CHAPTER I

BACKGROUND OF STUDY

Cardiovascular diseases (CVD) have a major share in the incidence of non-communicable disease. CVD is also one of the leading cause of morbidity and mortality in India. It has out grown the boundaries of gender, location of dwelling etc. In 2000 there were an estimated 29.8 million people with Coronary Heart Disease (CHD) in India out of total estimated population of 1.03 billion or nearly 3% overall prevalence. According to World Bank estimates CVD has a 31% share in the total burden of disease in 2001.

It is estimated that by 2020 cardiovascular disease will be the cause of over 40% deaths in India as compared to 24% in 1990. With over 3 million deaths owing to cardiovascular diseases every year, India is set to be the heart disease capital of the world in few years, said doctors on the eve of World Heart Day (September 29, 2012).

WHO\(^1\) in 2011 reports that an increasing number of countries are facing a double burden of disease as the prevalence of risk factors for chronic diseases such as diabetes, heart diseases and cancers are increasing and many countries still struggle to reduce maternal and child deaths caused by infectious diseases. For the Millennium
Development Goals, according to the World Health Statistics 2011 released by the World Health Organization (WHO), Non-Communicable diseases such as heart diseases, stroke, diabetes and cancer, now make up two-thirds of all deaths globally, due to the population aging and the spread of risk factors associated with globalization and urbanization. The risk factors such as tobacco use, sedentary lifestyle, unhealthy diet and excessive use of alcohol becomes more critical. The latest WHO figures showed that about 4 out of 10 men and 1 in 11 women are using tobacco and about 1 in 8 adults is obese.

Global status reports on Non-Communicable Diseases, WHO (2010) states that 57 million deaths that occurred globally in 2008, 36 million (63%) – almost two thirds – were due to Non Communicable Diseases, comprising mainly Cardio Vascular Diseases, Cancers, Diabetes and Chronic Respiratory diseases. From the data it is clear that 39% of deaths were due to CVD, more than 3 times the deaths that are caused by infectious diseases including HIV/AIDS, Tuberculosis and Malaria Combined. Furthermore it is estimated that Non-communicable conditions will account for more than three-fourth of all the deaths in 2030, and death from CVD will rise to 23.4 million , an approximately 37% increase from current rates. In addition, the leading cause of death in the world in 2030 are predicted to be Ischemic Heart Disease and Cerebrovascular Disease (Stroke) , both components of CVD (WHO, 2009).
Beaglehole\(^3\), reports that by 2030, non-communicable diseases will account for more than three-quarters of death worldwide. CVD alone will be responsible for more deaths in low income countries than infectious diseases, maternal and perinatal conditions and nutritional disorders combined (figure 1.2)
Figure 1.2 : Projected Global Deaths by Cause. 

World Health Organisation\(^2\) in 2009 reported that globally there is an uneven distribution of age adjusted CVD mortality. The lowest age-adjusted mortality rates are in the advanced industrialized countries and parts of Latin-America, whereas highest rates today are found in Eastern Europe and a number of low and middle
income countries. For example, age-standardized mortality rates for CVD are in excess of 500 per 100,000 in Russia and Egypt; between 400 and 450 for South Africa, India and Saudi Arabia; and around 300 for Brazil and China. This is in contrast to rates of between 100 and 200 per 100,000 for Australia, Japan, France, and the United States. Overall, age-adjusted CVD death rates are today higher in major low and middle income countries than in developed countries.

Figure 1.3: Age standardized deaths due to cardiovascular diseases (rate per 1,000,000), Source: WHO, 2009
Leeder\textsuperscript{4} reported that not only age-adjusted CVD death rates tend to be higher in developing countries, but a significantly higher percentage of cardiovascular deaths also occur in younger people in the developing world than in developed countries. For example, the proportion of CVD deaths reported for 35 to 64 years is 41 percent in South Africa, 35 percent in India, and 28 percent in Brazil, compared to only 12 percent in the United States and 9 percent in Portugal.

The figure 1.4 on pages ahead represents that as a general trend, men and women in countries with higher development status (measured in terms of gross domestic product) (GDP per Capita) experience CVD events older and die much later than in less developed countries. For example, in Japan, Australia, France, and Sweden, the median age at death from IHD averages 85 years in women and 77 years in men. Men in these countries experience an acute myocardial infarction more than a decade before their median age at death. Indeed, the survival of individuals after a cardiovascular event has increased in high income countries. This trend of increased survival with CVD has caused an increased prevalence of CVD in many high income countries despite decreasing incidence over time. A second set of countries experienced median events at much younger ages despite having among the highest measures of GDP growth in the world. They include many Middle Eastern countries with considerable oil wealth. A third set of countries at intermediate levels of GDP per capita achieved above-average median ages at AMI and first stroke occurrence and death. They include Malaysia, Nicaragua, China, and Jamaica. Davies\textsuperscript{5}
Figure 1.4: Median age (a) at acute myocardial infarction, (b) of ischemic heart disease deaths, (c) at first stroke, and (d) of stroke deaths, by country.

