

## **REVIEW ARTICLE**

# **21st century nurse's role in decreasing the rising burden of cardiovascular disease**

Gideon Victor<sup>1</sup>, Jacoline Sommer<sup>2</sup>, Farida Himat Khan<sup>3</sup>

<sup>1</sup>Senior Lecturer, Islamabad Nursing College, Main Murree Road, Bhara Kahu, Islamabad, (Pakistan)

<sup>2</sup>Senior Lecturer, Shifa College of Nursing, Pitraus Bukhari Road, Sector H-8/4, Islamabad 44000 (Pakistan)

<sup>3</sup>Principal, Islamabad Nursing College, Main Murree Road, Bhara Kahu, Islamabad, (Pakistan)

**Correspondence:** Gideon Victor, Islamabad Nursing College, Islamabad Medical & Dental College, Main Murree Road, Bhara Kahu, Islamabad, (Pakistan); E-mail: gideon.victor@imdcollge.edu.pk

### **ABSTRACT**

**Background:** Cardiovascular diseases are the major cause of morbidity and premature mortality in man worldwide. Developing countries contribute a greater share to the global burden of cardiovascular disease. About one third of all deaths in Pakistan are caused by cardiovascular diseases.

**Purpose:** The purpose of this review article is to identify and highlight the roles of nurse in decreasing the burden of cardiovascular mortality and morbidity. The critical barriers to nurse roles are also discussed.

**Methodology:** The literature search was done using key words and statements; cardiovascular diseases, prevalence of cardiovascular diseases in Pakistan and worldwide, roles of nurse, current roles of nurse in cardiovascular diseases prevention and management, from HEC digital library, Google Scholar and PubMed.

**Results:** Nurses represent the largest body of health care professional. A socially responsible nurse having civic sense is a key for applying public health interventions in the community. Being round the clock at patient bedside, nurse is in best position to initiate the resuscitation process whether witnessed or/and un-witnessed cardiac arrest. Nurse role in cardiac rehabilitation is identified as having a 'spider-in-the-web' like character. A trained nurse could effectively deal with CVS emergencies including rhythm recognition, early defibrillation and emergency medication administration. The nurse role as educator could meet the needs of patients through education, support, supervision and reinforcement. Need for specialized knowledge, shortage of nurses, work overload and role confusion are barriers to nurse roles.

**Implications:** Critical health care problems from CVD cannot be alleviated without the involvement of nursing workforce. The emerging roles of nurse can significantly contribute to counteract the growing cardiovascular problems.

**Key words:** Cardiovascular diseases; Nurse; Morbidity; Mortality

**Citation:** Victor G, Sommer J, Khan FH. 21st century nurse's role in decreasing the rising burden of cardiovascular disease. *Anaesth Pain & Intensive Care* 2016;20(4):503-510

**Received:** 29 Aug 2016; **Reviewed:** 8, 19 Sep 2016; **Corrected:** 23 Sep 2016; **Accepted:** 10 Oct 2016

### **INTRODUCTION AND BACKGROUND**

Cardiovascular diseases (CVD) are 'known major cause of morbidity and premature mortality in women and men worldwide',<sup>1</sup> and are number one cause of death globally; more people die each year from CVD than any other causes. An estimated 17.5 million people died from CVD in 2012 which represented 31% of all global deaths;

out of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million due to stroke.<sup>2</sup> 'It is not widely realized that at present developing countries including Pakistan contribute a greater share to the global burden of CVD than developed countries. This burden is projected with an explosive increase in the coming years'.<sup>3</sup> More than one third of all deaths in Pakistan are

caused by CVD, while 'reduced blood supply to the heart, known as ischemic heart disease has been identified as the leading cause of deaths in working-age adults (15-69 years)'.<sup>4</sup> A recent World Bank's study "Capitalizing on the Demographic Transition -Tackling Non-communicable Diseases (NCDs) in South Asia" reported that 'Pakistan is in the early stages of a demographic transition that will result in a significant increase in the average age of the population as well as the ratio of population over 40 years of age'. The experts warned about this demographic transition that it will increase in the already high prevalence of CVD. Due to this critical transition; effective strategies would be required to prevent, manage and treat the load of CVD.<sup>4</sup>

CVDs have multiple influences including social and economic impacts on patients and caregivers. CVD significantly affect the activity and lifestyle pattern; consequently patients have to relocate their job to leave the current employment status that demand physical activity. Patients also relocate their jobs to stay near to their homes and health care centers. It is also found that caregivers also change or leave their jobs to take care of sick family member at home. Adolescents in case of caregivers; frequently drop out of their education system to fulfill the family economic demands or they show poor performance in education. 'The direct link is found between the sick role with the CVD and economic issues'. The economic impact is reported in both direct and indirect losses to the economy. The direct impact is on the health care system and its efficiency to work. The indirect impact is through loss of working personnel, de facto caregivers and breadwinner is out of the workforce. The China reports, 'annual direct costs of CVD are estimated at more than US \$40 billion, or roughly four percent of its gross national income'.<sup>5</sup> The 2004 report 'A Race against Time' evaluated the potential loss due to early CVD. The socioeconomic burden in the developing countries is further compounded by the facts that CVD occurs proportionally higher among working age adults as they present the main working force. The loss of working age adults could have a huge impact on developing countries and their economic viability.<sup>6</sup>

