JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S11

Nurses as Pioneers in Cardiovascular Care: A Review of Effective Interventions

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Abstract

Cardiovascular disease (CVD), particularly coronary artery disease (CAD), is a leading cause of death worldwide. While revascularization therapies like percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) are primary treatment options, primary prevention through lifestyle modifications remains the most effective strategy. Nurse-led clinics have emerged as a promising approach to deliver preventive, educational, and psychological services to patients with CVD. This literature review highlights the role of nurses and their interventions in managing patients with cardiovascular diseases. Nurses play a crucial role in promoting healthy lifestyles, reducing cardiovascular risks, and providing post-discharge care. Evidence supports the effectiveness of nurse-led interventions in early initiation of thrombolysis, cardiac rehabilitation, and management of chronic heart failure. Nurse-led lifestyle programs have been shown to improve cardiovascular risk factors, while nursing interventions post-cardiac catheterization and cardiovascular surgery have yielded positive outcomes. Gender differences in cardiovascular risk and treatment underscore the importance of nursing expertise in providing tailored care. The COVID-19 pandemic has accelerated the adoption of telemedicine, with nurse-led initiatives demonstrating feasibility in managing patients with CVD. Nurse-led interventions have also shown promise in improving medication adherence, reducing hospital readmissions, and enhancing quality of life for patients with various cardiac conditions.

Further research is needed to investigate the long-term effects of nurse-led clinics on the treatment and management of patients with cardiovascular diseases.
Keywords: nurses, Cardiovascular Care, CVD, Cardiovascular disease

Introduction

Today, cardiovascular disease (CVD), particularly coronary artery disease (CAD), is increasingly prevalent (Birger et al., 2021). Although there has been a decline in mortality rates, CAD remains one of the leading causes of death among patients worldwide. Male patients, particularly those over the age of 50 and those with cardiovascular risk factors such as a family history of CAD, are at an elevated risk for developing this condition. The World Health Organization (WHO) has reported that approximately 80% of cardiovascular diseases could be averted through lifestyle changes, including a healthy diet, blood sugar management, regular physical activity, and complete cessation of smoking (Benjamin et al., 2017). However, these health-promoting behaviors have only been adopted by a small minority, with only 4.3% of patients engaging in them according to a survey conducted across 17 countries (Teo et al., 2013).

For patients diagnosed with CAD, revascularization therapies, such as percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), remain the primary treatment options, in addition to lifelong cardiac medications like anticoagulants and beta-blockers. Nonetheless, primary prevention continues to be the most effective strategy.

Currently, health services emphasize the importance of keeping individuals within their communities, leading to the establishment of nurse-led clinics, which function similarly to small outpatient facilities. These clinics originated in the United States and the United Kingdom in 1980 within the primary care framework, aimed at maintaining patient care post-discharge following cardiovascular interventions. Nurse-led clinics are managed by advanced nurse practitioners, clinical nurse specialists, and other specialized nursing staff to deliver effective care tailored to individual patients. These clinics consist of specially trained nurses who provide counseling based on primary prevention strategies to avert chronic diseases (Laurant et al., 2018).

Nurses play a crucial role in cardiovascular care by promoting and encouraging healthy lifestyles, thereby contributing to the reduction of cardiovascular risks within the population. These clinics operate independently, solely staffed by nursing personnel, and are primarily designed to offer supportive, educational, preventive, and psychological services to patients, distinguishing them from therapeutic clinics.

Despite the significant contributions of nurse-led interventions to the effective management of patients with cardiovascular diseases, there is a notable scarcity of published studies focusing on nurse-led clinics and cardiovascular conditions. Consequently, this brief literature review aims to highlight the role of nurses and their interventions in the management of patients suffering from cardiovascular diseases.

Finaly Nurses play an indispensable role in managing and caring for patients with CHD , nursing interventions improve outcomes for individuals to prevent , management and treatment through care strategies (Shan et.al, 2023).