SOURCE: Data from WHO, 2009
India has the second largest population and the 9th largest GDP in the world. India’s healthcare system is expected to grow to an estimated USD $77 Billion by the end of 2012. Despite this growth India’s healthcare infrastructure has not kept pace with the economy’s growth and the physical infrastructure is inadequate to meet today’s healthcare demands despite the healthcare system being one of the country’s largest economic sectors both in terms of revenue and employment and accounts for approximately 6% of India’s GDP. The rapidly growing and ageing population, lifestyle changes and the rise of the middle class are all factors that are creating significant opportunities, as well as challenges, for India’s strained healthcare sector. India is also experiencing a large rise in chronic diseases, especially heart disease, stroke and diabetes. The country has one of the largest populations of diabetics in the world with a current estimate of 50 million individuals. This is forecast to increase 150% over the next two decades. This will put a significant strain on India’s health system and economy as the total annual cost to treat.

Cardiovascular disease will be the largest cause of death and disability by 2020 in India. It has been forecasted that 2.6 Million people will die from coronary heart disease, which constitutes 54% of all cardiovascular disease deaths. Approximately half of these deaths will occur in young and middle aged individuals, making the impact to society and the economy even more significant.
Neo Cardiac Care reports that India will have the largest cardiovascular disease burden in the world. One fifth of the deaths in India are from coronary heart disease. By the year 2020, it will account for one third of all deaths. Sadly, many of these Indians will be dying young. Heart disease in India occurs 10 to 15 years earlier than in the west. There are an estimated 45 million patients of coronary artery disease in India. An increasing number of young Indians are falling prey to coronary artery disease. Sedentary lifestyle is a major cause of disease, disability and death. Physical inactivity increases all causes of mortality, doubles the risk of cardiovascular disease, type II diabetes and obesity. It also increases the risk of colon and breast cancer, high blood pressure, lipid disorders and anxiety.

WHO\textsuperscript{2} reported that the four leading chronic diseases in India are Cardio Vascular Diseases (CVDs), Diabetes Mellitus, COPD and Cancer. All of these diseases are projected to continue to increase in prevalence in near future as shown in figure 1.5

![Figure 1.5: Prevalence of CVDs, Diabetes, COPD and Cancer in India. (Source: Non Communicable Disease Network, WHO, 2009)](image-url)
Reddy\textsuperscript{6} in The Lancet reported that “India Experienced the highest loss in potentially productive years of life” worldwide. The leading cause of death was Cardio Vascular Diseases, mostly affecting people aged 35-64 years. It has been calculated that in 2000, 9.2 million years of productive life were lost in India. This translates into USD 9 billion of loss of National Income. The projected cumulative loss of National Income for India due to non-communicable disease mortality for 2006-2015 will be USD 237 billion. By 2030, this productivity loss is expected to double to 17.9 million years lost—almost ten times the projected loss of productive life in the US, which has a population a third the size of India’s.

Sharma\textsuperscript{7} reported in ‘India Today’ that Heart diseases have emerged the number one killer in both urban and rural areas of the country. About 25\% of deaths in age group of 25 – 69 years occur because of heart diseases. In urban areas, 32.8\% of deaths occur because of heart ailments, while this percentage in rural areas is 22.9. If all age groups are included, heart diseases account for about 19\% of all deaths. The proportion of death caused by Heart Diseases is highest in south India (25 \%) and the lowest – 12\% - in the central region. The top ten causes of death in India is shown in Table 1.1 below.
### TABLE 1.1

**TOP TEN CAUSES OF DEATH IN INDIA**  
(All ages as percentage)

<table>
<thead>
<tr>
<th>RANK</th>
<th>CAUSE OF DEATH</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cardiovascular Diseases</td>
<td>20.3</td>
<td>16.9</td>
<td>18.8</td>
</tr>
<tr>
<td>2.</td>
<td>Respiratory Diseases</td>
<td>9.3</td>
<td>8.0</td>
<td>8.7</td>
</tr>
<tr>
<td>3.</td>
<td>Diarrhoeal Diseases</td>
<td>6.7</td>
<td>9.9</td>
<td>8.1</td>
</tr>
<tr>
<td>4.</td>
<td>Perinatal Conditions</td>
<td>6.4</td>
<td>6.2</td>
<td>6.3</td>
</tr>
<tr>
<td>5.</td>
<td>Respiratory Infections</td>
<td>5.4</td>
<td>7.1</td>
<td>6.2</td>
</tr>
<tr>
<td>6.</td>
<td>Tuberculosis</td>
<td>7.1</td>
<td>4.7</td>
<td>6.0</td>
</tr>
<tr>
<td>7.</td>
<td>Malignant and other tumors</td>
<td>5.4</td>
<td>6.0</td>
<td>5.7</td>
</tr>
<tr>
<td>8.</td>
<td>Senility</td>
<td>4.0</td>
<td>6.5</td>
<td>5.1</td>
</tr>
<tr>
<td>9.</td>
<td>Unintentional injuries</td>
<td>5.2</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>10.</td>
<td>Ill-defined conditions</td>
<td>4.6</td>
<td>5.0</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Source: India Today, April 12, 2010