A large body of evidences is available for more than four decades highlighting the nurse roles in CVD. The nurses have come forward to take on key roles in managing the multiple risk factors of CVD including; hypertension, smoking, high cholesterol, diabetes, coronary artery disease, heart failure, obesity and other factors. Nurses have participated in CVD management activities to manage these

risk factors through primary health care programs, specialized clinics, acute care services, direct patient care activities and rehabilitative interventions.<sup>7-17</sup> The improvement in patient outcomes and overall decreased burden from CVD is associated with performance of these activities. There has been less exploration on the nurse roles to decrease the burden of CVD in Pakistan. The purpose of this review paper is to identify and highlight the roles of nurse in society, acute care service, emergency department, and intensive care unit in preventing / managing the patients with CVD. It has also discussed critical barriers that hinder the nurses to perform their roles.

## METHODOLOGY

The literature search was done using key words and statements; prevalence of CVD in Pakistan and worldwide, roles of nurse in CVD, current roles of nurse in CVD, from Higher Education Commission (HEC) digital library, Google Scholar and PubMed, without considering the time period of publication. Full text journal articles, review articles, newspaper articles, eBooks, electronic resource were included, while dissertations, conference proceedings, presentations and medical research papers were excluded.

## CIVIC ROLE

Leininger is one of the known historical nursing leaders; she identified the nurses having societal mandate to provide care in the community.<sup>18</sup> Nurse, as a member of the society can play a significant role in decreasing the burden of CVD. A study<sup>19</sup> reported 'nurses viewed public service as a part of their job and professional responsibility'. Due to civic sense and social responsibility; nurses participate in the public service activities for the welfare of community. The concept of public in nursing is not new; it is rooted deep in the history of professional nursing. Nurses can effectively participate in CVD prevention strategies by introducing and implementing public health primary interventions. Several epidemiological studies - in particular, the North Karelia project, 'confirm that several lifestyle interventions should play a role in the management of the CVD burden'.

The lifestyle changes interventions includes; adjustment with disease pattern, facilitation in performance of activities of daily living, support avoiding use of alcohol and tobacco, a healthy weight maintenance, and eating a healthy diet. These interventions are designed and applied with

variety of strategies at individual and as well as at community level. The individual level strategies include screening for the risk factors of CVD and introducing interventions for them. Reduction in the risk factors will ultimately lead to reduction in the morbidity and mortality from CVD.<sup>20</sup> Nurse could affect the people around her/him, including family members, neighborhood, community centers and public placed with the knowledge of strategies to prevent and manage CVD.

## ROLE IN RESUSCITATION

Research support the fact that nurses spend more time with patients than other health care providers and patient outcomes are affected by quality of nursing care.<sup>21</sup> This fact holds the nurse role strongly to initiate the resuscitation process for in-hospital cardiac arrest. The majority of cardiac events; particularly cardiac arrests are witnessed events. In this case; early advance care; cardiopulmonary resuscitation (CPR) and defibrillation is very much possible. Nurse is one of the health care professional who is immediately available round the clock in case of any cardiac event. Mostly cardiac arrests are witnessed by the nurses. In care of un-witnessed arrest, the first responders are also nurses. They activate the emergency system/team for patient resuscitation. Having the knowledge to identify and initiate the resuscitation process is corner stone for saving the lives. Therefore, nurses must be equipped with basic and advanced level life support knowledge and skills. Including nurses; basic life support skills are important for everyone. It is mandatory in most of the institutions for the nurses to possess valid basic cardiac life support (BCLS) certificate. While nurses in acute and intensive care units required to have further training in advanced cardiac life support (ACLS) skills. Cardiac events are common in acute and intensive care units though could occur anywhere. Therefore, it is important to initiate and activate the resuscitative process as soon as possible to save life. Intensive care nurses are usually part of rapid response team and advance cardiac life support provider team. They are involved in providing CPR, defibrillation, emergency medication administration, patient stabilization and transfer of patient to the intensive care unit.<sup>22</sup>

The following roles of nurse are identified in patient resuscitation;<sup>23-26</sup>

- The initial rescuer performing CPR
- Advance cardiac care provider including defibrillation, airway and ventilation, invasive

lines, drugs and tubes

- Staff in charge of documentation resuscitation process
- Prompting team members of critical actions required
- Ensuring all follow-up actions are completed
- Resuscitation instructor

These entire roles in resuscitation solidify the nurse's importance in decreasing the cardiovascular burden of mortality and morbidity.

