

## Recent Advances in Clinical Trials

## Multidisciplinary Teams and Innovative Inpatient Interventions in Preventive Cardiology: A Transformative Approach to Inpatient Care

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### ABSTRACT

*This review examines and analyzes tailored, specific strategies and interdisciplinary collaborations employed within inpatient settings to initiate preventive cardiology efforts. By dissecting the intricate dynamics of hospital-based teams, this paper aims to provide targeted insights into innovative practices, emerging trends, and actionable interventions driving preventive cardiology forward from the very onset of patient care. Drawing from empirical research and real-world case studies, it examines the pivotal role of multidisciplinary collaboration in mitigating cardiovascular risks and fostering superior patient outcomes right from the inpatient stage.*

### Keywords

Cardiovascular disease, Preventive cardiology, Inpatient care, Innovative interventions.

### Introduction

Preventive cardiology plays a crucial role in mitigating the burden of cardiovascular disease, which remains a leading cause of morbidity and mortality worldwide. While traditional approaches to cardiovascular care often focus on the management of acute conditions, there is increasing recognition of the importance of preventive measures, particularly within inpatient settings. In this context, the implementation of embedded multidisciplinary teams and innovative inpatient interventions emerges as a promising strategy to transform care pathways and improve patient outcomes. This introduction sets the stage for exploring the synergistic effects of collaborative teamwork and technological advancements in preventive cardiology within hospital environments.

Embedded multidisciplinary teams represent a paradigm shift in healthcare delivery, bringing together diverse expertise from cardiology, nursing, dietetics, physical therapy, and social work to address cardiovascular risk factors holistically. By integrating

structured workflows and seamless communication channels, these teams facilitate early identification and intervention for cardiovascular risk factors during hospital stays. Furthermore, the joint decision-making frameworks employed by multidisciplinary teams enable personalized care plans tailored to individual patient needs, thus optimizing patient trajectories and preventing complications.

In tandem with embedded multidisciplinary teams, innovative inpatient interventions leverage technology and patient engagement to augment preventive cardiology efforts. From bedside education modules to interactive digital platforms and wellness programs, these interventions empower patients with knowledge and skills for cardiovascular risk management. Additionally, wearable devices, remote monitoring systems, and teleconsultation services enable real-time tracking of vital signs and facilitate continuous communication between patients and healthcare providers. Through detailed case studies and outcome assessments, the efficacy of these interventions in reducing hospital readmissions and fostering patient empowerment is underscored, laying the groundwork for sustained preventive efforts beyond the inpatient setting.

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As the burden of cardiovascular disease continues to rise, the integration of embedded multidisciplinary teams and innovative inpatient interventions holds immense potential to reshape the landscape of preventive cardiology within hospital settings. By fostering collaboration, enhancing patient engagement, and leveraging technology, these approaches represent a proactive shift towards preventive care, ultimately aiming to reduce the incidence and impact of cardiovascular disease on both individual patients and healthcare systems. This paper aims to deeper understand these transformative strategies, focusing on their implications for improving patient outcomes and informing future research and clinical practice in preventive cardiology.

As preventive cardiology continues to evolve within inpatient settings, several emerging trends and challenges warrant attention. One notable trend is the integration of artificial intelligence (AI) and machine learning algorithms in risk prediction and personalized treatment planning. By analyzing vast datasets encompassing genetic, clinical, and lifestyle factors, AI-driven models can facilitate early identification of individuals at heightened risk of cardiovascular events, enabling timely interventions to mitigate risks. Moreover, AI-powered decision support systems hold promise in optimizing treatment strategies and enhancing clinical decision-making, thereby augmenting the efficacy of preventive cardiology efforts [1]. However, the widespread adoption of AI in clinical practice necessitates addressing challenges related to data privacy, algorithmic bias, and clinician trust, underscoring the need for robust regulatory frameworks and interdisciplinary collaboration to harness its full potential.

Despite the strides made in preventive cardiology, several challenges persist, impeding the effective implementation of preventive strategies within inpatient settings. One such challenge is the underutilization of evidence-based interventions due to systemic barriers, including limited resources, time constraints, and organizational culture. For instance, studies indicate suboptimal adherence to guideline-recommended therapies and lifestyle modifications among healthcare providers and patients alike [2]. Addressing these barriers demands a concerted effort to streamline care processes, enhance provider education, and promote patient empowerment through tailored interventions and behavioral support. Moreover, fostering a culture of prevention necessitates a paradigm shift in healthcare delivery, prioritizing proactive risk assessment, and personalized care planning to mitigate the burgeoning burden of cardiovascular disease effectively.