Factors Contributing to the Development of Cardiovascular Diseases

A variety of factors contribute to the onset of cardiovascular disease (CVD) (Flora & Nayak, 2019). Key cardiovascular risk factors encompass diabetes mellitus, hypertension, elevated body mass index (overweight and obesity), cigarette smoking, a family history of cardiovascular disorders, dyslipidemia, insufficient physical activity, a sedentary lifestyle characterized by fast food consumption, and alcohol intake. These risk factors are observed to be more prevalent among men. In women, additional risk factors may include menopause and

autoimmune conditions such as antiphospholipid syndrome and systemic lupus erythematosus. While age and male gender were traditionally recognized as significant cardiovascular risk factors, recent observations indicate that younger populations and an increasing number of women are now also at heightened risk for cardiovascular diseases. Furthermore, individuals with chronic kidney disease are at considerable risk for experiencing cardiovascular events (Liu et al., 2014).

Revascularization in Patients with Cardiovascular Diseases

Patients diagnosed with coronary artery disease (CAD) may experience acute coronary syndrome (ACS), which includes ST-Elevation Myocardial Infarction (STEMI), Non-ST-Elevation Myocardial Infarction (NSTEMI), and unstable angina. The management of ACS often necessitates invasive or surgical interventions. Percutaneous coronary intervention (PCI) is the most commonly performed invasive revascularization procedure for these patients. In cases involving more complex conditions such as triple vessel disease, complex CAD, left main CAD, and chronic total occlusion, open-heart surgery, specifically coronary artery bypass grafting (CABG), should be considered. Following these procedures, patients are typically prescribed lifelong antiplatelet agents or anticoagulants to avert stent thrombosis and reduce the risk of re-infarction (Dagher & Modrall, 2007).

Nurse-Led Clinics

Contemporary health services emphasize the importance of maintaining individuals within their communities and minimizing hospital admissions, reserving hospital settings primarily for emergency cases. Nurse-led clinics are small outpatient facilities supervised by experienced nurses in specific specialties. Research has demonstrated that these clinics offer more efficient outpatient care and significantly reduce waiting times. Managed by advanced nurse practitioners, clinical nurse specialists, and other specialized nursing staff, these clinics were established to explore new strategies for effectively managing complex care that meets the needs of both patients and healthcare providers. Additionally, nurse-led clinics aim to enhance patient access to care and provide a cost-effective, high-quality streamlined service. Numerous nurse-led clinics have been developed specifically for the management of patients with cardiovascular diseases (Al-Mallah et al., 2016).

The Evidence to Support Nurse-Led Interventions

The healthcare system is widely recognized as requiring its own form of "treatment," and efforts to enhance efficiency and overall effectiveness continue on both sides of the Atlantic. Initial attempts to elevate the standard of care for cardiac patients must be cost-effective, compatible with existing healthcare structures, and both reproducible and practical if proven effective.

In this context, interventions led, mediated, coordinated, or delivered by specialist nurses appear promising. A review of the literature through the electronic databases Medline and CINAHL reveals over 500 articles published in the last five years on this topic, with about a quarter focusing on heart disease—primarily on areas such as smoking cessation, lipid management, and chest pain clinics. A search of the Cochrane Database of Systematic Reviews and the Cochrane Controlled Trials Register identified approximately 25 relevant studies, most of which center on secondary prevention. Despite the growing interest, studies on nurse-led initiatives have been relatively underfunded due to suboptimal research practices and a reluctance to support research that is either commercially unappealing or difficult to establish in terms of cause and effect. Nevertheless, there are noteworthy examples of effective nurse-led interventions in three key areas: early initiation of thrombolysis, cardiac rehabilitation, and management of chronic heart failure.

Early Initiation of Thrombolytic Therapy

The benefits of timely administration of thrombolytic therapy for patients experiencing acute myocardial infarction (MI) are well established. However, despite the routine introduction of

this treatment over a decade ago, few patients receive thrombolysis within the critical first two hours of symptom onset, and treatment delays vary significantly across hospitals. Upon arrival at the hospital, patients meeting the criteria for immediate thrombolytic therapy often experience wait times exceeding the national standard of 30 minutes for 'door-to-needle' time. It has been suggested that allowing suitably trained nurses to administer treatment before physician assessment could mitigate these delays.

Several studies have demonstrated that nurses can safely identify patients eligible for immediate thrombolysis. Consequently, many hospitals have implemented systems for 'nurse-led' and 'nurse-initiated' thrombolysis. These initiatives have successfully reduced treatment delays using protocols initiated by nurses. While there is increasing evidence supporting the role of nurses in facilitating rapid and appropriate treatment for acute MI, research has primarily focused on decision-making and process metrics, highlighting a need for additional studies to assess the cost-effectiveness of such approaches and to quantify their impacts on health outcomes.