Cardiovascular Diseases is usually associated with one or more characteristics, known as risk factors. In general risk factors for CVD include, family history of CVD, Diabetes Mellitus, Hypertension, physical in activity, cigarette smoking, increased serum lipid levels and obesity.
also states that newly emerging risk factors include low birth weight, foliate deficiency, and infections, which are more frequent among the poorest segments of the population in low and middle income countries. By 2005, the total number of cardiovascular disease deaths (mainly CHD, stroke and RHD), had increased globally to 17.5 million from 14.4 million in 1990. Of these 7.6 million were attributed to coronary artery disease and 5.7 million to stroke. More than 80% of deaths occurred in low and middle income countries.

investigated that CAD affects Indians with greater frequency and at younger age than counterparts in developed countries, as well as many others in developing countries. Age standardized CVD Death rates in people 30 – 69 years old are 180 per 1,00,000 in Britain, 280 per 1,00,000 in China and 405 per 1,00,000 in India. Also 50% of CAD related deaths in India occur in people <70 years of age, whereas 22% of CAD – related deaths in western countries occur in this age group. CAD remains responsible for about one-third of all deaths in individuals over age 35.

in the Global Burden of Diseases (GBD) study reported the estimated mortality from CAD in India at 1.6 million in the year 2000. Extrapolation of this estimate shows the current burden of CAD in India to be more than 32 million patients. Epidemiological studies show a sizeable burden of CAD in rural (3-5%) and urban (7-10%) populations. A conservative estimate indicates that there could be 30
millon CAD patients in India of which 14 million are in rural and 16 million in urban areas. If the current trend continues by the year 2020, the burden of atherothrombotic CVD in India will surpass other regions of the world.

Reddy and Yusuf\textsuperscript{12} studied that CAD is epidemic in India and one of the major causes of disease burden and death. Mortality data from Register general of India shows that cardiovascular diseases are major causes of death in India still now. Studies to determine the precise causes of death in urban Chennai and rural areas of Andhra Pradesh have revealed that cardiovascular diseases cause about 40\% of the deaths in urban areas and 30\% in rural areas. Analysis of cross-sectional CAD epidemiological studies performed over the past 50 years reveals that this condition is increasing in both urban and rural areas. The adult prevalence has increased in urban areas from about 2\% in 1960 to 6.5\% in 1970, 7.0\% in 1980, 9.7\% in 1990 and 10.5\% in 2000; while in rural areas, it increased from 2\% in 1970, to 2.5\% in 1980, 4\% in 1990, and 4.5\% in 2000.

Gupta\textsuperscript{10} reported that in terms of absolute numbers there is 30 million CAD patients in the country. The disease occurs at a much younger age in Indians as compared to those in North America and Western Europe. Rural-urban differences reveal that risk factors like obesity, truncal obesity, hypertension, high cholesterol, low HDL cholesterol and diabetes are more in urban areas.
Murray\textsuperscript{13} reports that CAD prevalence appears to be worsening in India. In Developed countries Ischemic Heart Disease (IHD) is predicted to rise by 30\% - 60\% between 1990 and 2020. In developing countries rates are predicted to increase by 120\% in women and 137\% in men from 1990 to 2020. Table – 2 indicates the rising prevalence of CAD in India as compared to China and Established Market Economies (EME) from 1990 – 2020

<table>
<thead>
<tr>
<th>Countries</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>1.16</td>
<td>1.59</td>
<td>2.03</td>
<td>2.58</td>
</tr>
<tr>
<td>China</td>
<td>0.76</td>
<td>0.99</td>
<td>1.15</td>
<td>1.37</td>
</tr>
<tr>
<td>EME</td>
<td>1.67</td>
<td>1.84</td>
<td>1.87</td>
<td>1.95</td>
</tr>
</tbody>
</table>

CABG is one of the treatments for coronary artery disease. Coronary Artery Bypass Graft Surgery (CABG) was first performed in India in 1975 about 13 years after its advent in 1962.

Padmavathi S\textsuperscript{14} reported that in the mid 1990 some 10,000 CABG surgeries were being performed annually in India.
Kaul U and Bhatia V\textsuperscript{15} reported that there has been a steady 25-30\% annual increase in the number of Coronary Procedures over the past several years. There is also an increase in number of bypass surgeries in India, as compared to US. About 60,000 CABGs are done annually in India.

Eder B\textsuperscript{16} reported that patients undergoing CABG are associated with number of potential complications including wound pain, decrease of abilities to physical activities and sometimes depression.

Kasliwal RR\textsuperscript{17} reported that Indian patients undergoing bypass surgeries are often young (Average age of 60 years) and yet reveal a high burden of major modifiable risk factors. The prevalence of obesity, is 51\%, Diabetes 48\%, Hypertension 71\%, smoking 40\% and high LDL-C is 86\%.

