

Original article:

Phase-I cardiac rehabilitation practices among physiotherapists in INDIA - A survey

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Abstract:

Objective: To find out the current practice patterns of Physiotherapists in Phase I Cardiac Rehabilitation of patients following Cardiac Surgery (CABG/Valve Surgery). **Materials and Methods:** The cross sectional survey included 600 cardio-pulmonary physiotherapists working in Cardiac Care Unit, who filled questionnaires sent to them through e-mail. **Results:** 252 completed questionnaires were received back, the response rate being of 42 %, with a major portion of responses coming from Maharashtra, Karnataka and Andhra Pradesh. More than 80 % of physiotherapists assess and treat the patient Pre- Operatively. More than 90% of physiotherapists performed Cardiac Rehabilitation Post-Operatively. Cardiac Rehabilitation Treatment Techniques predominantly focused on Breathing Exercises (96.7%), Incentive Spirometry (91.1%), Coughing and Huffing (83.3%), Thoracic Expansion Exercises (82.13%), Positioning (71.16%), Percussion and Vibration (63.6%), Modified Postural Drainage (41.2%), active exercises of the upper limb (89.13%), and lower limb exercises (89.3%). Dangling the lower limb (69%) was started on Post –Operative day 2. Room and corridor mobilisation (73.8%) began on third Post-Operative day. 29.4% Stair case climbing was started on fourth post-operative day. 73.8% of patients practiced 6-minute walk test prior to discharge. Most commonly used sternal precautions were Supported Coughing (96.0%) and Lifting Restrictions (82.5%). **Conclusion:** Phase I cardiac rehabilitation adopted by physiotherapists for cardiac surgery patients involves treatment which mainly focused on cough and huff techniques, breathing exercises and thoracic expansion exercises. On Post-Operative day 2, dangling the lower limb and room ambulation started on third post-Operative day 3. The training for climbing stairs started on fourth post-operative day. The most commonly used sternal precautions were supported coughing and lifting restrictions whereas 6-minute walk test was use to assess exercise tolerance, prior to discharge

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Introduction

The patients are given chest Physiotherapy following cardiac Surgery (CABG/ valve surgery) to decrease or prevent the pulmonary complications after

surgery.¹ The treatment is initiated after extubating the patients in ICU and it is continued in the acute wards until the patients get discharged.^[2] The physiotherapy treatment given during hospital stay

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generally consists of exercises for relaxation, chest expansion; breathing exercises, cough and huff techniques, postural drainage therapy, walking and stair climbing.¹⁻⁴ The progressive ambulation and education to prepare them before returning home is part of acute physiotherapy management.² Although the value of post-operative chest physiotherapy is well established, there is limited information on the efficient and effective practices for mobilizing the patients during the first few days' after cardiac surgery.⁴

There is lack of evidence on the most effective physiotherapy practices for patients following cardiac surgery. In the absence of any such supporting evidence from literature, there were suggestions by experts to use lower grades of evidence.² Although, the clinical practice surveys do not provide research evidence, they are useful for accurate description of practice patterns. Therefore, it will be important for the therapists to know if their practices are according to the standard practices in cardiac rehabilitation.² Several surveys on chest physical therapy interventions were conducted on patients undergoing cardiac surgery in Australia, Brazil, Canada, Sweden, New Zealand, the United Kingdom and Greece. These studies have shown the variations in the application of treatment techniques among these countries in the pre and post-operative period.^{1, 5} However, there are no studies which have been conducted to find optimal chest physiotherapy care given to patient following Cardiac Surgery in India. To our knowledge, there exists no survey's discussing the Post-Operative Phase I Cardiac Rehabilitation practice following Cardiac Surgery (CABG/valve surgery). The study was aimed at analysing the current practice patterns among physiotherapists in Phase I Cardiac Rehabilitation following Cardiac Surgery (CABG/Valve Surgery).

Material and method

Content validation:

Seven Physiotherapists working in a Cardiac Care Unit, experts in the field of Cardio-Pulmonary Physiotherapy were given the "Current Practice patterns of Physiotherapists in Phase I Cardiac Rehabilitation following Cardiac Surgery (CABG/Valve Surgery)" questionnaire for content validation and accordingly the final questionnaire was prepared based on their reviews and suggestions.

Questionnaire:

The questionnaire consisted of three sections of question on general data, post-operative

physiotherapy treatment and sternal precautions. Information regarding routine physiotherapy interventions administered to patients undergoing cardiac surgery was collected using open ended but structured questions. Each questions had five responses "Always", "Frequently", "Sometimes", "Seldom" and "Never".

Study Procedure:

After obtaining approval from Institutional Ethics Committee, the list of hospitals were collected from the NABH [National Accreditation Board of Hospital and Healthcare Providers] and MCI [Medical Council of India] websites. Six hundred questionnaires were sent via email to physiotherapists working in cardiac rehabilitation units.

The hyperlink was sent to the participants with the informed consent form and subjects consenting to participate could access the questionnaire. To ensure a good response rate, a period of 2 weeks starting from the date of mailing given to the respondents to fill the questionnaire. On receiving no responses within the time, reminders were sent through phone calls or e-mails. The investigators waited for response for another 2 weeks after which non-respondents were excluded from the study.