Cardiac Rehabilitation

There is robust evidence supporting the benefits of cardiac rehabilitation. This approach can aid recovery, enhance health and quality of life, and potentially reduce mortality risk in individuals with heart disease. Most cardiac rehabilitation programs have been initiated, developed, and coordinated by nurses. National clinical guidelines and audit standards, formulated by a nurse-led team based on a comprehensive review of the evidence, emphasize the importance of early individual assessment and intervention, as well as systematic follow-up. Nurses are ideally positioned to identify patients who would benefit from cardiac rehabilitation, assess their risks and needs, and develop individualized plans accordingly.

Early psychological and educational interventions for MI patients and their partners, designed and delivered by nurses, have been shown to effectively reduce psychological distress while increasing knowledge and satisfaction for up to six months post-discharge from the hospital. Extended nurse-led counseling and rehabilitation for couples have also demonstrated effectiveness for up to a year following MI. However, cardiac rehabilitation has not been extensively evaluated as a nurse-led intervention due to its multidisciplinary nature. One challenge in evaluating cardiac rehabilitation lies in the complex interactions of multifaceted interventions on various outcomes within a heterogeneous population.

Management of Chronic Heart Failure

There is growing evidence that nurse-led interventions are a cost-effective means of enhancing the quality of post-discharge care for patients with chronic heart failure (CHF) by reducing readmission rates. Current literature suggests that interventions involving specialist nurse-led, home-based follow-up are more effective than those relying on clinic-based follow-up. However, clinic-based approaches appear to be more beneficial than home visits focused solely on education.

Recent studies have confirmed the beneficial effects of nurse-led interventions in both the medium and long term. A recent study involving 200 CHF patients indicated that a nurse-led, multidisciplinary home-based intervention was associated with significantly longer event-free survival, approximately 40% fewer unplanned readmissions, and about 60% fewer days spent in the hospital due to unplanned admissions during a six-month follow-up. The study also noted improvements in quality of life, reduced healthcare costs, and an overall enhancement in survival duration.

Nurse Interventions in Lifestyle Programs on Cardiovascular Risk Factors

To prevent or mitigate cardiovascular risk factors, lifestyle modifications—including healthy eating habits, adequate daily physical activity, and smoking cessation—should be implemented. Specialized nurses have been trained to provide counseling to patients regarding

the prevention and management of these risk factors. A primary role of nurses is to educate patients on these lifestyle modifications. Supporting this assertion, the EUROACTION Project, a nurse-led model for cardiovascular prevention and rehabilitation programs adapted in Spain, has facilitated healthier lifestyles. This model has successfully achieved affordable and sustainable therapeutic goals for cardiovascular disease prevention in routine clinical practice (Buigues et al., 2022).

In another study focusing on nurse interventions, a notable proportion of patients with angina (31.5%) reported making dietary changes, while 23.3% increased their daily physical activities, particularly walking. Nurse-facilitated interventions have been shown to significantly reduce the frequency of angina attacks, decrease physical disabilities, and alleviate depression among patients with coronary artery disease (CAD). A trial conducted in Glasgow community practice clinics and patients' homes demonstrated that compared to usual care for patients awaiting open-heart surgery, the nurse-led group achieved a significantly higher smoking cessation rate, with a reduction of 25% compared to only 2% in the control group. Additionally, cholesterol levels and blood pressure were significantly lowered in the nurse intervention group, indicating favorable outcomes.

Moreover, a single-blinded randomized controlled trial assessed the impacts of a nurse-led eHealth cardiac rehabilitation program on health outcomes in 146 patients with CAD. In this study, nurses conducted lifestyle modification educational sessions with patients during their hospital stay, followed using an e-platform upon discharge to enhance understanding of disease management and monitor progress toward health behavior goals. This eHealth platform was overseen by nurses, who provided weekly feedback to patients. At six weeks post-intervention, patients who participated in the nurse-led interventions exhibited significant improvements in daily physical activity, health-promoting lifestyle profiles, and health-related quality of life compared to the control group, underscoring the effectiveness of eHealth nursing interventions for protecting CAD patients.