Henkin\textsuperscript{18} stated that Cardiac rehabilitation programs have the potential to decrease morbidity and mortality and increase quality of life after acute coronary events and coronary bypass surgery (CABG). Unfortunately, the proportion of eligible patients that participate in cardiac rehabilitation remains low, despite coverage of such programs by the Israeli National Health Insurance. A low participation rate is especially prominent in women, elderly, minorities and low socioeconomic classes.
An interventional study conducted aimed at increasing the participation of patients in cardiac rehabilitation programs after CABG in 5 cardiothoracic wards across Israel. They interviewed 489 patients in the intervention arm and 472 patients in the control arm before surgery and a year later. The intervention included dissemination of information on cardiac rehabilitation to the medical staff and patients. Following the intervention, cardiac rehabilitation increased almost twofold in veteran-Israeli males and females. Although it increased significantly in USSR-born male immigrants, their absolute rate of participation remained low (13.6%). No USSR-born female participated in rehabilitation, either before or after the intervention. The good news is that a simple, inexpensive intervention can increase participation in cardiac rehabilitation after CABG surgery. The bad news is that this potentially lifesaving activity remains unattended by most USSR-born immigrants, and particularly by females. Additional research is required to explore the cultural, social and economic barriers of this phenomenon.

Dankner[^19] found that Cardiac rehabilitation has a beneficial effect on the prognosis and quality of life of cardiac patients, and was also cost-effective. This report describes a comprehensive and low cost educational intervention designed to increase the attendance at cardiac rehabilitation programs of patients who have undergone coronary artery bypass graft surgery.

A controlled prospective intervention trial comprised of 520 patients who underwent coronary artery bypass graft surgery between January 2004 and May 2005 in five medical centres across Israel was done. This group received no additional treatment.
beyond usual care. The intervention arm comprised 504 patients recruited from the same cardiothoracic departments between June 2005 and November 2006. This group received oral and written explanations about the advantages of participating in cardiac rehabilitation programs and a telephone call two weeks after hospital discharge intended to further encourage their enrolment. The medical staff attended a one-hour seminar on cardiac rehabilitation. In addition, it was recommended that referral to cardiac rehabilitation be added to the letter of discharge from the hospital. Both study groups were interviewed before surgery and one-year post surgery. A one-year post-operative interview assessed factors affecting patient attendance at cardiac rehabilitation programs, as well as the structure and content of the cardiac rehabilitation programs attended. Anthropometric parameters were measured at pre- and post-operative interviews and medical information was obtained from patient medical records. The effect of cardiac rehabilitation on one- and three-year mortality was assessed. It reported a low cost yet comprehensive intervention designed to increase cardiac rehabilitation participation by raising both patient and medical staff awareness to the potential benefits of cardiac rehabilitation.

Cardiac rehabilitation has a beneficial effect on the prognosis and quality of life of cardiac patients, and has been found to be cost-effective. A comprehensive and low cost educational intervention designed can increase the attendance of patients to the cardiac rehabilitation programs.
NEED FOR THE STUDY

Open heart surgery is a fearful and life threatening experience for many patients. The mortality rate remains higher than that of general surgery patients. In recent years much attention has been given by nurses to the critical physiological needs of the patients after open heart surgery. Cardiac surgery patients require intensive nursing care to promote comfort, hemodynamic monitoring and stability of these parameters are main focus of patient care aspect in immediate post-operative period. Prevention of pulmonary complication, reducing incision pain, early ambulation and promotion of comfort are the challenges of Intensive Care Unit nurse looking after cardiac surgery patients.

Cardiovascular disease has become the leading cause of morbidity and mortality in India during the last 3 decades. The genetic predisposition and acquisition of traditional risk factors at a rapid rate as a result of urbanization seems to be the major cause. While efforts are being made to contain this epidemic by educating public and applying preventive measures, the ever increasing burden of patients with symptomatic and life threatening manifestations of the disease is posing a major challenge. This requires a concerted effort to develop modern facilities to treat these patients.
Kaul\textsuperscript{20} reported that the healthcare facilities to manage these high risk patients by contemporary methods like percutaneous coronary revascularization and surgical methods have shown a very promising trend during the last decade. The facilities of modern diagnostic methods and new proven techniques to offer symptomatic relief and improve their prognosis are available in most parts of the country. However, in the last few years serious efforts have been made to streamline these procedures. Some peculiarities of CAD patterns stand out in Indian patients. These include: younger age at presentation, a high incidence of double (DVD) and triple vessel disease (TVD), diffuse involvement, distal disease and significant left ventricular dysfunction at presentation. An angiographic study from Vellore in 1066 consecutive males admitted for CAD noted significant disease in 877 patients; of these, 55 per cent were <50 years of age, 34 per cent were <45 years of age and 12 per cent were below 40 years of age. Although the mean age was 48 years, TVD was more common (55\%) than DVD (24\%) and single vessel 43\%

Hassan\textsuperscript{21} investigated and compared between aerobic training and resistance training on CABG’s patients. 32 patients after coronary artery bypass grafting (CABG) have participated in this study in two groups (aerobic and resistance groups). Resistance training group performed: bench press, arm curls, lateral raise, leg curl, leg extensions and triceps kickback, three times a week for two months. Results showed that the arm
and leg strength increased after resistance training. After intervention left ventricular area and ejection fraction for both groups have changed. Result also showed that there was a significant increase in peak VO2 from baseline averaged 16% for aerobic group and 9% for resistance group. Findings of current study clearly show the advantage of resistance training for patients during cardiac rehabilitation.

