Original Article

The effectiveness of self instructional module on cardiac rehabilitation

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A B S T R A C T

Objective: Nurses play a strong role in helping patients reduce their risk for disease and make informed lifestyle changes. Reliability of the nurses is critical for them to serve as role models and educators. The aim of the present study was to improve nurse knowledge of post-myocardial infarction rehabilitation at selected hospitals in Indore through a newly designed self-instructional module.

Methods: Sixty cardiac center staff nurses were administered a questionnaire, a pre-test on cardiac care and the self-instructional module. Five days after the nurses were administered the module, a post-test was given to assess the gain in knowledge on post-myocardial infarction cardiac rehabilitation.

Results: The mean pre-test score was 8.27 ± 4.40 but increased to 23.18 ± 3.69 in the post-test following administration of the self-instructional module. The change in score was statistically significant (P < 0.0001) indicating that the self-instructional module was instrumental in increasing knowledge of post-myocardial infarction rehabilitation.

Conclusions: The results of this study highlight the need for continuing education of nurses in cardiac rehabilitation. Self-instructional modules are a useful tool for furthering nurse education.

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1. Introduction

The heart, a vital internal organ, and is susceptible to several disorders, which account for one of the leading causes of death worldwide [1]. Myocardial infarction (MI), also known as a heart attack, is caused by reduced coronary blood flow that causes a reduction in oxygen and a destruction of myocardial tissue [2].
A recent study which analyzed all major world ethnic groups in relation to heart disease found that Indians have the highest risk of coronary heart disease, with rates three to four times higher than Americans, six times more than the Chinese and 20 times more than the Japanese [3]. In North India, 7–10% of people have coronary heart disease while the prevalence is as high as 14% in South India [4]. Indians typically suffer from MIs around 50 years of age. But it appears the age of onset is decreasing with an increasing number of people in their 3rd and 4th decades of life presenting with MIs [5]. A 2003 population-based cross-section survey found that the prevalence of coronary heart disease in India was estimated to be 3–4% in rural areas (two-fold higher compared with 40 years ago) and 8–10% in urban areas (six-fold higher compared with 40 years ago), with a total of 29.8 million people affected (14.1 million in urban areas and 15.7 million in rural areas) [6]. In 1990, there were an estimated 1.17 million deaths from coronary heart disease in India and the number is likely to almost double to 2.03 million by 2010. The Indian subcontinent suffers from a tremendous loss of productive working years due to cardiovascular disease deaths: an estimated 9.2 million constructive years of life were lost in India in 2000, with an expected increase to 17.9 million years in 2030 almost ten times the projected loss of productive life in the United States [7,8].

Myocardial infarction results in enormous burden of increased mortality and morbidity by threatening the patient’s stability, security, adaptability, belief and assumptions [9]. After MI, many patients led miserable unproductive lives, they were frightened to return to work and unnecessarily become cardiac invalids. Recognizing the importance of patients to run to ‘normal’, cardiac rehabilitation has emerged as a part of total patients care. It is increasingly being recognized that post infarct care of life is more effective only if delivered with proper rehabilitation backup to enhance the speed of recovery and quality of life [10]. National Institute of Health, USA, defines rehabilitation of cardiac patient as “the sum of activities required to influence favorably the underlying cause of the disease, as well as to ensure the patients best possible physical, social and mental conditions, so that they may by their own efforts, preserve or resume when lost, as normal a place as possible in the life of the community” [11].

From our own experience, we have found that patients between 35 and 70 years of age that were admitted to the intensive care unit, many for their second heart attack, were psychologically, physiologically, socially and vocationally handicapped. We believe that MI patients receiving robust rehabilitative support and care by the nursing staff will achieve optimum levels of health and a reduced risk for future attacks. Given the importance of cardiac rehabilitation in post-MI patients, we undertook the present study. Because most patients were unaware of the cardiac rehabilitation options, we developed a comprehensive teaching program incorporating various topics such as physiological, psychological, vocational and sexual rehabilitation with the ultimate goal of providing relief and preventing recurrence.