## ROLE IN CARDIAC REHABILITATION

Cardiac rehabilitation is a key to recover from diseases and a U-turn to the normal life activities. 'The nurse's multiple roles in cardiac rehabilitation have a 'spider in the web-like' character'. Because, nurse modifies her/his role depending on the patient's recovery phase. Nurse could act as a container, a counselor, a coach, care provider and an educator. The implementation of rehabilitation from the CVD is deliberate and scientific process. The nurses must be equipped to use rehabilitative strategies, improved evaluation tools to monitor patient condition and apply evidence based interventions. Nurse should also possess the ability for self-analysis and act as a role model.<sup>27</sup> It is less likely for the patient to follow lifestyle modification if nurse does not portray. The patients with CVD suffer serious ailments and at times it could be debilitating. For this reason, numerous patients experience high level of stress and anxiety. They also lose confidence due to limitations caused by cardiac events. Many of them do not return to their previous roles at home, workplace and society. Effective cardiac rehabilitation can address secondary prevention, enable patient to return to usual activities and alleviate physical, social, and psychological impacts.<sup>28</sup> 'A strong body of evidence demonstrates a reduction in cardiac mortality of 26-36% and overall mortality of 13-26% following cardiac rehabilitation'. It targets both primary and secondary prevention. Primary prevention is reflected in improved quality of life and ability to use activity of daily living, and allows patients to return to work earlier. The secondary prevention usually focuses reduction of causative risk factors comprising control of blood pressure, lipids and glucose levels. 'The Lam's study showed that patients attending cardiac rehabilitation had lower hospital readmission rates and demonstrated a reduction in repeat cardiac events'.<sup>10,29-32</sup>

The core components of a cardiac rehabilitation

nurse's role to decrease cardiovascular disease

service are identified as follows:

- Education for change in health behavior
- Management of lifestyle risk factors
- Improving psychosocial health
- Controlling of medical risk factors
- Use of cardioprotective therapies
- Facilitating long-term management
- Audit and evaluation of rehabilitation (BACPR, 2012).

These components are critical in providing positive outcomes from cardiac rehabilitation. Therefore, each component of rehabilitation must be delivered with diligence by trained, competent staff that is capable to meet individual patient needs.<sup>33</sup> An experimental study,<sup>34</sup> of rehabilitation as intervention found that 'intervention group demonstrated a significantly better performance in walking, diet adherence, medication adherence; a significantly greater reduction in serum lipids including triglyceride, total cholesterol, low-density lipoprotein; and significantly better control of systolic and diastolic blood pressure at three months'. Upon completion of the rehabilitation program, patients depict significant improvement in quality of life, activity of daily living, and life style changes. Jiang pointed out 'a nurse can significantly improve the health behaviors and cardiac physiological risk parameters in coronary heart disease patients'.

### **ROLE IN EMERGENCY CARDIAC CARE**

'At least 12 Pakistanis die every hour due to heart attack while more than one third (34%) of all deaths in Pakistan are caused by cardiovascular diseases (CVD), making it the leading non-communicable disease in the country'.<sup>35</sup> Significant numbers of patients visit emergency department in hospital due to cardiovascular emergencies. Not only in middle low income countries but also in United Kingdom,<sup>36</sup> the CVD are reported main cause of death; estimating one in three deaths. About half of all the reported deaths were due to coronary artery disease. It was also found the most common cause of premature death. The magnitude of cardiac events is reflected in 268,000 episodes of acute myocardial infarction occurring each year in less than 68 years of age in both men and women. Nurses are known as frontline health care providers in dealing with CVS emergencies. Their role is central in the multidisciplinary team. A trained nurse attending the patient at bedside; recognizing alterations in patient condition and vital signs, activation of emergency response system and effective response to cardiac events is vital.

In a prospective observational study of 14,720 in-hospital cardiac arrests,<sup>29</sup> it was found that 'in collapse patients, rhythm was ventricular fibrillation (VF) in only 25% of instances compared with VF being the predominant rhythm in out-of-hospital cardiac arrests'.<sup>37</sup> The class-I recommended treatment of VF is defibrillation. It is well established fact that early defibrillation to VF has most favorable outcomes. The defibrillation could be performed with conventional defibrillator and automated external defibrillator (AED). The both options are provided in one machine in recent devices though separate are also available. The AED is easy to use with shock advisory mode. The use of AED is now considered as one of the core skills for general ward and intensive care nurses.<sup>24, 25, 38</sup> Coronary care unit (CCU) is the commonest place where cardiac events occur. The successful patient care and management is associated with expertise of nurses while working in close collaboration with multidisciplinary team. The nurses with specialized knowledge and skills to deal with cardiac events are most valuable at CCU, recognizing arrhythmias, ischemic changes, and heart blocks. Traditionally, it is obligatory for CCU nurses to develop advance care skills to respond promptly in case of acute cardiac events. Such skills are also required in the ambulatory service, accident and emergency department.<sup>39</sup>