Preventive cardiology represents a cornerstone of contemporary healthcare practice, with inpatient settings serving as pivotal arenas for early intervention and risk mitigation. Through interdisciplinary collaborations and innovative interventions, healthcare teams can forge holistic care pathways tailored to individual patient needs, thereby fostering superior cardiovascular outcomes. As the landscape of preventive cardiology continues to evolve, embracing emerging trends such as AI-driven risk prediction and personalized medicine holds promise in optimizing patient care and reducing the burden of cardiovascular disease.

However, addressing persistent challenges such as underutilization of evidence-based interventions necessitates concerted efforts to overcome systemic barriers and foster a culture of prevention within healthcare systems. By leveraging the insights gleaned from empirical research and real-world case studies, healthcare practitioners can chart a course toward a future where preventive cardiology initiatives thrive, ensuring enhanced patient well-being and reduced cardiovascular morbidity and mortality.

### **Definition and Composition of Embedded Multidisciplinary Teams**

The diversified makeup and cooperative approach to patient treatment by Embedded Multidisciplinary Teams in preventive cardiology inside inpatient settings are characteristics of the field [3,4]. Cardiologists, nurses, nutritionists, physiotherapists, pharmacists, psychologists, social workers, and others are frequently included in these teams; each member contributes specialized knowledge and abilities to the table [3]. For instance, nurses are essential in patient monitoring and education, while cardiologists concentrate on diagnosing and treating heart diseases [4]. Pharmacists handle pharmaceuticals, dietitians advise on diet, physiotherapists help with rehabilitation, and psychologists deal with psychological issues that affect cardiovascular health [3]. Social workers ensure a holistic approach to preventive cardiology by assessing social determinants of health and facilitating access to community resources [4]. Because of their varied makeup, embedded multidisciplinary teams are better equipped to address the intricate interactions between lifestyle, psychological, and medical factors that affect cardiovascular health, improving patient outcomes.

Empirical studies indicate that incorporating heterogeneous healthcare practitioners into integrated multidisciplinary teams leads to better patient outcomes and higher care quality [3,4]. These teams can offer complete and holistic therapy that addresses the complex nature of cardiovascular illness by utilizing the individual skills of each team member [3]. Research has demonstrated, for example, that collaborative care models involving multidisciplinary teams are linked to improved treatment regimen adherence, better management of cardiovascular risk factors, and fewer readmissions to hospitals among patients with cardiovascular conditions [4]. Additionally, these teams' interdisciplinary approach enables the early detection and treatment of cardiovascular risk factors, which may stop the progression and consequences of the disease [3]. Embedded multidisciplinary teams are essential in changing inpatient care pathways because they offer patient-centered, comprehensive preventive cardiology methods.

Embedded multidisciplinary teams' makeup can change based on the patient base, institutional resources, and particular therapeutic requirements [3,4]. Depending on the complexity and acuity of their patients, some institutions may form ad hoc preventive cardiology teams. In contrast, others may have specialist teams with experience in cardiovascular risk assessment and management [3]. Effective teamwork and communication are crucial for improving patient outcomes, regardless of the precise makeup of

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the group [4]. Embedded multidisciplinary teams can transcend disciplinary silos and provide integrated and coordinated care that meets the holistic needs of patients with cardiovascular diseases by promoting a culture of teamwork and mutual respect [3].

### **Structured Workflows and Communication Channels Within Multidisciplinary Teams**

Key elements of integrated multidisciplinary teams in preventive cardiology inside inpatient settings are structured processes and efficient communication channels [3-5]. It guarantees that team members know their contributions to patient care when roles and duties are clearly defined [5]. Frequent team meetings promote a culture of cooperation and creativity by offering chances for cooperative decision-making, care planning, and knowledge exchange [3]. By facilitating smooth information interchange and continuity of care across disciplines, using electronic health records (EHRs) allows for prompt interventions and reduces errors [5]. Workflows are streamlined by standardized protocols and pathways, which improves the effectiveness and consistency of care delivery [4]. Additionally, communication technologies that enable real-time communication and information sharing among team members, including shared documentation portals and secure messaging systems, further optimize coordination and collaboration [3]. Embedded multidisciplinary teams can enhance their ability to provide patient-centered care and improve cardiovascular outcomes by adopting standardized procedures and communication channels.