Because cardiovascular disease contributes to high rates of mortality, the present study is warranted. Our goal is to provide a comprehensive approach to post-MI patient care through education of the staff nurses that work in the cardiac units. In this study, we assess the effectiveness of a self-instructional module on the education of post-MI patients by staff nurses working in cardiac units of the Indore Hospital. The main objectives of study were to (a) to assess the pre-test knowledge of staff nurses regarding cardiac rehabilitation of post-MI patients, (b) to evaluate the effectiveness of the self-instructional module on knowledge regarding cardiac rehabilitation of post-MI patient and (c) to evaluate the association between pre-test knowledge, score and selected demographic variables.

2. Research methodology

We conceptualized this study utilizing the goal attainment theory, or “interpersonal relationship model”, established by Imogene King. The goal attainment theory encompasses concepts of perception, goal setting, action, interaction and transaction (Fig. 1) with a special emphasis on interpersonal systems, a feature highly relevant to the nursing profession. Goal attainment theory is based on holism, or one total human being interacting with another total human being in a specific situation. King’s theory establishes mutual goal setting as the independent variable. “Each human being perceives the world as a total person in making transactions with individuals and things in environment. Transaction represents a life situation in which perceiver and thing perceived are encountered and in which person enters the situation as an active participant and each is changed in the process of these experiences” [10].

We adopted an evaluative approach [11] for the research method, as it involves the collection of data from a representative sample population. This approach is suitable to assess the effectiveness of the self-instructional module on acquired knowledge by cardiac unit staff nurses on post-MI patient cardiac rehabilitation education in the Indore hospital system. An experimental research design was used, as there was no compensation for the lack of randomization or a control group. The data from the experimental group is then analyzed using pre- and post-test analyses (O1, X , O2) (Fig. 2)

Sixty cardiac unit nurses were selected using the non-probability convenience sampling technique [13]. The following inclusion criteria were applied: the nurse must be part of a cardiac unit, the nurse must be a willing participant and the nurse must be readily available for study testing and analysis. Nurses who were not willing to participate or were not members of the cardiac unit were excluded from this study. In this study, the dependent variable was the post-MI cardiac rehabilitation knowledge of the nurses while the independent variable was the self-instructional module on cardiac rehabilitation [14]. A schematic representation of the study design is depicted in Fig. 3.

2.1. Development and description of the research tools

This study was designed with the personal clinical experience of the primary investigator, extensive review of the literature and expert input from doctors and teachers in the medical and surgical nursing departments. We used several tools, both
procedures and instruments, to collect data and attain the study objectives. We used the following approach to develop the questionnaire: (a) preparation of a blueprint/outline, (b) preparation of a first draft, (c) content validation, (d) reliability analysis, and (e) preparation of the final draft.

To evaluate the staff nurses, a structured questionnaire and an observation checklist tool were developed. Demographic data including the nurse’s age, sex, professional educational status, clinical experience in the cardiac unit and source(s) of knowledge related to cardiac rehabilitation of post-MI patient were collected. In the structured questionnaire, 30 queries related to cardiac rehabilitation in post-MI patients were generated. Each question had four answer choices, with only one answer being the correct answer. Each question correctly answered received one point while incorrect answers were given zero points.

2.2. Development of the self-instructional module

The self-instructional module was developed step-wise by the lead investigator for staff nurses by (a) preparing a first draft of the self-instructional module, (b) validating the content of the self-instructional module and (c) preparing a final draft. The lead investigator also reviewed the literature and sought the opinion of experts and from his own clinical experiences. The final version of the self-instructional module included the definition, objectives, principles and components of cardiac rehabilitation in post-MI patients.

Nine experts in the field of cardiac rehabilitation reviewed the content validity of the self-instructional module.

\[
O_1 \quad \xrightarrow{\text{Intervention}} \quad O_2
\]

Pre-test knowledge \quad \text{Intervention} \quad \text{Post-test knowledge}

Fig. 2 – The pre- and post-test analyses (O₁, X, O₂).

Fig. 1 – The self-instructional module.

Fig. 3 – The schematic representation of the study design.
and suggestions of the experts were taken into consideration to edit the items of the tool as well the content of the self-instructional module [12].

A pilot study was conducted to evaluate the reliability of the module. The questionnaire and observational checklist were analyzed with the coefficient of internal consistency using a pre-test/post-test method. Pearson’s correlation coefficient was used to determine test reliability. The reliability of the structured knowledge questionnaire was \( r = 0.834 \), indicating that the tool was reliable [14].