In case of ST elevated myocardial infarction, door-to-needle time is critical for positive patient outcomes since it is proven the benefits of thrombolysis are time bounded. Most of the patients could receive immediate thrombolysis calling for help within 60 minutes.<sup>40</sup> Most benefit reported, 'in terms of lives saved by thrombolysis, is seen in patients treated within the first hour following symptom onset - the concept of a 'golden hour' for thrombolysis has been proposed'.<sup>41</sup> Commonly, nurses prepare and administer medications. Administration of thrombolytic medications in CCU and emergency department is safe, realistic and achievable goal. The adverse incidents including cardiac arrest are rare in well screened patients. It is prescribed by doctors though; prepared, administered and monitored by the nurses. Early assessment, early prescription and early administration of thrombolysis agent can decrease the further deterioration in the condition of patient. Consequently, it can save the life and prevent further deterioration in the condition of patient.

### **ROLE IN PATIENT EDUCATION**

Many patients with CVS disorders are readmit

in the hospital because of poor preparation on home management skills and no education during discharge period. The commonest cause is lack of knowledge in life style modification and adjustment with disease pattern. When patient and their family members are given the knowledge related to disease management at home, this may strongly fill the gap of knowledge. This could enable the patient and their family members to provide care and follow medical regimens accurately at home. As a result, this will decrease numbers of readmission in the hospital. Need based patient education is associated with multiple benefits including compliance with the treatment, lesser depression and anxiety, and increased patient satisfaction. Subsequently, it improves quality of life of patient and aid family members to create an environment that support patient. The integration of patient education as a part of patient care is widely acknowledged by all health care professionals. It is recommended that patient and family education must be considered the part of patient care planning. It must be delivered with appropriate content and strategies, well before the discharge time.<sup>42-47</sup>

The complications from cardiac events and risk of new cardiac event could be reduced with patient education. It will result in improved health outcomes. Readmissions are common after cardiac event when patients are not aware about their disease. Many of them also suffer new cardiac event which further deteriorate their health. Nurse implemented health educational program improves knowledge of patient about their disease management, lifestyle changes, prevention of cardiac event and readmission to hospital.

Even though, the role of health education is imperative in patient care, yet due value is not given in the daily clinical practice. Amongst the many reasons, shortage of spare time and staff nurses. Many nurses also do not view patient education as a part of their job. This fact also constitute that treatment of the disease is more emphasized.<sup>48</sup> Minimizing the patient stay at hospital is becoming a trend and mark of quality in many health care organizations. Few time, patient also demand to go from hospital as soon as possible. As a result, neither nurses nor patients have ample time for effective education. Therefore, patient education should start immediately after the diagnosis of the disease.<sup>49</sup> Nurses could achieve this goal more effectively because their contact and interaction with the patient is more than other health care professionals. The role of nurse is dynamic in the management of cardiac diseases as they are close

to the patients and families during hospitalization. The role of nurse as educator is important to meet the needs of patients through education, support, supervision and reinforcement.

## **BARRIERS TO PERFORM NURSING ROLES**

Usually, nurses do not seem to perform the roles important in alleviating the burden of CVD. Many barriers and challenges hinder the nurses to perform these emerging roles. The main barriers and challenges include lack of specialized knowledge and skills, nursing shortage, work overload, and role confusion.

### **Lack of specialized knowledge and skills**

Nurses share in decreasing the burden of CVD morbidity and mortality cannot be achieved with the basic knowledge of nursing. These roles demand the specialized, precise and up to date knowledge and skills for effective patient management. It is identified that providing care to patients with CVD is complex. Their clinical presentation is often complicated that requires multiple modalities to treat the patient. Many organizations focus holistic care models to manage the patient as well. There is also change of health care paradigm with introduction of technology, new procedures and treatment modalities. It is a challenge to provide care in community, ambulatory care services, emergency department and coronary care units. All the technology and available resources turn useless if optimal benefits are not taken or the nurse cannot operate, interpret and respond. This challenge can only be met with specific and specialized knowledge, training and practice. Cardiac nurses, therefore require high standards of quality and competence since patients' lives are at stake.<sup>50</sup>

Cardiac events including life threatening arrhythmia occur more frequent among cardiac compromised patients and often require basic and advanced cardiac life support therapies. It is found that cardiac department nurses comparatively more frequently involve with CPR. For this reason, nurses are considered to be the key for the success of entire cardiac system.<sup>51</sup> The knowledge and practice of nurses involved in the CVD care is nevertheless corner stone to decrease morbidity and mortality.