Another randomized trial highlighted the advantages of nurse-led follow-up care for post-discharge CAD patients in achieving optimal low-density lipoprotein (LDL) control. The STEP-IT-UP study also demonstrated that nurse-led interventions effectively promoted physical activity and improved cardiovascular risk factors within a three-month timeframe. This approach was particularly effective in encouraging physical activity among sedentary elderly individuals, resulting in notable improvements in cardiovascular risk factors within three months of implementation. Additionally, in a two-armed randomized controlled trial, participants were randomly assigned to nurse-led lifestyle intervention campaigns or received standard hospital care (Zheng et al., 2020). Participants learned strategies to reduce the prevalence of cardiovascular issues and their adverse effects on health. The nurse-led Health Promotion Model guided lifestyle intervention program significantly enhanced participants' self-efficacy and the implementation of health-promoting behaviors.

Nurse Interventions Post Cardiac Catheterization

Nurses play a pivotal role in cardiac catheterization, particularly in the post-operative phase. A quasi-experimental study involving 112 Chinese participants with myocardial infarction undergoing percutaneous coronary intervention (PCI) assessed the effects of a nurse-led individualized self-management program focusing on health behaviors, cardiac risk factor management, and health-related quality of life. The study demonstrated significant positive outcomes after one year, including improvements in health behaviors, quality of life, better control of cardiac risk factors such as smoking cessation, reduced low-density lipoprotein levels, and significant enhancements in body mass index among participants assigned to the nurse-led intervention group, thereby supporting the efficacy of nursing interventions in cardiac catheterization (Jiang et al., 2020).

Additionally, another study with 62 participants who underwent cardiac catheterization found that a nurse-led intervention group, which included discharge counseling and telephone follow-ups, resulted in moderate to good smoking cessation rates, adherence to cardiac medications, dietary changes, a physically active lifestyle, and improved healthcare satisfaction among patients. A retrospective analysis of nurse-led clinics for 1,325 patients with ST-elevation myocardial infarction, non-ST-elevation myocardial infarction, unstable angina, and stable angina treated with PCI assessed 30-day mortality rates, readmissions, and patient satisfaction. The findings revealed a mortality rate of 0.4% during follow-up visits, with 10% of patients readmitted within 30 days, of which only 1.8% were due to cardiac causes. This study indicated that nurse-led PCI clinics effectively managed cardiovascular risk factors without increasing adverse cardiac outcomes.

Moreover, a randomized clinical study conducted in the Interventional Cardiology Ward of Jondi Shapur University Hospital in Ahvaz, Iran, from 2006 to 2008, focused on patients undergoing balloon angioplasty and found that nurse-led education significantly reduced complications following the invasive procedure. The simplicity of nursing staff teaching was highlighted as a critical factor in minimizing complications after coronary interventions. Furthermore, the involvement of nurse specialists in assessing the radial artery before and after coronary catheterization using ultrasound has also yielded positive results in interventional cardiology (Williams et al., 2020).

Nurse-Led Interventions and Cardiovascular Surgery

Nursing interventions in coronary artery bypass grafting (CABG) have proven effective as well. A randomized control trial involving 188 patients at a tertiary center in the United Kingdom evaluated a nurse-led support and educational program for patients awaiting CABG. The results indicated high levels of patient satisfaction, with participants valuing the support from nursing staff; however, recommendations were made to enhance communication among staff and with patients, as individuals appreciated both physical and psychological preparations prior to surgery.

In a prospective study conducted with patients hospitalized for CABG between April 2014 and November 2015 in Turkey, findings showed that the nurse-led clinical pathway contributed to a reduction in hospital stay length, allowing for earlier patient discharge following open-heart surgery, along with a significantly lower rate of complications among those assigned to the nurse-led treatment group (Kebapcı & Kanan, 2018). Another study evaluated the safety and efficacy of a nurse-led clinic for patients recovering after CABG, involving 584 patients who underwent the procedure. These patients received care from either a nurse practitioner or a resident. The results indicated that those treated by nurse practitioners were discharged significantly sooner without an increase in mortality rates, concluding that a nurse-led clinic for post-CABG recovery was both safe and effective in a Dutch non-cardiac surgery hospital. Additionally, another study highlighted a nurse-led interventional program aimed at reducing overall healthcare utilization in patients awaiting cardiac surgery.