2.3. Pilot study

The pilot study was conducted in the Cardiac Center of the Greater Kailash Hospital and Research Center in Indore, India between April 5, 2013 and April 11, 2013 after obtaining permission from the concerned authority prior to the study. Written informed consent was obtained from each nurse after the study was explained and confidentiality was assured. For the pilot, six nurses met the inclusion criteria on the first day of the study and received the self-instructional module. On the fifth day of the study, a post-test was conducted with the same questionnaire to assess whether the nurses had increased knowledge of cardiac rehabilitation in post-MI patients. After the pilot period, the study questionnaire was found to be feasible, practical and acceptable.

2.4. Research study

This study was approved by XXX at the Cardiac Center, Bhandari Hospital and Research Center in Indore, India. Data for the study was collected from April 13, 2013 through April 27, 2013. Prior to the pre-test, participants received an explanation of the study and were assured that their participation was confidential; written informed consent was received from each nurse participant and a good rapport was maintained. On the first day of the study, the pre-test data was obtained using the structured questionnaire. On the fifth day, the post-test was conducted with the same questionnaire to assess whether the nurses had increased knowledge of cardiac rehabilitation in post-MI patients. After the pilot period, the study questionnaire was found to be feasible, practical and acceptable.

2.5. Data analysis

Data was analyzed on the basis of the study objectives and its hypotheses. The demographic data was collected to analyze the frequency and percentage of participant gender, age, education and clinical experience. The knowledge scores of the nurse participants before and after the self-instructional module were analyzed for frequency, percentage, mean, median, standard deviation. A \( \chi^2 \) test was applied to evaluate the association between each nurse’s knowledge and the demographic data. A paired t-test was used to identify significant differences between the mean pre- and post-test knowledge scores. A value of \( p < 0.05 \) was set as the threshold for statistical significance while \( p < 0.001 \) was considered highly significant.

3. Results

3.1. Frequency and percentage of socio-demographic variables

All demographic information regarding staff nurses age and gender included in the study is presented in Table 1. The following age ranges were included in the study: ≥36 years (\( n = 7; 11.66\% \)), 31–35 years (\( n = 11; 18.33\% \)), 26–30 years (\( n = 22; 36.77\% \)), 20–25 years (\( n = 20; 33.33\% \)). The largest number of patients was between 26 and 30 years old. Fifty-five percent (\( n = 33 \)) of the nurses were male.

Professional qualifications attained by the staff nurses are presented in Table 2. Thirty-seven (61.67%) of the nurses had taken the General Nursing Midwifery (G.N.M.) course, nine (15%) nurses had completed the Post Basic Bachelor of Science (P.B.B.Sc. Nursing) degree, 13 staff nurses (21.67%) had completed their Bachelor of Science (B.Sc. in Nursing) and one staff nurse (1.67%) had completed a Master of Science (M.Sc. in Nursing). Nurses who had taken the G.N.M. had the highest frequency at almost 62% while all other degrees contributed to only 38% frequency.

In this study, a majority of nurses (\( n = 39; 65\% \)) had between 0 and 3 years of clinical experience on the cardiac unit. The remaining nurses had 4–6 years (\( n = 8; 13.3\% \)), 7–9 years (\( n = 7; 11.67\%) or 10–12 years (\( n = 6; 10\% \)) of clinical experience. Thus, 65% of patients saw nurses with 0–3 years experience. The frequency decreased with years of experience.

3.2. The effectiveness of the self-instructional module in terms of gain in knowledge scores of staff nurses

The existing knowledge of cardiac rehabilitation of the staff nurse participants are reported as the marks/category scored in the pre-test and presented in Table 3. For scoring, every correct answer carried one mark while incorrect answers received zero marks. The following rubric was used for assessing nurse knowledge: 0–10 was categorized as poor knowledge, 11–20 was categorized as average knowledge and 21–30 was categorized as good knowledge. After the nurses were administered the pre-test, we found that a small percentage of staff nurses (1.67%) had good knowledge of cardiac rehabilitation, while a majority of the staff nurses (78.33%) fell into the poor knowledge category (0–10 score). Twelve staff nurses (45.0%) had an average knowledge (11–20 score) of post-MI cardiac rehabilitation. After the post-test, we found that a majority of nurses (61.66%) now fell into the good knowledge category (21–30 score).