These challenges and requirements are also linked with increasing opportunities for career development and professional growth. It is also associated with improved quality of nursing care, patient satisfaction and decreased burden of cardiovascular problems.

### **Shortage of nurses**

The justified performance of emerging roles is associated with adequate working force that could meet the demand of new roles for the nurses. In Pakistan, often emergency department of tertiary hospitals are used instead of innovative ambulatory services and community-based models of care, to manage the acute illnesses including CVD. As a result, the outcomes are very costly and also below expectations. The numbers of chronically ill patients continue to rise in tertiary care setting due to inadequate primary care workforce and facilities. In addition, this doubles the demand in developing countries like Pakistan that is still in a trap of fatal communicable infectious diseases.<sup>52</sup> More trained nurses are required to give due attention to these problems. The existing nurse patient ratio is approximately 1:50 in public hospitals whereas Pakistan Nursing Council prescribes 2:1 in specialized areas (CCU, ER) and 1:10 in general wards. This shortage is further exacerbated by a misdistribution of nurses across provinces. This shortage is particularly pronounced in Sindh; in contrast, Khyber Pakhtunkhwa has the highest number of nursing staff.<sup>53</sup> The shortage further gets worse as many trained nurses move out of the country. The nurses outflow of other countries is not unusual in Pakistan. These migrant usually move for better opportunity and earning. Usually, novice nurses replace the migrant working force to fill the gap between supply and demand in the domestic market. But not ready yet to take on emerging roles and meet the demand and challenges due to CVD rise. Shortage is also associated with increased workload in practice areas. Shortage of nursing is not just a governmental challenge or a topic for financial analysis. It has a catastrophic impact on health care. Failure to deal with a nursing shortage, whether it is local, regional, national or global, will lead to failure in improving health care services.<sup>54</sup> Thus, immediate and effective strategies are required to deal with nursing shortage.

### **Role confusion**

Nurses are important member of multidisciplinary team taking care of patients with complex CVS problems. Effective team working is required for safe and optimal care of patients. Care of patient could compromise when roles in the team are not well defined. It is wise to differentiate the roles while working in a multidisciplinary team. Doctors and nurses are among the health care professionals who interact with the patient more frequently.

Nurses are rated second to the doctor as a social

and professional view in developing countries. It is fact that there is a vast difference between these two professions. Both work for the same goal to manage the patient problems by providing high quality effective treatment. Their essence, professional obligations are different. In simple words; role of the nurse is to care whereas of a doctor is to cure. Neither is mutually exclusive, in fact one cannot successfully function without the other. Unfortunately, there seems to be conflict between doctors and nurses with respect to their roles and responsibilities. Consequently, patients are affected. Patient assessment is found a compromised area of patient management. Both assess the patient to identify patient problems. Therefore, who will assess what could be confusing at times.<sup>55-56</sup> Role clarification at practical level is one of the solutions to this problem. It is argued as well that inter-professional educational sessions could bridge the gap and improve deficiencies in role perceptions. 'It is believed that to change inter-professional relationships positively, shared learning could be introduced at the undergraduate level, shared workshops in relation to patient care, working in multidisciplinary team can clarify the roles and relationships, leading to better patient outcomes',<sup>57-58</sup>

### **CONCLUSION**

It is concluded that CVD are growing serious concern causing significant burden of morbidity and mortality. It is affecting the working age adults adding an economic burden to patient, family, society and country at large. It has noteworthy multidimensional impacts on patients and caregivers. Developing countries share greater burden of CVD than developed countries. There has been less exploration on the nurse's role to decrease the burden of CVD in Pakistan. This review paper has highlighted the nurse's roles and their share in decreasing the burden of CVD in 21st century. Nurses are one of the largest work forces in health care system. For that reason, their participation in prevention, treatment and care is imperative. It is not possible to meet the challenges arising from CVD without involvement of nurses. The emerging roles of nurse in health care system, multidisciplinary team and organizations have significant impacts in decreasing CVD morbidity and mortality. It is believed the best role of the nurse is yet to come. There are barriers that limit the nurse to perform these roles. Nurses need specialized knowledge and skills to provide effective care to patients suffering from CVD. Effective strategies

are required to ensure the nurses participation in decreasing the burden of CVD through these emerging roles. It is also noteworthy that further evaluation of nurse roles is required to define the competencies required for dealing with CVD in 21st century.