Impact of Gender on Cardiovascular Risk and the Implication of Nursing Expertise to Improve This Condition

Cardiovascular prevention strategies differ significantly between male and female patients, as highlighted by various studies. In clinical settings, men and women do not always receive equivalent treatment. The Lancet Women and Cardiovascular Disease Commission aims to enhance cardiovascular prevention and reduce global mortality and complications related to cardiovascular disease in women by 2030. In 2019, cardiovascular mortality accounted for 35% of total deaths among female patients. Literature indicates that women experience a higher risk of bleeding compared to men when undergoing anticoagulation therapies. Furthermore, cardiovascular diseases in women have frequently been understudied, underdiagnosed, under-

recognized, and undertreated globally. Treatments for cardiovascular diseases typically involve antiplatelet agents and anticoagulants; however, women have often been underrepresented or excluded from clinical trials, resulting in a diminished capacity to assess the safety and efficacy of therapies for women. This exclusion also hampers the identification of sex-specific differences in critical outcomes and the development of tailored strategies that could enhance guideline recommendations for the prevention and management of cardiovascular diseases (Legato et al., 2016).

Additionally, studies have shown that women with diabetes mellitus are more likely to be categorized in a lower cardiovascular risk group and to receive lifestyle counseling and less intensive cardiovascular therapy compared to their male counterparts. To improve the quality of care for both genders, it is essential for nurses to educate men and women about the specific risk factors that may differ by sex. A narrative review published in the Journal of Clinical Medicine described treatment-related sex differences in physical activity and diet among older women, highlighting the distinct responses to exercise and dietary components between the sexes. The review emphasized the scarcity of research focused on women and called for increased studies examining women's cardiovascular risk. The involvement of nursing staff in accurately identifying cardiovascular risk factors in female patients could potentially reduce complication rates in this population.

The Impact of the Recent Pandemic (COVID-19) on the Functioning of the Health System and the Implication of Nurses to Improve Telemedicine Modalities

The COVID-19 pandemic has significantly altered the functioning of the health system, primarily focusing on maintaining continuity of care for patients. The healthcare sector was compelled to reassess traditional healthcare delivery methods. During this period, training nursing students for new care delivery approaches, particularly telemedicine, became crucial (Maynard & Knickerbocker, 2023). The shift towards telemedicine, expedited by the pandemic, is expected to have lasting implications and represents an evolution in medical technology. Several online applications have emerged as primary prevention programs, facilitating patient management. For instance, technology-enabled diabetes prevention programs that incorporate physical activity, dietary control, and coaching have been well-received and deemed effective by patients. The adoption of such technologies can enhance clinical guidance and support the health behaviors advocated by nurses. Nurses trained in diabetes management can play a vital role in ongoing risk assessment, monitoring, and timely interventions to prevent diabetes, thereby indirectly mitigating the risk of cardiovascular diseases.

Throughout the COVID-19 pandemic, telemedicine emerged as an effective strategy for ensuring continuous care for patients with cardiovascular diseases. A nurse-led tele-consultation initiative was implemented to manage over 12,000 patients with cardiovascular conditions in Punjab, India, utilizing a two-stage tele-consultation approach. This telecommunication facilitated referrals to physicians for patients with uncontrolled diabetes, hypertension, and congestive heart failure. The study concluded that this nurse-led strategy was feasible for triaging patients with cardiovascular diseases in restricted settings.

The healthcare system faces immense pressure due to chronic diseases. Competent healthcare providers, including nurses, can deliver comprehensive care during rehabilitation for patients discharged from the hospital. A recent systematic review and meta-analysis focusing on nurse-led telehealth interventions for rehabilitation (tele-rehabilitation) among community-dwelling patients with chronic diseases demonstrated that telephone follow-ups conducted by nurses were the most accessible tele-rehabilitation delivery method, involving nurse-patient communication, self-management support, and regular follow-ups (Lee et al., 2022). However, the authors indicated that the design of this nurse-led tele-rehabilitation program requires enhancement.