Hulzebo\textsuperscript{22} found that Cardiac surgery is one of the most common surgical procedures and accounts for more resources expended in cardiovascular medicine than any other single procedure. Because cardiac surgery involves sternal incision and cardiopulmonary bypass, patients usually have a restricted respiratory function in the postoperative period. Moreover, anesthesia and analgesia affect respiratory function (during and after the surgical intervention) causes changes in lung volume, diaphragmatic dysfunction, respiratory muscle strength, pattern of ventilation, gas exchange, and the response to carbon dioxide and oxygen concentrations. As a consequence of these changes (see Figure 6), patients undergoing cardiac surgery have an increased risk of postoperative pulmonary complications (PPCs), which lead to increased postoperative morbidity and mortality, increased use of medical resources, longer hospital stay, and increased health care costs.
Cserép\textsuperscript{23} found that Psychosocial factors have shown independent predictive value in the development of cardiovascular diseases. The study investigated the relationship between depression, anxiety, education, social isolation and mortality 7.5 years after CABG surgery.
cardiac surgery. 180 patients undergoing cardiac surgery between July 2000 and May 2001 were prospectively enrolled and followed for ten years. During the follow-up period, the patients were contacted annually by mail. Anxiety (Spielberger State-Trait Anxiety Inventory, STAI), depression (Beck Depression Inventory, BDI) and the number and reason for re-hospitalizations were assessed each year. Those patients who did not respond were contacted by telephone, and national registries were searched for deaths. During a median follow-up of 7.6 years, the mortality rate was 23.6%. In a Cox regression model, the risk factors associated with an increased risk of mortality were a higher, higher preoperative STAI-T score, lower education, and the occurrence of major adverse cardiac and cerebral events during follow up. In the post-discharge model, the same risk factors remained. The results suggest that the assessment of psychosocial factors, particularly anxiety and education may help identify patients at an increased risk for long-term mortality after cardiac surgery.

Leegaard showed that inadequate knowledge among health care providers is a key barrier to good pain management, and nurses have a major role to provide education to patients. The purpose of this study was to identify nurses' learning needs to prepare patients for managing pain before and after discharge home from cardiac surgery. The overall aim is to develop a pain education intervention for nurses working with cardiac surgical patients.

A focus groups study conducted Participants (N=22) were asked about their perceptions of patients' education needs for pain management after cardiac surgery
and approaches to help nurses meet these needs. The Pain Beliefs Scale was used to capture nurses' own mis-beliefs about pain that would need clarification in a successful pain education intervention.

Nurses identified pain management challenges in the hospital, particularly related to patients' age, patient concerns about the use of opioids, the need to use multiple management strategies, and preparing patients to manage pain at home. Pain Beliefs Scale scores were low related to opioid dosing and adverse effects. Participants identified their most helpful educational approaches being brief in-services, hands-on learning, lunch-and-learn sessions, and designated education days. These data will be used to develop an education intervention for nurses to help their cardiac surgery patients with more effective pain management strategies before and after discharge home.

Farkhondeh found that many patients experience anxiety and depression after cardiac bypass surgery. The aim of this study was to examine the effect of cardiac rehabilitation on anxiety and depression in patients undergoing coronary artery bypass grafting in hospitals affiliated to Shiraz University of Medical Sciences in southern Iran. For this randomized controlled trial, 80 patients who met the inclusion criteria were recruited and randomly assigned to case and control groups. Anxiety was measured with the Spielberger Anxiety Scale and depression was measured using Beck’s Depression Inventory at three points in time: on discharge from the hospital, immediately after the intervention, and 2 months after cardiac rehabilitation. After measuring anxiety and depression in both groups upon discharge, the experimental
group participated in 8 cardiac rehabilitation sessions over a 4-week period. The control group received only the routine follow-up care.

There was a statistically significant difference in depression scores between groups at all three time-points (Mean score from 19.6 to 10 in the intervention group and from 19.5 to 14 in the control group. However, no significant difference was seen in anxiety scores between the groups (Mean score from 37 to 28 in the intervention group and from 38 to 32 in the control group. Therefore Cardiac rehabilitation was effective in reducing depression 2 months after surgery in patients undergoing coronary artery bypass grafting.

Lamarche\textsuperscript{26} examined the impact of a preadmission telephone intervention on anxiety, knowledge, and readiness for discharge for patients attending a preadmission teaching program prior to cardiac surgery. The primary goal of the telephone intervention was to provide support by giving additional information about individual concerns. The telephone intervention did not have an effect on anxiety and knowledge. A significantly higher level of anxiety was found in the experimental group on admission, but this difference became non-significant when baseline level and length of waiting time were entered as covariates. The more anxious group rated their perceived knowledge level lower, despite the fact that both groups had similar scores in actual knowledge. Given the potential barrier that anxiety can pose for patient learning, nurses need to adapt their interventions to deal with the patients'
feelings of anxiety that accompany cardiac surgery to make the learning process effective.