**Conflict of interest:** Authors declare no conflict in interest.

#### Authors' contribution:

GV: Concept development, literature search, introduction and roles of nurse segment writing, referencing & manuscript development

JS: Barriers to perform roles segment writing and manuscript editing

FHK: Abstract and conclusion writing and manuscript editing

## REFERENCES

- Hayman LL, Berra K, Fletcher BJ, Houston Miller N. The Role of Nurses in Promoting Cardiovascular Health Worldwide: The Global Cardiovascular Nursing Leadership Forum. *J Am Coll Cardiol.* 2015;66(7):864-6. doi: 10.1016/j.jacc.2015.06.1319. [PubMed]
- World Health Organization. Cardiovascular diseases (CVD) [Internet]. World Health Organization. 2016 [cited 19 September 2016]. Available from: <http://www.who.int/mediacentre/factsheets/fs317/en/>
- Nishtar S. The CVD Situation in Pakistan. *Heartfile Newsletter* [Internet]. 2001 [cited 28 July 2016];(3(1):1-2. Available from: <http://www.heartfile.org/pdf/Essentialdrugs.pdf>
- Aga Khan University. Symposium on cardiovascular and pulmonary diseases. The Aga Khan University Newsletter [Internet]. 2000 [cited 28 June 2016];(4):4. Available from: [http://ecommons.aku.edu/aku\\_newsletter](http://ecommons.aku.edu/aku_newsletter)
- Pestana JA, Steyn K, Leiman A, Hartzenberg GM. The direct and indirect costs of cardiovascular disease in South Africa in 1991. *S Afr Med J.* 1996; 86(6): 679-684. [PubMed]
- Leeder S, Raymond S, Greenberg H, Liu H, Esson K. A race against time. Sydney: University of Sydney, Australian Health Policy Institute; 2004. Available from: [earth.columbia.edu/news/2004/.../raceagainsttime\\_FINAL\\_051104.pdf](http://earth.columbia.edu/news/2004/.../raceagainsttime_FINAL_051104.pdf)
- Miller N, Froelicher E. Disease management models for cardiovascular care in cardiac nursing. In: Woods S, Froelicher E, Motzer S, Bridges E, ed. *Cardiac Nursing*. 5th ed. Philadelphia: Lippincott, Williams and Wilkins; 2004. p. 986-996.
- Berra K, Miller NH, Jennings C. Nurse-based models for cardiovascular disease prevention: from research to clinical practice. *J Cardiovasc Nurs.* 2011;26:S46-S55. doi: 10.1097/JCN.0b013e318213ef5c. [PubMed]
- Berra K, Fletcher B, Hayman LL, Miller NH. Global cardiovascular disease prevention: a call to action for nursing executive summary. *J Cardiovasc Nurs.* 2013;28:505-13. doi: 10.1097/JCN.0b013e31826b6822. [PubMed]
- Clark AM, Hartling L, Vandermeer B, McAlister FA. Meta-analysis: secondary prevention programs for patients with coronary heart disease. *Ann Intern Med.* 2005;143(9):659-672. [PubMed]
- Haskell WL, Alderman EL, Fair JM, Maron DJ, Mackey SF, Superko HR, et al. Effects of intensive multiple risk factor reduction on coronary atherosclerosis and clinical cardiac events in men and women with coronary artery disease: the Stanford Coronary Risk Intervention Project (SCRIP). *Circulation.* 1994;89(3):975-90. [PubMed] [Free full text]
- Wood DA, Kotseva K, Connolly S, Jennings C, Mead A, Jones J, et al. Nurse-coordinated multidisciplinary, family-based cardiovascular disease prevention programme (EUROACTION) for patients with coronary heart disease and asymptomatic individuals at high risk of cardiovascular disease: a paired, cluster-randomised controlled trial. *Lancet.* 2008;371(9629):1999-2012. doi: 10.1016/S0140-6736(08)60868-5. [PubMed]
- De Busk RF, Miller NH, Superko HR, Dennis CA, Thomas RJ, Lew HT, et al. A case-management system for coronary risk factor modification after acute myocardial infarction. *Ann Intern Med.* 1994;120(9):721-9. [PubMed]
- Hayman LL, Meininger JC, Daniels SR, McCrindle BW, Helden L, Ross J, et al. Primary prevention of cardiovascular disease in nursing practice: focus on children and youth: a scientific statement from the American Heart Association Committee on Atherosclerosis, Hypertension, and Obesity in Youth of the Council on Cardiovascular Disease in the Young, Council on Cardiovascular Nursing, Council on Epidemiology and Prevention, and Council on Nutrition, Physical Activity, and Metabolism. *Circulation.* 2007;116(3):344-57. [PubMed] [Free full text]
- Ma J, Berra K, Haskell WL, Klieman L, Hyde S, Smith MW, et al. Case management to reduce risk of cardiovascular disease in a county health care system. *Arch Intern Med.* 2009;169(21):1988-1995. [PubMed] [Free full text]
- Berra K, Miller NH, Jennings C. Nurse based models for cardiovascular disease prevention: from research to clinical practice. *Euro J Cardiovasc Nurs.* 2011;10(2):S42-50. [PubMed]
- Fonarow GC, Gawlinski A, Moughrabi S, Tillisch JH. Improved treatment of coronary heart disease by implementation of a Cardiac Hospitalization Atherosclerosis Management Program (CHAMP). *Am J Cardiol.* 2001;87(7):819-822. [PubMed]
- Leininger MM, McFarland MR. *Transcultural nursing: concepts, theories, research and practice*. 3rd ed. New York: McGraw-Hill; 2002.
- Riley JM, Beal JA. Public service: Experienced nurses' views on social and civic responsibility. *Nurs Outlook.* 2010; 58(3):142-7. doi: 10.1016/j.outlook.2010.02.158. [PubMed]
- Gaziano TA. Reducing the growing burden of cardiovascular disease in the developing world. *Health Aff (Millwood).* 2007; 26(1): 13-24. [PubMed]
- DeLucia PR, Ott TE, Palmieri, PA. Performance in Nursing. *Rev H F Erg.* 2009;5(1):1-40. [google scholar]
- Nadkarni VM, Larkin GL, Peberdy MA, Carey SM, Kaye W, Mancini ME, et al. First documented rhythm and clinical outcome from in-hospital cardiac arrest among children and adults. *JAMA.* 2006; 295(1):50-57. [PubMed] [Free full text]
- Larsen MP, Eisenberg MS, Cummins RO, Hallstrom AP. Predicting survival from out-of-hospital cardiac arrest: a graphic model. *Ann Emerg Med.* 1993; 22(11):1652-1658. [PubMed]
- Warwick JP, Mackie K, Spencer I. Towards early defibrillation--a nurse training programme in the use of automated external defibrillators. *Resuscitation.* 1995; 30(3):231-235. [PubMed]