Other Implications of Nurse Interventions in Cardiology

A nurse practitioner clinic can provide a systematic approach to enhance adherence to guidelines following heart valve surgery. Another study found that a nurse-led educational program significantly improved medication adherence, dietary modifications, social support, and symptom management among Chinese patients with congestive heart failure. This program also resulted in a notable reduction in hospital readmissions. The authors concluded that implementing such nurse-led educational initiatives could be highly beneficial, leading to improved patient satisfaction and better cardiovascular outcomes, particularly for those who may lack regular access to cardiac hospitals and centers, especially in metropolitan areas. A recent meta-analysis further supported these findings, showing that congestive heart failure patients assigned to a nurse-led intervention group experienced significantly lower rates of re-hospitalization and mortality, reinforcing the importance of such interventions (Qiu et al., 2021).

Additionally, a retrospective cohort study examining the clinical outcomes of a nurse-led post-discharge education program for 136 heart transplantation patients revealed a significant reduction in outpatient visits for clinical issues and a longer duration before the first unplanned re-hospitalization, indicating the effectiveness of nurse-led educational programs following heart transplantation. Similarly, in patients with atrial fibrillation, nurse-led multidisciplinary team management has been shown to decrease hospitalizations due to cardiac causes and significantly enhance quality of life, suggesting that this innovative management approach warrants implementation in clinical practice (Yan et al., 2022).

Conclusions

This review highlights the significant roles of nurses in both primary and secondary prevention of cardiovascular diseases, as well as in cardiovascular interventions and cardiac surgeries. Nurses also play critical roles in managing cardiac complications, including congestive heart failure, atrial fibrillation, and heart transplantation. Nurse-led interventions are essential and should be integrated into clinical practice for the treatment and management of patients with cardiovascular diseases. Given the advancements in therapy, further research should be conducted to investigate the long-term effects of nurse-led clinics on the treatment and management of patients with cardiovascular conditions.

References

Al-Mallah, M. H., Farah, I., Al-Madani, W., Bdeir, B., Al Habib, S., Bigelow, M. L., Murad, M. H., & Ferwana, M. (2016). The Impact of Nurse-Led Clinics on the Mortality and Morbidity of Patients with Cardiovascular Diseases: A Systematic Review and Meta-analysis. *The Journal of Cardiovascular Nursing*, *31*(1), 89–95. https://doi.org/10.1097/JCN.0000000000000224

Benjamin, E. J., Blaha, M. J., Chiuve, S. E., Cushman, M., Das, S. R., Deo, R., de Ferranti, S. D., Floyd, J., Fornage, M., Gillespie, C., Isasi, C. R., Jiménez, M. C., Jordan, L. C., Judd, S. E., Lackland, D., Lichtman, J. H., Lisabeth, L., Liu, S., Longenecker, C. T., … American Heart Association Statistics Committee and Stroke Statistics Subcommittee. (2017). Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. *Circulation*, *135*(10), e146–e603. https://doi.org/10.1161/CIR.0000000000000485

Birger, M., Kaldjian, A. S., Roth, G. A., Moran, A. E., Dieleman, J. L., & Bellows, B. K. (2021). Spending on Cardiovascular Disease and Cardiovascular Risk Factors in the United States: 1996 to 2016. *Circulation*, *144*(4), 271–282. https://doi.org/10.1161/CIRCULATIONAHA.120.053216

Buigues, C., Trapero, I., Velasco, J. A., Salvador-Sanz, A., Jennings, C., Wood, D., & Queralt, A. (2022). Nurse-led and Interdisciplinary Secondary Cardiovascular Prevention Programmes: Spanish Cohort of the EUROACTION Project. *Endocrine, Metabolic & Immune Disorders Drug Targets*, *22*(13), 1319–1329. https://doi.org/10.2174/1871530322666220331154354

Dagher, N. N., & Modrall, J. G. (2007). Pharmacotherapy before and after revascularization: Anticoagulation, antiplatelet agents, and statins. *Seminars in Vascular Surgery*, *20*(1), 10–14. https://doi.org/10.1053/j.semvascsurg.2007.02.006

Flora, G. D., & Nayak, M. K. (2019). A Brief Review of Cardiovascular Diseases, Associated Risk Factors and Current Treatment Regimes. *Current Pharmaceutical Design*, *25*(38), 4063–4084. https://doi.org/10.2174/1381612825666190925163827

Jiang, W., Feng, M., Gao, C., Li, J., Gao, R., & Wang, W. (2020). Effect of a nurse-led individualized self-management program for Chinese patients with acute myocardial infarction undergoing percutaneous coronary intervention. *European Journal of Cardiovascular Nursing*, *19*(4), 320–329. https://doi.org/10.1177/1474515119889197