Studies reveal that well-organized processes and efficient channels of communication in interdisciplinary teams lead to better patient outcomes and higher-quality care [3-5]. For example, standardized care pathways and protocols have been demonstrated in studies to lower practice variability and promote more consistent and evidence-based care delivery [4]. Electronic health records also help with cross-disciplinary decision-making and information sharing, which improves continuity of care and lowers the possibility of mistakes [5]. Frequent team meetings provide a common understanding of patient requirements and treatment objectives by offering chances for interprofessional collaboration and knowledge exchange [3]. Structured processes within multidisciplinary teams maximize resource usage and improve efficiency by improving communication and streamlining workflows, ultimately benefiting patients and healthcare providers.

While structured channels of communication and procedures within interdisciplinary teams have numerous advantages, there may be challenges in implementing and optimizing them [3-5]. As Furze et al. point out, successful collaboration can be hindered by variations in team membership, communication styles, and institutional procedures. Additionally, technological constraints and privacy issues related to electronic health records can impede information exchange and system interoperability [3,5]. To address these issues, as suggested by Pozzi et al., interdisciplinary teams need proactive leadership, continual training, and a commitment to continuous quality improvement [4]. Healthcare organizations can enhance the ability of embedded multidisciplinary teams to

provide patient-centered, high-quality preventive cardiology treatment in inpatient settings by removing obstacles to organized workflows and communication channels, and by fostering a culture of proactive leadership.

### **Joint Decision-Making Frameworks for Early Identification and Intervention of Cardiovascular Risk Factors**

Embedded multidisciplinary teams utilize joint decision-making frameworks to identify and intervene early in cardiovascular risk factors among inpatients, thereby preventing adverse outcomes [3-5]. By leveraging evidence-based guidelines and risk assessment tools, team members collaboratively evaluate patients' cardiac risk profiles and develop personalized care plans tailored to individual needs [5]. Shared decision-making involving patients ensures that interventions align with their preferences and priorities, enhancing treatment adherence and engagement [3]. Multidisciplinary discussions may focus on optimizing medication regimens, implementing lifestyle modifications, and addressing psychosocial factors contributing to cardiovascular risk [4]. Early identification and intervention of risk factors enable timely initiation of appropriate therapies, potentially preventing disease progression and complications [5]. Joint decision-making frameworks promote collaboration and synergy among team members, fostering a patient-centered approach to preventive cardiology within inpatient settings [3]. Embedded multidisciplinary teams can effectively mitigate cardiovascular risks and optimize patient care trajectories through collective expertise and shared decision-making.

The integration of joint decision-making frameworks within embedded multidisciplinary teams has been shown to significantly improve patient outcomes and reduce the burden of cardiovascular disease [3-5]. Studies have demonstrated that collaborative care models involving joint decision-making result in better management of cardiovascular risk factors, increased adherence to treatment regimens, and reduced hospital readmissions among patients with cardiovascular conditions [4]. Moreover, shared decision-making, where patients actively participate in the decision-making process by expressing their preferences and concerns, empowers them to actively participate in their care, leading to improved treatment satisfaction and health-related quality of life [3]. By involving patients in the decision-making process, multidisciplinary teams can address individual preferences, values, and concerns, resulting in more personalized and effective interventions [5]. Furthermore, early identification and intervention of cardiovascular risk factors through joint decision-making frameworks enable timely initiation of preventive strategies, ultimately reducing the incidence of cardiovascular events and improving long-term outcomes [3].

Despite the numerous benefits associated with joint decision-making frameworks, challenges may arise in their implementation and optimization within embedded multidisciplinary teams [3-5]. Variability in patient preferences, cultural backgrounds, and health literacy levels may impact the effectiveness of shared decision-making processes [3]. Moreover, time constraints and resource limitations may hinder comprehensive risk assessment and shared decision-making discussions [4]. Addressing these challenges

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requires ongoing training, patient education, and organizational support, which plays a crucial role in providing the necessary resources, fostering a culture of collaboration, and promoting effective communication within multidisciplinary teams [5]. By overcoming barriers to joint decision-making, embedded multidisciplinary teams can optimize patient care and outcomes in preventive cardiology within inpatient settings.