## nurse's role to decrease cardiovascular disease

25. Kaye W, Mancini ME, Giuliano KK, Richards N, Nagid DM, Marler CA, et al. Strengthening the in-hospital chain of survival with rapid defibrillation by first responders using automated external defibrillators: training and retention issues. *Ann Emerg Med.* 1995; 25(2):163-168. [PubMed]
26. Peberdy MA, Kaye W, Ornato JP, Larkin GL, Nadkarni V, Mancini ME, et al. Cardiopulmonary resuscitation of adults in the hospital: a report of 14,720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. *Resuscitation.* 2003; 58(3):297-308. [PubMed]
27. Fridlund B. The role of the nurse in cardiac rehabilitation programmes. *Eur J Cardiovasc Nurs.* 2002;1(1):15-18. [PubMed]
28. Shibeshi WA, Young-Xu Y, Blatt CM. Anxiety worsens prognosis in patients with coronary artery disease. *J Am Coll Cardiol.* 2007;49(20):2012-27. [PubMed]
29. Heran BS, Chen JM, Ebrahim S, Moxham T, Oldridge N, Rees K, et al. Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews.* 2011; 7:CD001800 [PubMed] [Free full text]
30. Lawler PR, Filion KB, Eisenberg MJ. Efficacy of exercise-based cardiac rehabilitation post-myocardial infarction: a systematic review and meta-analysis of controlled trials. *Am Heart J.* 2011;162(4):571-584. [PubMed] [Free full text]
31. Yohannes AM, Doherty P, Bundy C, Yalfani A. The long term benefits of cardiac rehabilitation on depression, anxiety, physical activity and quality of life. *J Clin Nurs.* 2010; 19(19-20); 2806-13. [PubMed]
32. Lam G, Snow R, Shaffer L, La-Londe M, Spencer K, Caulin-Glaser T. The effect of a comprehensive cardiac rehabilitation programme on 60-day hospital readmissions after an acute myocardial infarction. *J Am Coll Cardiol.* 2011; 57(14): 597. [PubMed] [Free full text]
33. British Association for Cardiovascular Prevention and Rehabilitation. *Standards and Core Components for Cardiovascular Disease Prevention and Rehabilitation 2012.* 2nd ed. London: Association for Cardiovascular Prevention and Rehabilitation; 2012.
34. Jiang X, Sit JW, Wong TK. A nurse-led cardiac rehabilitation programme improves health behaviours and cardiac physiological risk parameters: evidence from Chengdu, China. *J Clin Nurs.* 2007;16(10):1886-97. [PubMed]
35. DAWN. 34pc deaths in Pakistan due to cardiac diseases: experts [Internet]. Dawn.com. 2013 [cited 29 July 2016]. Available from: <http://www.dawn.com/news/1046114>
36. British Heart Foundation. *Heart statistics: Coronary Heart Disease Statistics Database* [Internet]. Heartstats.org. 2005 [cited 29 July 2016]. Available from: <https://www.bhf.org.uk/research/heart-statistics>
37. Bayes de Luna A, Coumel P, Leclercq JF. Ambulatory sudden cardiac death: mechanisms of production of fatal arrhythmia on the basis of data from 157 cases. *Am Heart J.* 1989; 117(1):151-159. [PubMed]
38. Larsen MP, Eisenberg MS, Cummins RO, Hallstrom AP. Predicting survival from out-of-hospital cardiac arrest: a graphic model. *Ann Emerg Med.* 1993; 22(11):1652-8. [PubMed]
39. Quinn T. The role of nurses in improving emergency cardiac care. *Nurs Stand.* 2005; 19(48): 41-48. [PubMed]
40. Birkhead JS, Walker L, Pearson M, Weston C, Cunningham AD, Rickards AF, et al. Improving care for patients with acute coronary syndromes: initial results from the National Audit of Myocardial Infarction Project (MINAP). *Heart.* 2004;90(9):1004-9. [PubMed] [Free full text]