Kebapcı, A., & Kanan, N. (2018). Effects of nurse-led clinical pathway in coronary artery bypass graft surgery: A quasi-experimental study. *Journal of Clinical Nursing*, *27*(5–6), 980–988. https://doi.org/10.1111/jocn.14069

Laurant, M., van der Biezen, M., Wijers, N., Watananirun, K., Kontopantelis, E., & van Vught, A. J. (2018). Nurses as substitutes for doctors in primary care. *The Cochrane Database of Systematic Reviews*, *7*(7), CD001271. https://doi.org/10.1002/14651858.CD001271.pub3

Lee, A. Y. L., Wong, A. K. C., Hung, T. T. M., Yan, J., & Yang, S. (2022). Nurse-led Telehealth Intervention for Rehabilitation (Telerehabilitation) Among Community-Dwelling Patients With Chronic Diseases: Systematic Review and Meta-analysis. *Journal of Medical Internet Research*, *24*(11), e40364. https://doi.org/10.2196/40364

Legato, M. J., Johnson, P. A., & Manson, J. E. (2016). Consideration of Sex Differences in Medicine to Improve Health Care and Patient Outcomes. *JAMA*, *316*(18), 1865–1866. https://doi.org/10.1001/jama.2016.13995

Liu, M., Li, X.-C., Lu, L., Cao, Y., Sun, R.-R., Chen, S., & Zhang, P.-Y. (2014). Cardiovascular disease and its relationship with chronic kidney disease. *European Review for Medical and Pharmacological Sciences*, *18*(19), 2918–2926.

Maynard, K., & Knickerbocker, J. (2023). A Telemedicine Standardized Patient Experience: Enhancing the Virtual Classroom and Preparing for Alternative Modalities of Care. *Nursing Education Perspectives*, *44*(3), 181–182. https://doi.org/10.1097/01.NEP.0000000000001076

Qiu, X., Lan, C., Li, J., Xiao, X., & Li, J. (2021). The effect of nurse-led interventions on re-admission and mortality for congestive heart failure: A meta-analysis. *Medicine*, *100*(7), e24599. https://doi.org/10.1097/MD.0000000000024599

Teo, K., Lear, S., Islam, S., Mony, P., Dehghan, M., Li, W., Rosengren, A., Lopez-Jaramillo, P., Diaz, R., Oliveira, G., Miskan, M., Rangarajan, S., Iqbal, R., Ilow, R., Puone, T., Bahonar, A., Gulec, S., Darwish, E. A., Lanas, F., … PURE Investigators. (2013). Prevalence of a healthy lifestyle among individuals with cardiovascular disease in high-, middle- and low-income countries: The Prospective Urban Rural Epidemiology (PURE) study. *JAMA*, *309*(15), 1613–1621. https://doi.org/10.1001/jama.2013.3519

Williams, T., Condon, J., Davies, A., Brown, J., Matheson, L., Warner, T., Savage, L., Boyle, A., Collins, N., & Inder, K. (2020). Nursing-led ultrasound to aid in trans-radial access in cardiac catheterisation: A feasibility study. *Journal of Research in Nursing: JRN*, *25*(2), 159–172. https://doi.org/10.1177/1744987119900374

Yan, H., Du, Y.-X., Wu, F.-Q., Lu, X.-Y., Chen, R.-M., & Zhang, Y. (2022). Effects of nurse-led multidisciplinary team management on cardiovascular hospitalization and quality of life in patients with atrial fibrillation: Randomized controlled trial. *International Journal of Nursing Studies*, *127*, 104159. https://doi.org/10.1016/j.ijnurstu.2021.104159

Zheng, X., Yu, H., Qiu, X., Chair, S. Y., Wong, E. M.-L., & Wang, Q. (2020). The effects of a nurse-led lifestyle intervention program on cardiovascular risk, self-efficacy and health promoting behaviours among patients with metabolic syndrome: Randomized controlled trial. *International Journal of Nursing Studies*, *109*, 103638. https://doi.org/10.1016/j.ijnurstu.2020.103638

Shan, Y., Chen, J., Zhou, S., & Wen, G. (2023). Nursing Interventions and Care Strategies for Patients with Coronary Heart Disease: A Comprehensive Review. Galen medical journal, 12, 1-13 .