### **Case Analyses Illustrating the Tangible Benefits of Multidisciplinary Collaboration**

Case studies illustrate the tangible benefits of multidisciplinary collaboration in preventive cardiology within inpatient settings. For example, consider a case where a middle-aged patient is admitted for an acute myocardial infarction. The embedded multidisciplinary team swiftly initiates comprehensive assessments, covering medical, dietary, psychosocial, and rehabilitative aspects of care [3]. Cardiologists promptly initiate appropriate medical management, while nurses monitor vital signs and educate patients on post-discharge care. Dietitians tailor a heart-healthy meal plan, emphasizing dietary modifications to control cholesterol and blood pressure. Physiotherapists devise a personalized exercise regimen, gradually reintroducing physical activity. Pharmacists review medication lists, ensuring optimal dosing and addressing potential drug interactions. Psychologists offer counseling to alleviate anxiety and promote adherence to lifestyle changes. Social workers assess the patient's support network and coordinate follow-up care with outpatient resources. The multidisciplinary team addresses the patient's immediate needs through this collaborative approach and develops a comprehensive care plan.

Follow-up evaluations of such cases often demonstrate tangible improvements in patient outcomes, validating the effectiveness of multidisciplinary collaboration. Post-discharge assessments may reveal improved cardiac function, better adherence to treatment regimens, and enhanced quality of life among patients who received care from embedded multidisciplinary teams [4]. Moreover, longitudinal follow-up studies indicate sustained improvements in cardiovascular health metrics, including blood pressure control, lipid profiles, and adherence to lifestyle modifications [5]. These findings underscore the enduring impact of multidisciplinary interventions in optimizing patient trajectories and preventing complications in preventive cardiology within inpatient settings.

In summary, real-world case analyses are compelling evidence of the tangible benefits of multidisciplinary collaboration in preventive cardiology within inpatient settings. These case studies highlight the transformative potential of collaborative approaches in improving cardiovascular health outcomes by showcasing successful outcomes achieved through comprehensive, patient-centered care delivered by embedded multidisciplinary teams [3]. Through such collaborative efforts, healthcare providers can effectively mitigate cardiovascular risks, optimize patient care trajectories, and ultimately enhance the quality of life for individuals affected by cardiovascular disease.

### **Implications for Optimizing Patient Trajectories and Preventing Complications**

Multidisciplinary collaboration in preventive cardiology within inpatient settings carries significant implications for optimizing patient trajectories and preventing complications. By integrating diverse expertise and resources, embedded multidisciplinary teams can comprehensively address the complex needs of patients with cardiovascular conditions [3]. Early identification and intervention of cardiovascular risk factors allow for the timely initiation of preventive strategies, potentially mitigating disease progression and reducing the likelihood of adverse outcomes [4]. Moreover, personalized care plans developed through collaborative decision-making ensure that interventions align with individual patient preferences and priorities, enhancing treatment adherence and engagement [3]. As a result, patients receiving care from embedded multidisciplinary teams may experience improved health outcomes, reduced hospital readmissions, and enhanced quality of life [5]. By optimizing patient trajectories and preventing complications, multidisciplinary collaboration in preventive cardiology within inpatient settings holds promise for enhancing healthcare delivery's overall effectiveness and efficiency.

Furthermore, the holistic approach adopted by embedded multidisciplinary teams addresses the medical aspects and the psychosocial and lifestyle factors influencing cardiovascular health [4]. Psychosocial support, dietary counseling, and rehabilitation services seamlessly integrate into patient care plans, facilitating holistic recovery and promoting long-term well-being [3]. By addressing underlying psychological stressors, promoting healthy behaviors, and facilitating access to community resources, multidisciplinary teams empower patients to actively participate in their care and make informed decisions about their health [5]. This patient-centered approach fosters trust and confidence and enhances patient satisfaction and engagement, contributing to positive health outcomes and long-term adherence to preventive strategies [3]. Thus, the implications of multidisciplinary collaboration extend beyond clinical outcomes to encompass the holistic well-being and empowerment of patients with cardiovascular conditions.

Moreover, the preventive focus of embedded multidisciplinary teams has broader implications for healthcare systems, including potential cost savings and resource optimization [4]. By preventing complications and reducing the need for intensive interventions, multidisciplinary preventive strategies may alleviate the burden on healthcare resources and improve the cost-effectiveness of care delivery [5]. Furthermore, by promoting early detection and management of cardiovascular risk factors, multidisciplinary collaboration may contribute to the overall reduction in cardiovascular events and associated healthcare costs [3]. These implications underscore the value of preventive cardiology initiatives within inpatient settings and highlight the importance of continued investment in multidisciplinary approaches to cardiovascular care.