**Khalida** conducted an interventional study on 55 patients at Saddam Centre for Cardiac Surgery throughout the period from 1st of July 1997 to 15th of January 1999. The study aimed to evaluate the effectiveness of constructed nursing education program on reduction of complications and improving recovery among patients with Coronary Artery Bypass Graft (CABG) surgery through the application of repeated measures. The sample is divided into 27 patients who received the nursing educational program (study group) and 28 patients who continued to receive regular care (controls). Based on previous research methods, were followed-up for 3 months after surgery. To evaluate the effectiveness of the intervention education program, two major instrument were used, these instrument included knowledge test and self-efficacy check list. The knowledge given to the patient in study group prior to the implementation of the intervention program and retested at discharge and on three months after the operation and in the control group given knowledge test pre operative and re-tested at discharge and on three months after the operation. In a Self efficacy check list it was assessed at time of discharge and at first, second, and third month after discharge for the study and control groups. The result revealed that marked improvement in health status of the study group compared to the control group.
Miller determined the effectiveness of a slow, deep-breathing relaxation technique in relieving postoperative pain after coronary artery bypass graft surgery. Significant decreases were demonstrated as a result of relaxation, in blood pressure, heart rate, respiratory rate, and report of pain on the visual descriptor scale. No significant differences were seen in analgesic use or visual analogue scale scores. Eleven subjects (73.3%) said the technique was helpful in their pain management. All experimental subjects stated that the relaxation technique was simple to perform, and they would recommend it to others who have postoperative pain.

Larsen compared the effect of three different physiotherapy masks on the incidence of post operative complications after thoracic surgery. It was concluded that any of the three therapies: continuous positive airway pressure (CPAP), positive expiratory pressure (PEP) and inspiratory resistance-positive expiratory pressure (IR-PEP) may be used as supplement to standard chest physiotherapy.

Freitas assessed the effect of intensive spirometry for preventing post operative pulmonary complications in adult undergoing CABG. Individual small trials suggest that there is no evidence of benefit from incentive spirometry in reducing pulmonary complications and in decreasing the negative effects on pulmonary function in patients undergoing CABG. In view of the modest number of patients studied, methodological shortcomings and poor reporting of the included trials, these results should be interpreted cautiously. An appropriately powered trial of high
methodological rigour is needed to determine those patients who may derive benefit from incentive spirometry following CABG.

Pasquina\textsuperscript{31} assessed whether respiratory physiotherapy prevents pulmonary complications after cardiac surgery. The usefulness of respiratory physiotherapy for the prevention of pulmonary complications after cardiac surgery remains unproved. Large randomized trials are needed with no intervention controls, clinically relevant end points, and reasonable follow up periods.

Stiller\textsuperscript{32} evaluated 120 patients undergoing coronary artery surgery completed a randomized controlled study designed to investigate whether prophylactic chest physiotherapy affected the incidence of postoperative pulmonary complications. There was no indication that the incidence or severity of fever, hypoxemia, chest roentgenlogic abnormalities or clinically significant postoperative pulmonary complications was different between groups. These results suggest that the necessity for prophylactic chest physiotherapy after routine coronary artery surgery should be reviewed.

Cambach\textsuperscript{33} in their study evaluated the efficacy of three months rehabilitation program including exercise training, patient education, breathing retraining, evacuation of mucous, relaxation techniques and recreational activities. The effects of
rehabilitation were evaluated, three and six months after baseline measurements in terms of exercise tolerance and quality of life. Patients who started with rehabilitation showed significant improvement in endurance time, cardiac frequency during cycling, walking distance and chronic respiratory disease questionnaire (CRDQ) scores compared to the control group.

Dolansky\textsuperscript{34} suggested that post cardiac – surgery patients could get better physical fitness and better quality of life as well, after receiving exercise training for a long time and post surgery education.

Stone\textsuperscript{35} found that Cardiac rehabilitation causes enhancement and maintenance of cardiovascular health through individualized programmes, designed to optimize physical, psychological, social, vocational and emotional status.

Mittal\textsuperscript{36} found that many patients are unprepared for a relatively long recovery period following coronary bypass and said that cardiac rehabilitation improves quality of living, correction of risk factors, and assistance to social and professional reintegration.

Some patients may also be unaware that the true success of operation is only partially dependent on the technical result of the procedure. Indeed, active rehabilitation and
aggressive medical management in the post operative period is critical for long term success of a coronary bypass operation.

Understanding the magnitude of post-operative discomforts and its consequences is imperative for nurses working in the post-operative care units to be increasingly aware that pulmonary rehabilitation and psychological well-being are important in the recovery of patients after surgery. Pulmonary rehabilitation program can increase the patients confidence to cope up with the stress related to the surgery, allays the fear of surgery and thus would be better prepared to participate actively in the post-operative care, aimed at preventing and controlling the post-operative complications.

However it has still not tested the variety of nursing intervention techniques in Indian scenario that can be introduced before surgery to help patients cope with stress more effectively.