<table>
<thead>
<tr>
<th>Participant age</th>
<th>Frequency</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–25</td>
<td>20</td>
<td>33.33</td>
</tr>
<tr>
<td>26–30</td>
<td>22</td>
<td>36.66</td>
</tr>
<tr>
<td>31–35</td>
<td>11</td>
<td>18.33</td>
</tr>
<tr>
<td>≥36</td>
<td>7</td>
<td>11.66</td>
</tr>
</tbody>
</table>

Table 1 – Frequency and percentage distribution of study subjects according to age (\( n = 60 \)).
knowledge category, 31.66% had average knowledge and only 6.66% fell in the poor knowledge category.

The mean pre-test score was 8.27 ± 4.40. After the self-instructional module, the post-test mean score increased significantly to 23.18 ± 3.69 (p < 0.0001; Table 4).

3.3. Association between pre-test scores and selected demographic variables

We next analyzed how the demographic variables (e.g. age, gender, professional qualification and clinical experience) related to the pre-test score. Table 5 shows the relationship between the pre-test score level of knowledge and the age of the nurses. The observed \( \chi^2 \) critical value is 20.52 for six degrees of freedom (\( p < 0.001 \)). This analysis revealed that age was in part correlated with knowledge in pre-test scores.

The level of professional education attained by the nurses was also compared with pre-test scores and is presented in Table 6. Using a \( \chi^2 \) analysis, we obtained a value of 9.19 for 6 degrees of freedom (\( p > 0.05 \)), indicating that there is not a significant association between professional education and pre-test scores. We also compared the length of clinical experience (in years) of the nurse participants with the pre-test scores (Table 7). A \( \chi^2 \) analysis resulted in a score of 11.27 for 6 degrees of freedom (\( p > 0.05 \)), indicating that years of clinical experience were not associated with the pre-test scores. Similarly, we observed no significant association between gender and pre-test scores (\( \chi^2 = 2.5, 2 \) degrees of freedom; \( p > 0.05 \) (Table 8).

4. Discussion

Previous research has demonstrated that self-help in the form of an intervention may lead to a reduction in psychological distress levels when provided by a nurse in rehabilitation programs [15,16]. A study from Harbman (2014) found that rehabilitation is an acceptable form of care due to high participant enrollment rate and low attrition rate [17]. Lower rates of recruitment were reported in studies targeting participants who were completing cardiac rehabilitation [18] while higher rates were found in programs that offered comprehensive lifestyle interventions delivered by nurses and/or dieticians [19]. Two other comparable nurse-led secondary prevention studies have reported recruitment rates of approximately 70% [20,21]. The high enrollment and low attrition rates in the Harbman (2014) study suggest that interventions including a nurse practitioner were desirable and acceptable to patients with acute MI [17]. Compared with the length of time physicians spend with patients, the nurses in the present study spent a longer time (mean: 36 min) with each patient visits [22]. Accordingly, the nurse practitioner had ample opportunity to provide, clarify and reinforce information about rehabilitation. Thus, dedicated appointment times for patients to see the nurse are highly recommended.

Staff nurses significantly improved their knowledge after taking the self-instructional module. We observed no significant associations between the age, professional education,

### Table 2 - Professional qualifications and clinical experience of staff nurses in terms of frequency and percentage (n = 60).

<table>
<thead>
<tr>
<th>Particular educational status (degree/diploma)</th>
<th>G.N.M.</th>
<th>P.B. B.Sc.</th>
<th>B.Sc.</th>
<th>M.Sc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (No.) 37 (%)</td>
<td>61.67</td>
<td>15.00</td>
<td>21.67</td>
<td>1.67</td>
</tr>
<tr>
<td>Frequency (No.) 39 (%)</td>
<td>65.00</td>
<td>13.33</td>
<td>11.67</td>
<td>10.00</td>
</tr>
<tr>
<td>Specific experience in the cardiac unit (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–3 years 4–6 years 7–9 years 10–12 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.N.M.: General Nursing Midwifery, P.B.B.Sc.; Post Basic Bachelor of Science, B.Sc.; Bachelor of Science in Nursing, M.Sc.; Master of Science in Nursing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3 - Frequency and percentage distribution of pre- and post-test knowledge score (n = 60).