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## Initiation of Post-Discharge Preventive Strategies Through Embedded Teams

Initiating post-discharge preventive strategies through embedded multidisciplinary teams represents a critical phase in the continuum of care for patients with cardiovascular conditions. Following discharge from inpatient settings, patients remain vulnerable to complications and recurrent cardiovascular events [4]. Embedded teams play a pivotal role in ensuring seamless transitions of care by developing comprehensive post-discharge plans tailored to individual patient needs [3], including facilitating access to outpatient services, coordinating follow-up appointments, and providing ongoing support and education to promote adherence to preventive strategies [5]. By initiating preventive interventions early in the post-discharge period, multidisciplinary teams aim to mitigate risk factors and prevent adverse events, ultimately improving long-term outcomes and reducing the likelihood of hospital readmissions [3].

Evidence suggests that proactive post-discharge management by embedded multidisciplinary teams leads to improved patient outcomes and enhanced continuity of care [3-5]. For instance, studies have shown that structured post-discharge interventions, such as medication reconciliation, patient education, and coordinated follow-up, reduce medication error rates, improve treatment adherence, and better disease management among patients with cardiovascular conditions [5]. Moreover, early initiation of preventive strategies during the post-discharge period has been associated with lower rates of hospital readmissions and emergency department visits, indicating the effectiveness of embedded teams in preventing complications and optimizing patient trajectories [4]. By proactively addressing the transitional care needs of patients, embedded multidisciplinary teams contribute to the overall quality and efficiency of healthcare delivery in preventive cardiology within inpatient settings.

Furthermore, initiating post-discharge preventive strategies through embedded multidisciplinary teams has broader implications for healthcare systems, including potential cost savings and resource optimization [3-5]. By preventing complications and reducing the need for costly interventions, proactive post-discharge management may lead to significant reductions in healthcare expenditures and resource utilization [5]. Moreover, by promoting patient self-management and empowerment, embedded teams foster a culture of preventive care and patient engagement, which may result in long-term benefits for population health and healthcare sustainability [3]. Thus, initiating post-discharge preventive strategies through embedded multidisciplinary teams improves individual patient outcomes and contributes to the broader goals of healthcare system efficiency and cost-effectiveness.

## Overview of innovative interventions and technological solutions in inpatient settings

There are several innovative technologies providing solutions for cardiovascular patients, including bedside educational modules and interactive digital platforms, and wellness programs to empower patients with knowledge and the confidence to monitor their health.

Beyond the inpatient setting, the advancement of commercial and medical wearable devices offers remote monitoring systems and consistent communication between patients and their providers to promote continuous care.

## Integration of bedside education modules to enhance patient understanding of cardiovascular risk factors

The integration of bedside education modules in inpatient cardiology care is imperative in enhancing patient understanding of cardiovascular risk factors. Meng et al. analyze a self-management patient education program for patients with chronic heart failure undergoing inpatient cardiac rehabilitation. The study by Meng et al. found that implementing a self-management program empowered patients and led to significantly improved self-management competence in the short term and treatment satisfaction at discharge. The researchers also noted improved long-term symptom monitoring 6 months post-discharge, as well as improved symptom monitoring and physical activity 12 months post-discharge. Meng et al.'s study concluded that patient education and self-management are an essential component of chronic heart failure management, yet identified a need for further research on successful educational strategies [6].

In addition to bedside education modules, the inception of interactive digital platforms and wellness programs has led to an increased focus on patient autonomy, empowerment, and shared decision-making in inpatient cardiology. The impact of interactive digital platforms is well-documented in the literature. A systematic review and meta-analysis by Fredericks et al. notes improvements in several patient outcome metrics, such as quality of life, patient adherence to therapy, and reduced symptoms of depression and anxiety as a result of increased education for heart surgery patients [7].

A comprehensive review of the literature assesses the impact of digital patient education on key outcomes such as patient knowledge (health literacy), as well as mental health, quality of life, and overall patient satisfaction. These digital platforms include the use of a smartphone or tablet for patients to view educational materials, web-based content, and modules including virtual reality and a combination of two-dimensional and three-dimensional videos. Pool et al. concluded that digital patient education not only increases health literacy but also improves patient confidence in the reduction of feelings of anxiety and depression [8]. While the benefits are clear, further study is warranted to identify best practices in digital patient education. A review by Cutilli identifies four key components to be addressed by healthcare professionals providing patient education: assessment, planning, implementation, and evaluation, and suggests that a simple, patient-centered, and multimodal approach is key in improving the knowledge of not only patients but also their caregivers [9].