The results of various studies also revealed that marked improvement in health status of the study group. The patient’s recovery was determined by percentages of indices of self-efficiency, and knowledge level. The indices were found to be higher for patients who received nursing education program throughout the period of study. In light of these findings, the investigator recommends that the implementation of an educational program by nurses for patient with open heart surgery and reinforcement of education during the follow-up period concerning to the patients’ need should be there.
STATEMENT OF THE PROBLEM

A study to evaluate the effectiveness of Pulmonary Rehabilitation Program (PRP) on Physiological Parameters and Quality of Life among patients undergoing Coronary Artery Bypass Grafting (CABG) in selected hospital of Delhi.

OBJECTIVES OF THE STUDY

The main objectives of the present study are to:

1) Assess and evaluate the effects of Pulmonary rehabilitation program (PRP) on physiological parameters of patients after undergoing Coronary Artery Bypass Grafting (CABG)

2) Assess and evaluate the effect of Pulmonary rehabilitation program (PRP) on quality of life of patients after undergoing Coronary Artery Bypass Grafting (CABG).

HYPOTHESIS

H-1) The experimental group subjects exposed to PRP will have a significant difference in heart rate as compared to control group subjects who are not exposed to PRP as evident from pulse-oximeter at 0.05 level of significance.

H-2) The experimental group subjects exposed to PRP will have a significant difference in respiratory rate as compared to control group subjects who are not
exposed to PRP as evident from counting respiratory rate, at 0.05 level of significance.

**H-3)** The experimental group subjects exposed to PRP will have a significant difference in blood pressure as compared to control group subjects who are not exposed to PRP as measured by B.P. apparatus, at 0.05 level of significance.

**H-4)** The experimental group subjects exposed to PRP will have a significant difference in pulmonary function as compared to control group subjects who are not exposed to PRP as evident from incentive spirometer and peak expiratory flow meter, at 0.05 level of significance.

**H-5)** The experimental group subjects exposed to PRP will have a significant difference in the saturation of oxygen as compared to control group subjects who are not exposed to PRP as evident from pulse-oximeter at 0.05 level of significance.

**H-6)** The experimental group subjects exposed to PRP will have a significant difference in perception of pain as compared to control group subjects who are not exposed to PRP as evident from Visual Numeric Pain Scale at 0.05 level of significance.

**H-7)** The experimental group subjects exposed to PRP will have a significant difference in the level of anxiety as compared to control group subjects who are not exposed to PRP as measured by Spielberger’s state trait anxiety inventory at 0.05 level of significance.
The experimental group subjects exposed to PRP will have a significant difference in the quality of life as compared to control group subjects who are not exposed to PRP as evident from Modified WHO QOL BREF instrument, at 0.05 level of significance.

OPERATIONAL DEFINITIONS

a) Pulmonary rehabilitation program (PRP) : refers to individualized structured information for patients undergoing CABG. Pulmonary rehabilitation program includes pulmonary exercises i.e. deep breathing exercise, pursed lip breathing, breathing exercise with incentive spirometer, post expiratory pressure therapy through peak expiratory flow, diaphragmatic breathing and to perform relaxation as given in information booklet (IB), demonstration by the researcher, clarification of doubts and taking feedback on how to perform relaxation and pulmonary exercises through self reporting Performa.

b) Physiological parameters : refers to measurement of heart rate, respiratory rate, blood pressure, pulmonary function (inspiratory capacity and peak expiratory flow) and saturation of oxygen as measured by pulse-oximeter, counting of respiratory rate, B.P. apparatus, incentive spirometer and peak expiratory flow meter and pulse-oximeter respectively. The physiological parameters also includes pain and anxiety.

Pain : is an unpleasant sensory experience associated with actual or potential tissue damage. In this study the pain experienced by the patients undergone CABG is
measured by Visual Numeric Pain Scale. Pain is assessed on 5 occasions as pain on chest incision at rest, during change of position, on walking, on deep breathing and on coughing.

**Anxiety:** is referred as psycho-physiological reaction and an unpleasant state of inner turmoil, feeling of fear, worry and uneasiness by the patients undergone CABG which can be assessed by C.D. Spielberger’s state trait anxiety inventory.

c) **Quality of life (QOL):** Quality of Life is a multi-dimensional evaluation of an individual’s current life circumstances in context of culture in which they live and values they hold. QOL is primarily subjective sense of wellbeing encompassing physical, psychological, social and spiritual dimension as demonstrated by Modified WHO QOL BREF instrument.

d) **Coronary Artery Bypass Grafting (CABG):** It is a principal method of surgical revascularization performed by bypassing diseased coronary arteries to restore blood flow to the heart tissue that has been deprived of an adequate blood because of coronary artery disease.
ASSUMPTIONS

The study assumes that:

1) Patients undergoing CABG are likely to develop deviation on physiological parameters like heart rate, respiratory rate, pulmonary functions, blood pressure and saturation of oxygen.

2) Patients undergoing CABG are likely to have increased perception of pain, and anxiety.

3) CABG impacts quality of life of patients.

