadth of research. Additionally, the exclusion of non-English language publications may have led to the omission of relevant literature.

### **Best Practices and Technologies for Chronic Conditions Management**

Effective management of chronic conditions involves a combination of best practices and technologies that address various aspects of care. Here's a summary of best practices and technologies currently recognized for their impact:

#### **Best Practices**

1. **Patient-Centered Care:** Tailoring treatment plans to individual needs and preferences is crucial. This approach includes shared decision-making, personalized care plans, and active patient involvement in managing their condition.
2. **Multidisciplinary Teams:** Integrating care through teams comprising primary care physicians, specialists, nurses, and other healthcare professionals ensures comprehensive management of chronic conditions. Regular communication and coordination among team members are essential.
3. **Chronic Disease Self-Management Programs:** These programs empower patients by teaching them skills to manage their condition, including medication adherence, lifestyle modifications, and coping strategies.
4. **Care Coordination:** Effective management often requires coordinating between various levels of care. This includes coordinating transitions between primary and secondary care, ensuring follow-up appointments, and managing referrals.
5. **Patient Education:** Providing patients with education about their condition, treatment options, and self-management techniques improves adherence and outcomes.
6. **Regular Monitoring and Follow-Up:** Frequent monitoring of disease markers and symptoms allows for timely adjustments to treatment plans and early intervention when problems arise.
7. **Evidence-Based Guidelines:** Adhering to clinical practice guidelines ensures that care is based on the latest research and standards.



8. **Behavioral Interventions:** Incorporating behavioral strategies, such as motivational interviewing and cognitive-behavioral therapy, can help patients make and sustain lifestyle changes.

### Technologies

1. **Electronic Health Records (EHRs):** EHRs enhance care coordination by providing a centralized platform for patient information, facilitating communication among providers, and tracking patient progress.
2. **Telemedicine:** This technology enables remote consultations and follow-ups, increasing accessibility to care and allowing for more frequent monitoring without the need for travel.
3. **Remote Patient Monitoring (RPM):** Devices such as blood glucose meters, blood pressure monitors, and wearable sensors collect health data that can be transmitted to healthcare providers for ongoing monitoring and management.
4. **Mobile Health Apps:** Apps designed for chronic disease management can track symptoms, medication adherence, physical activity, and provide educational resources. They often include features for self-monitoring and communication with healthcare providers.
5. **Decision Support Systems:** These systems use algorithms and data analysis to support clinical decision-making, identify potential issues early, and recommend evidence-based interventions.
6. **Health Information Exchange (HIE):** HIE platforms facilitate the sharing of patient information across different healthcare settings, improving care continuity and reducing duplication of services.
7. **Personal Health Records (PHRs):** PHRs allow patients to manage their health information, track their health status, and communicate with healthcare providers.
8. **Wearable Devices:** Wearables such as smartwatches and fitness trackers can monitor vital signs, physical activity, and other health metrics, providing real-time data to both patients and providers.
9. **Artificial Intelligence (AI) and Machine Learning:** AI can analyze large datasets to identify trends, predict outcomes, and personalize treatment plans. Machine learning algorithms can also assist in early detection and management of chronic conditions.
10. **Virtual Reality (VR) and Augmented Reality (AR):** These technologies can be used for patient education, pain management, and rehabilitation, providing immersive experiences that support treatment goals.

### Conclusion

The management of chronic conditions presents significant challenges and opportunities for improving healthcare delivery. Effective management necessitates a combination of best practices and advanced technologies, with a focus on patient-centered care and integration across different levels of healthcare. The scoping review highlights that integrated care approaches, which blend primary and secondary care, can potentially enhance patient outcomes, improve cost-effectiveness, and ensure continuity of care. However, variability in the effectiveness of these models suggests that a one-size-fits-all approach is insufficient. Key practices identified include the use of multidisciplinary teams,

chronic disease self-management programs, and patient education, which collectively contribute to better health outcomes and patient satisfaction. Technologies such as Electronic Health Records (EHRs), telemedicine, and remote patient monitoring play a critical role in facilitating this integration by improving communication, tracking patient progress, and enabling more frequent monitoring. Despite these advancements, the review also uncovers limitations, such as mixed results in cost-effectiveness and implementation challenges. Some studies reported increased hospital admissions and costs, underscoring the need for further research and refinement in the integration of care models. The findings stress the importance of ongoing research to address gaps in knowledge, particularly regarding specific interventions and their impact on various chronic conditions. Future efforts should focus on optimizing integrated care processes, enhancing electronic systems, and evaluating long-term outcomes to achieve effective chronic disease management. A collaborative approach involving healthcare providers, policymakers, and patients is essential for realizing the potential benefits of integrated care and overcoming existing challenges.

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