The advantages of bedside instruction and interactive digital platforms are evident in medical literature, notably in reducing hospital readmissions. A systematic review and meta-analysis of educational intervention in patients with heart failure, conducted

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by Marques et al., found that educational intervention by nurses and consistent communication between patients and healthcare professionals via telemedicine reduced the chance of readmission by 36%. Marques et al. also emphasized the importance of educational guidance on self-care as a key component in empowering patients [10]. The literature also underscores the importance of improved patient education by nurses on patient confidence in managing their disease and reducing the exacerbation of symptoms [11].

### **Utilization of interactive digital platforms and gamified wellness programs for patient engagement**

Beyond inpatient medicine, the utilization of interactive digital platforms, and gamified wellness programs have demonstrated potential to improve patient engagement. Commercial self-monitoring devices including the Oura Ring and the Apple Watch have shown promise in providing continuous monitoring of cardiovascular health, such as heart rate, respiratory rate, heart rate variability, and blood oxygen levels, in addition to health education related to these values, body temperature, activity, and diet on the device's corresponding cellphone applications. The medical literature offers evidence to support commercial wearable devices. For example, a recent study by Cao et al. found that the Oura Ring was able to accurately detect nocturnal HR and RMSSD in both five-minute and average-per-night tests while providing "acceptable" nocturnal readings of AVNN, pNN50, HF, and SDNN accuracy in average-per-night tests [12]. Several clinical trials and population-based studies support the use of similar wearables including Garmin, Apple watches, and Fitbit products [13-15].

### **Deployment of wearable devices and remote monitoring systems for real-time tracking of vital signs**

Recent innovations in remote monitoring systems have also shown promise, an example being the Zio patch. The Zio patch is a remote ambulatory ECG monitor prescribed by a physician and often applied in a clinic. The Zio patch is worn by a patient for up to 2 weeks, during which the device sends values, analyzes data, and provides a report to physicians. A review by Yenikomshian et al. found that long-term, continuous, and uninterrupted monitoring with Zio patches resulted in longer patient wear times, as well as improved detection rates of cardiac arrhythmia, underscoring the importance of these devices on continuous patient monitoring [16]. Additionally, teleconsultation services have also demonstrated progress in offering continuous communication between patients and healthcare providers, particularly in cardiology. An international review by Kędzierski et al., emphasizes the value of telemedicine as a promising addition or supplement to standard, routine cardiological care, and the impact of telemedicine in conjunction with remote monitoring systems [17]. These studies on innovative interventions underscore the power of sustained preventive efforts for patients with cardiovascular disease beyond the inpatient setting and highlight the imperative for ongoing research in this area to improve the accuracy of these tools as well as the establishment of guidelines and best practices.

Moreover, medical facilities are increasingly embracing Bluetooth biometric devices to monitor vital signs such as blood pressure,

weight, oxygen levels, and temperature in patients. These cutting-edge devices automatically capture and transmit data directly to healthcare providers for in-depth analysis [18]. This innovative approach has demonstrated enhancements in overall clinical outcomes and patient satisfaction while ensuring continuous care. Additionally, the rise of smartwatches has garnered attention for their ability to conduct 1-lead electrocardiograms and monitor heart rates without the immediate need for a healthcare provider's intervention. These smartwatches store electrocardiograms, enabling healthcare providers to detect arrhythmias like atrial fibrillation, atrial flutter, and sinus tachycardia upon further analysis. Studies indicate an increase in the number of patients seeking medical attention upon receiving notifications of abnormalities [19,20].

### **Use of teleconsultation services to enhance access and connectivity for improved healthcare delivery**

The integration of teleconsultation services into preventive cardiology represents a groundbreaking advancement in healthcare delivery. These services have not only facilitated access to healthcare for both providers and patients but have also bridged the gap between them. Patients now have the convenience of accessing expert healthcare advice, monitoring, and guidance from the comfort of their homes, enabling proactive measures to mitigate cardiovascular risks. Additionally, telemedicine implementation has addressed the shortage of cardiologists and cardiology subspecialties in rural and smaller healthcare systems. Its efficacy in cardiovascular disease prevention, particularly through frequent teleconsultation visits for cardiac rehabilitation, has been demonstrated [18]. This innovative approach not only enhances patient engagement and satisfaction but also encourages early intervention and personalized care strategies. Through the utilization of telecommunication technologies, healthcare professionals can conduct comprehensive assessments, provide tailored recommendations, and empower patients with the knowledge and resources to actively manage their cardiac health. Ultimately, the incorporation of teleconsultation services in preventive cardiology exemplifies a forward-thinking strategy aimed at improving healthcare accessibility, efficiency, and patient outcomes.