4) Pulmonary rehabilitation program (PRP) is an accepted strategy to administer for patients undergoing CABG that aims at bringing improvement in physiological parameter and quality of life.

5) Physiological parameters like heart rate, respiratory rate, pulmonary functions, blood pressure, saturation of oxygen, pain & anxiety and quality of life are measurable.

DELIMITATIONS

The study is delimited to:

1) Adult literate Patients undergoing Coronary Artery Bypass Grafting (CABG) in selected hospitals of Delhi

2) Administration of information booklet once only

3) Patients without any psychiatric illness and able to understand.
4) Assessment of Physiological parameters only once before and thrice after the administration of PRP

5) Anxiety and quality of life only once before and six times after the administration of PRP

6) Expressed verbal response required for pain perception, anxiety and quality of life.

7) Pain is observed post operatively only.

THEORETICAL FRAMEWORK FOR THE STUDY

The theoretical framework prepared by the researcher for the present study is based on Nursing process model given by Ida Jean Orlando in the year 1961. This model emphasizes the reciprocal relationship between the patient and nurse. The model states that “the function of professional Nursing is conceptualized as finding out and meeting the patient’s immediate need for help”

Nursing process is a series of planned steps and action directed towards meeting the needs and solving the problems of the patients and their families. It is an approach to nursing care that emphasizes the individual needs of each patient and provides a continuing review of standard and effectiveness of the care given to the patient.

Nursing process has 5 phases. They include: Assessment by data gathering, stating the nursing Diagnosis, Planning the care, Implementing the care plan and Evaluating the plan of care.
THEORETICAL FRAMEWORK OF THE STUDY

Assessment
- Physiological parameters
- Quality of Life

Diagnosis
- Altered cardio pulmonary function
- Altered discomfort R/T Pain & Anxiety
- Decreased QOL

Evaluation
- Improved pulmonary function
- Decreased pain
- Decreased anxiety
- Improved Quality of Life.

Planning
- Patient undergoing CABG
- Preparation of information booklet on PRP

Implementation
- Administration of PRP
  - Relaxation
  - Exercise (Pulmonary)
  - Avoidance of risk
  - Dietary management

Figure 1.7: Theoretical framework of the study based on nursing process
Assessment

Assessment is the deliberate and systematic collection of data to determine a patient’s current and past health status, functional status and present and past coping patterns. The purpose of assessment is to establish a database about the patients perceived needs, health problems and responses to those problems.

In assessment phase patients demographic characteristics, baseline physiological parameters like heart rate, respiratory rate, blood pressure, pulmonary function, saturation of oxygen, level of pain, anxiety, and the quality of life are assessed.

Nursing Diagnosis

Nursing Diagnosis is the statement that describes the patient’s actual and potential responses to a health problem that the nurse is licensed and competent to treat.

In the Diagnosis phase the diagnosis made is:

Altered cardio pulmonary function related to physiological parameters like heart rate, respiratory rate, blood pressure, pulmonary function & saturation of oxygen. Altered discomfort related to pain and anxiety, decreased quality of life in patients undergoing Coronary Artery Bypass Grafting.
Planning

Planning refers to the development of nursing strategies designed to eliminate client problem. A plan of care is developed to direct nursing care activities related to the individual for whom the expected outcome were set.

In planning phase, the expected outcome and plan of care were formulated. The expected outcome include: Patient will be free of pulmonary complications as evident from normal physiological parameters like heart rate, respiratory rate, blood pressure, pulmonary function, saturation of oxygen, decreased level of anxiety, decreased level of pain, and increased quality of life.

A structured information booklet planned with written instructions and self-explanatory pictures to provide information’s on prevention of pulmonary complications and for improving the quality of life.

Implementation

Implementation describes the performance of nursing interventions necessary for achieving the goals and expected outcomes of nursing care.

In Implementation phase the experimental group is exposed to selected nursing interventions. The interventions include: Taking informed consent. Administration of the information booklet.
Evaluation

Evaluation refers to the judgment of effectiveness of nursing care to meet the patient’s goal. The effect of the action or intervention has to be evaluated in order to ensure optimum benefits to all the patients.

In evaluation phase improved cardio pulmonary function observed by Physiological parameters like heart rate, respiratory rate, blood pressure, pulmonary function, saturation of oxygen, decreased level of anxiety, decreased level of pain and Improved quality of life are also observed at periodic intervals at Day-3, Day-7, on discharge, Day-30, Day-60, Day-90,

ORGANIZATION OF THE REPORT

This chapter has introduced the background of the study, need for the study, its problem statement, objectives of the study, hypothesis. It also includes operational definition of terms, assumptions, delimitations of the study. It also presents the conceptual frame work on which the study is based upon.

Chapter II is devoted to review of literature, relevant to the recent studies done on rehabilitation of patients undergoing CABG.

Chapter III gives an account of the methodology of the study.
Chapter IV would deal with Analysis and Interpretation of the findings.

Chapter V deals with the discussion of the findings.

Chapter VI would find the summary, conclusion, nursing implication of the study and recommendation. The report would end with a selected list of references and appendix.