<table>
<thead>
<tr>
<th>Knowledge score</th>
<th>Pre-test frequency</th>
<th>Post-test frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. %</td>
<td>No. %</td>
<td></td>
</tr>
<tr>
<td>Poor (0–10)</td>
<td>47 78.33</td>
<td>4 6.66</td>
</tr>
<tr>
<td>Average (11–20)</td>
<td>12 20.00</td>
<td>19 31.66</td>
</tr>
<tr>
<td>Good (21–30)</td>
<td>1 1.67</td>
<td>37 61.66</td>
</tr>
</tbody>
</table>

### Table 4 - Comparison of knowledge scores between pre- and post-test (n = 60).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Knowledge score Mean ± S.D.</th>
<th>Degree of Freedom</th>
<th>‘t’ value</th>
<th>Level of significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>8.27 ± 4.40</td>
<td>118</td>
<td>20.1254</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Post-test</td>
<td>23.18 ± 3.69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Highly significant.
clinical experience in the cardiac unit or gender of the staff nurses with the pre-test scores. The findings in this study have broad implications for the nursing practice, nursing education, nursing research and nursing administration fields.

Nursing practice: Nurses in both inpatient and outpatient settings play a critical role in cardiac rehabilitation post-MI education. This education can be enhanced by in-service education programs. For reference, copies of in-service modules can be kept in the cardiac unit. This form of self-instruction is an economical way of teaching with regard to time and resources and the nurses can participate in various workshop and conferences. It is beneficial for nurses to attain the most current knowledge to better treat their patients. Through these training programs, nurses acquire a positive attitude and develop a sound knowledge base, which they can use in clinical practice [17].

Nursing education: Given the constant change in health care trends, nursing education must emphasize disease prevention in addition to cures. An emphasis of preventative treatments empowers prospective nurses to be well prepared in the treatment of their patients. Training of Indian nurses includes basic cardiac care but should be updated to include post-MI cardiac rehabilitation information. While education should focus on prevention of cardiac disorders and specialty oriented courses are offered at the master level, training programs for nurses should be improved to provide better quality of care to the patient [5].

Nursing administration: The changing landscape of nursing care, including disease manifestations, ever increasing knowledge, and rapid technological advances warrants a need for participation by the administration to provide continuing education opportunities [7]. Administrative support is critical for the development of such educational materials; nursing personnel should be motivated to devote their time for continuing education courses and material through posters, pamphlets, planned teaching, and booklets on cardiac rehabilitation in post-MI patients. There is a genuine need for continuing education of nurses, particularly for those who are working in hospital departments dealing with the mothers in cardiac unit. In India currently, short-term education courses are conducted only sporadically for practicing nurses.

Nursing research: Though nursing research in cardiothoracic nursing field is still in its infancy in India, an increasing number of studies related to cardiac rehabilitation in post-MI patients have been undertaken by nurses at the masters and post-masters level in various Indian settings [7]. There is a great need for extensive research in cardiac rehabilitation to develop strategies for nurse education in cardiac units. Findings from these studies will serve as the foundation for education on cardiac rehabilitation in post-MI patients [17,22].

Future studies should be conducted to evaluate the effectiveness of an information booklet regarding cardiac rehabilitation in post-MI patients. A similar study should be repeated on a larger sample encompassing all staff nurses in a particular hospital. An evaluator study may be conducted to assess the knowledge of staff nurses. A study may be undertaken on staff nurses of different state to evaluate the effectiveness of the protocol on cardiac rehabilitation of post-MI patients.

5. Conclusion

The results from this study demonstrate the need for continuing education of nurses. While pre-test scores were not associated with age, gender, professional education or clinical experience, we found a significant increase in nurse

<p>| Table 6 – Association of professional education with pre-test knowledge scores (n = 60). |</p>
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Educational status</th>
<th>Knowledge score</th>
<th>Total</th>
<th>Degree of freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Poor</td>
<td>Average</td>
<td>Good</td>
</tr>
<tr>
<td>G.N.M.</td>
<td>32</td>
<td>4</td>
<td>1</td>
<td>37</td>
</tr>
<tr>
<td>P.B.B.Sc.</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>B.Sc.</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>12</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>$\chi^2 = 9.19$, $p &gt; 0.05$</td>
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</tbody>
</table>

G.N.M.: General Nursing Midwifery, P.B.B.Sc.; Post Basic Bachelor of Science, B.Sc.; Bachelor of Science in Nursing, M.Sc.; Master of Science in Nursing.
knowledge regarding cardiac rehabilitation in post-MI patients after nurses received the self-instructional module.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.ijnss.2015.07.004.

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