### **Case Studies in Reducing Hospital Readmissions and Empowering Patients**

The integration of telecardiology consultation services has demonstrated notable effectiveness in enhancing hospital visits and curbing unnecessary readmission rates. As per current NICE guidelines, patients exhibiting active chest pain and symptoms indicative of acute coronary syndrome are advised for immediate evaluation at the emergency department. A study by Molinari et al. scrutinized 456 patients presenting with initial cardiac-like symptoms, with 134 showing signs highly suggestive of acute coronary syndrome. Through telecardiology services, 84 out of these 134 patients underwent evaluation, revealing electrocardiogram findings within normal limits, thus indicating symptoms unrelated to acute coronary syndrome. This intervention resulted in the avoidance of unnecessary hospitalizations for these

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patients, translating to substantial cost savings estimated at around half a million dollars [21].

Another study done by Terkelsten et al. compared the door-to-balloon time between patients diagnosed with STEMI via telecardiology and those diagnosed upon hospital arrival. Their investigation encompassed 250 patients, with 214 successfully diagnosed with STEMI prior to hospital admission. This pre-hospital diagnosis reduced the door-to-balloon time from 81 minutes to 38 minutes by facilitating the direct transfer of patients to the cardiac catheterization lab, bypassing the need for initial work-up in the emergency department [22]. This underscores the significant efficacy of remote monitoring systems in enhancing patient care and safety.

These cases demonstrate that through the utilization of telecardiology consultation services, wearable and remote monitoring technology, patient education, and personalized care plans, healthcare providers have adeptly handled the intricacies of patient management, leading to enhanced health outcomes and heightened patient satisfaction. These case studies stand as invaluable illustrations of how proactive, patient-centered strategies can effectively influence healthcare delivery, ultimately resulting in improved patient outcomes and diminished healthcare expenditures.

Embedded multidisciplinary teams in preventive cardiology offer a holistic approach to healthcare, bringing together diverse expertise to address cardiovascular risk factors comprehensively. These teams enable proactive management of patient health during the hospital stay by facilitating early identification and intervention through structural workflows and seamless communication channels. Joint decision-making frameworks ensure collaborative discussions and personalized care plans tailored to individual needs, emphasizing patient-centered care. The concept of these multidisciplinary teams, as exemplified by various Heart Team models across different cardiovascular care settings, represents a transformative approach to inpatient care. From addressing complex coronary artery disease (CAD) to structural heart conditions, pulmonary embolism, cardiogenic shock, and cardiovascular care during pregnancy, these teams embody a paradigm shift towards disease-focused, patient-centric, interdisciplinary, and evidence-based care. Studies, including those evaluating specialized teams like the Pulmonary Embolism Response Team (PERT) and Cardiogenic Shock Team have consistently demonstrated significant improvements in patient outcomes following the implementation of multidisciplinary approaches causing reductions in intensive care unit stays, total hospitalization time, and 30-day mortality rates. Moreover, the integration of multidisciplinary Heart Teams in decision-making processes has led to more informed treatment strategies and improved long-term patient outcomes. Utilizing the collective expertise of diverse specialists and fostering consensus recommendations, these teams strive to comprehensively address the complexities of cardiovascular conditions [23].

Continuing the narrative of the transformative impact of

multidisciplinary teams in advancing preventive cardiology, recent research has highlighted the pivotal role of these teams, particularly within critical care settings. A recent multicenter observational study to detect the impact of shock teams on the management and outcomes of cardiogenic shock (CS) across 24 cardiac intensive care units (CICUs) in North America, has revealed intriguing insights into the role of multidisciplinary approaches in critical care. The presence of shock teams in CICUs was associated with lower mortality rates. These teams utilized aggressive hemodynamic monitoring and advanced mechanical circulatory support modalities, leading to tailored interventions and improved outcomes for patients with cardiogenic shock. The coordinated, multidisciplinary approach provided by shock teams in the study versus without shock teams contributed to the observed reduction in mortality (23% vs 29%), highlighting their crucial role in optimizing patient care in the ICU setting [24].

Innovative inpatient interventions play an important role in advancing preventive cardiology by reshaping traditional approaches to patient care and improving clinical outcomes. A recent study by Zhan et al. has revealed the transformative impact of continuous transversus thoracis muscle plane blocks (TTMP) in patients undergoing open heart valve replacement surgery. TTMP is a novel technique that involves administering a nerve block around the thoracic muscles, providing continuous pain relief following surgery [25]. TTMP has demonstrated remarkable benefits, including reduced postoperative pain, diminished opioid consumption, earlier extubation and mobilization, shorter ICU and hospital stays, and a lower incidence of postoperative nausea and vomiting [26].