41. Boersma E, Maas AC, Deckers JW, Simoons ML. Early thrombolytic treatment in acute myocardial infarction: reappraisal of the golden hour. *Lancet.* 1996; 348(9030):771-5. [PubMed]
42. Polikandrioti M, Itokou M. Needs of hospitalized patients. *Health Sci J.* 2011;5(1):15-22. [Free full text]
43. Nolan J, Nolan M, Booth A. Developing the nurse's role in patient education: rehabilitation as a case example. *Int J Nurs Stud.* 2001;38(2):163-173. [PubMed]
44. Smith J, Liles C. Information needs before hospital discharge of myocardial infarction patients: a comparative, descriptive study. *J Clin Nurs.* 2007;16(4):662-71. [PubMed]
45. Lanuza DM, Davidson PM, Dunbar SB, Hughes S, De Geest S. Preparing nurses for leadership roles in cardiovascular disease prevention. *Eur J Cardiovasc Nurs.* 2011;10(2):S51-57. doi: 10.1016/S1474-5151(11)00116-2. [PubMed]
46. McPherson CP, Swenson KK, Pine DA, Leimer L. A nurse-based pilot program to reduce cardiovascular risk factors in a primary care setting. *Am J Manag Care.* 2002;8(6):543-55. [PubMed]
47. Cao Y, Davidson PM, DiGiacomo M. Cardiovascular disease in China: an urgent need to enhance the nursing role to improve health outcomes. *J Clin Nurs.* 2009;18(5):687-93. doi: 10.1111/j.1365-2702.2008.02570.x. [PubMed]
48. Amin AA, Jones AM, Nugent K, Rumsfeld JS, Spertus JA. The prevalence of unrecognized depression in patients with acute coronary syndrome. *Am Heart J.* 2006;152(5):928-34. [PubMed]
49. Polikandrioti M. Needs of depressed patients with coronary artery disease. *Health Sci J.* 2011;5(4):241-242. [Free full text]
50. Aäri RL, Tarja S, Helena LK. Competence in intensive and critical care nursing: a literature review. *Intensive Crit Care Nurs.* 2008; 24(2): 78-89. doi: 10.1016/j.iccn.2007.11.006 [PubMed]
51. Dracup K. *Meltzer's intensive Coronary Care: a manual for nurses.* 5th ed. London: Prentice-Hall International; 1995.
52. Sylvia V, de la Peza L, Perry CP, Seltzer JB, O'Neil M, Reimann S, et al. *Health Systems in Action: An eHandbook for Leaders and Managers* [Internet]. 3rd ed. Cambridge, MA: Management Sciences for Health; 2010 [cited 29 July 2016]. Available from: <http://www.msh.org/resources/health-systems-in-action-an-e-handbook-for-leaders-and-managers>
53. Hafeez A, Khan Z, Bile KM, Jooma R, Sheikh M. Pakistan human resources for health assessment. *East Mediterr Health J.* 2010; 16 Suppl:S145-51. [PubMed]
54. Kingma M. Nurses on the move: a global overview. *Health Serv Res.* 2007;42(3p2):1281-98. [PubMed]
55. Australian Medical Association. *Role of the doctor* [Internet]. ama.com. 2011 [cited 29 July 2016].
56. Australian Nursing Federation. *Competency Standards for nurses in general practice* [Internet]. 2006. [cited 29 July 2016]. Available from: [http://www.anf.org.au/nurses\\_gp/resource\\_03.pdf](http://www.anf.org.au/nurses_gp/resource_03.pdf)
57. Greenfield L. *Doctors and Nurses: A Troubled Partnership.* *Ann Surg.* 1999;230(3):279-288. [PubMed] [Free full text]
58. Carpenter J. Doctors and nurses: stereotype and stereotype change in professional education. *J Interprofessional Care.* 1995;9(2):151-161. [Google Scholar]