Expanding upon the diverse array of innovative inpatient interventions in preventive cardiology, another notable example lies in the integration of Cardiac Resynchronization Therapy (CRT) in the management of heart failure (HF). CRT is a treatment involving the implantation of a specialized device, typically a pacemaker or defibrillator, designed to deliver synchronized electrical impulses to the heart. A recent systematic review, comprising nine randomized controlled trials and three non-randomized studies involving 8,067 patients with Heart Failure with preserved Ejection Fraction (HFpEF), investigated the effectiveness of CRT. The analysis uncovered significant benefits associated with CRT in HFpEF patients with a notable reduction in the risk of heart failure hospitalization in those who received CRT. Additionally, CRT was found to lead to significant improvements in various echocardiographic parameters, including reductions in left ventricular end-systolic volume (LVESV), left ventricular end-diastolic volume (LVEDV), and left ventricular end-diastolic diameter (LVEDD). These findings highlight the potential of CRT as an important therapeutic approach for managing HFpEF and to decrease the risk of adverse cardiovascular events, representing a ground-breaking advancement in Preventive Cardiology [27].

Another pioneering intervention involves the utilization of near-infrared spectroscopy-intravascular ultrasound (NIRS-IVUS) within inpatient settings. NIRS-IVUS combines near-infrared

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spectroscopy, which detects lipid content with intravascular ultrasound and provides detailed images of arterial structures. By analyzing the composition of plaques, particularly detecting lipid-rich plaques, NIRS-IVUS helps clinicians assess the vulnerability of coronary lesions and predict the likelihood of future cardiovascular events, such as myocardial infarction. These advancements emphasize the pivotal role of NIRS-IVUS in enhancing risk assessment and treatment strategies in preventive cardiology within inpatient settings, ultimately contributing to improved patient outcomes and reduced cardiovascular morbidity and mortality [28].

The implementation of embedded multidisciplinary teams (MDHTs) and innovative preventive cardiology interventions brings numerous challenges and limitations. Firstly, patients may endure physical, psychological, and financial burdens from interactions with multiple specialists and undergoing numerous diagnostic tests, affecting both patients and caregivers. Scheduling regular meetings for MDHTs can be problematic, potentially hindering efficiency despite the benefits of patient convenience and rapid decision-making. Furthermore, some programs may lack the collective experience and medical specialization necessary to address complex clinical scenarios, necessitating partnerships with larger, more experienced programs for collaboration through videoconferencing and electronic data sharing. Healthcare disparities related to race, gender, ethnicity, age, rurality, and social determinants of health pose significant challenges, demanding a thorough understanding of patient demographics and equitable access to care. Variability in MDHT composition and operation across different settings explains the need for greater standardization in staffing models, implementation guidelines, training opportunities, and outcome measurement. Additionally, the lack of a reimbursement structure from payers for provider time engaged in MDHT activities may hinder their sustainability and widespread adoption [29].

The exploration of preventive cardiology within inpatient settings unveils promising avenues for both research and clinical practice. Future investigations should delve into refining risk assessment tools tailored for inpatient populations, integrating novel technologies for real-time monitoring and intervention, and implementing comprehensive lifestyle modification programs. Moreover, collaborative efforts between cardiologists, primary care physicians, and multidisciplinary teams will be crucial in delivering personalized, holistic care to individuals at risk of cardiovascular events during their hospital stay. By advancing our understanding and application of preventive cardiology within inpatient settings, we can strive towards reducing the burden of cardiovascular disease and improving patient outcomes on a broader scale.

## Conclusion

By conducting a detailed examination of current inpatient initiatives and interdisciplinary collaborations, this review paper underscores the pivotal role of hospital-based teams in pioneering preventive cardiology practices from the point of admission.

Through targeted interventions, technology integration, and patient-centered care paradigms, inpatient settings can serve as catalysts for early risk identification, intervention, and patient empowerment, ultimately shaping long-term cardiovascular outcomes and promoting holistic wellness across care continuums. This includes the value of bedside education modules, interactive digital platforms, gamified wellness programs, the deployment of wearable devices and remote monitoring systems, and teleconsultation services. By delineating the structure and function of embedded teams and showcasing the efficacy of innovative interventions, this paper highlights the transformative potential of comprehensive care in optimizing patient care and mitigating cardiovascular risks. Moving forward, it is imperative that healthcare stakeholders embrace collaborative approaches and leverage technological advancements to enhance preventive cardiology efforts in and beyond the inpatient setting.

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