Data analysis

To obtain descriptive summaries and frequencies, numerical coding of data was done and analysed using SPSS version 13. Frequency variables were merged for assessment and treatment of cardiac patients, to create three responses; "always or frequently", "sometimes" and "rarely or never"

Ethical clearance: After obtaining approval from Institutional Ethics Committee, this study was submitted for publication.

Results

Response:

600 questionnaires were mailed to physiotherapists working in cardiac rehabilitation units in various states across India, of which 252 completed questionnaires were returned. The responses were received from 12 states including Andhra Pradesh, Chandigarh, Chattisgarh, Delhi, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Uttar Pradesh. Thus the response rate for the survey was 42 % with the majority of respondents hailing from Maharashtra 92.5(36.5%), Karnataka 88(34.9%) and Andhra Pradesh 29.5(11.5%). Demographic details are mentioned in

Table 1. Phase I Cardiac rehabilitation, frequency and assessment of Physiotherapy in post-Operative days are mentioned in Table 2.

Phase I Cardiac Rehabilitation: Post-operative day 1

The frequency at which various cardiac rehabilitation techniques were used on the Post-Operative Day-1 is given in Table 3. 95.6% respondents performed cardiac rehabilitation in Post-Operative Day-1. Of these, >80 % respondents marked “always or frequently” for techniques such as breathing exercises (n=234[92.9%]), relaxation (n=217[86.1%]), incentive Spirometry (n=217[86.1%]), cough and huff techniques (n=202[80.2%]), upper Limb ROM exercises (n=210[83.3%]) and lower limb ROM exercises (n=209[82.9%]). Thoracic Expansion exercises were marked “always or frequently” by 69.8% (n=176) of the respondents.

Percussion and Vibration were used “always or frequently” by 59.5% (n=150) of the respondents and Positioning by 75% (n=189). The percentage of respondents using Modified Postural Drainage “always or frequently” were 35.7% (n=90). Dangle Mobilisation was marked “Seldom or Never” by 43.3 % (n= 109); Up to Chair Mobilisation was marked “Seldom or Never” by 59.5 % (n=150) and Sit to Stand Mobilisation was marked “Seldom or Never” by 71.0% (n=179) of the respondents.

Phase I Cardiac Rehabilitation: Post-Operative Day 2

The frequency with which different cardiac rehabilitation techniques were used in the Post-Operative Day-2 is given in Table 4. 99.2% respondents performed Day 2 cardiac rehabilitation. Of these, >80 % of respondents gave response of “ always or frequently” for different types of breathing exercises ([98.8%]n=249), relaxation techniques([85.1%]n=216), chest expansion exercises ([86.1%]n=217), incentive spirometry ([92.1%]n=232), cough and huff techniques([84.9%] n=214), upper limb ROM exercises ([89.7%]n=226) and lower limb ROM Exercises ([91.7%]n=231).

Percussion and vibration were practised “Always or Frequently” by 65 .5 % (n=165) of the respondents. Positioning was followed “Always or Frequently” by 71.8 % (n=181) of the respondents and Modified Postural Drainage by 42.1% (n=106). Dangle Mobilisation was practised “Always or frequently” only by 69.4% (n=175); Up to Chair Mobilisation was given “Always or frequently” by 56.7% (n=143)

and Sit to Stand Mobilisation was used “Always or Frequently” by 38.5% (n=97) of the respondents. Ambulation in the room was “Seldom or Never” given by 48.4 % (n=122) of the respondents. Ambulation in the corridor was marked “Seldom or Never” by 67.1% (n= 169) of the respondents.

Phase I Cardiac Rehabilitation: Post-operative day 3

The frequency of use of various cardiac rehabilitation techniques used on Post-Operative Day-3 is given in Table 5. 98.8% respondents performed Day 3 cardiac rehabilitation. Of these above 80 % of respondents responded with “ Always or Frequently” for techniques which included breathing exercises ([98.4%]n=248), relaxation ([81.0%]n=204), chest expansion exercises [90.5%](n=228) incentive spirometry ([95.2%]n=240), cough and huff techniques ([84.9%]n=214), upper limb rom exercises ([94.4%]n=238) and lower limb rom exercises([93.3%]n=235). Percussion and vibration were given “always or frequently” by 65.9% (n=166) of the respondents.

Positioning was used “Always or frequently” by 66.7% (n=168) of the respondents and Modified Postural Drainage by 46.0% (n=116). Dangle Mobilisation was practised “Always or frequently” by 73.4 % (n=185); Up to Chair Mobilisation was given “Always or frequently” by 84.9 % (n=214) and Sit to Stand Mobilisation was performed “Always or frequently” by 82.5% (n=208) of the respondents. Walking was practised “Always or frequently” by 82.5% (n=186) of the respondents. Stair Climbing was marked “Seldom or Never” by 65.5% (n=165) of the respondents.

Phase I Cardiac Rehabilitation: Mobilisation on Post-Operative days

Data pertaining to mobilisation of patients post-surgery is shown in Table-6. On Post-Operative day 2, the patient was instructed to do walking under supervision for 20 to 50 feet by 54.4 % (n=137). The patient was supervised to walk 60 to 70 feet by 9.1 % (n=23); 80 to 90 feet by 4.0% (n=10) and two times a day by 37.7 % (n=95). The patient was made to walk just once a day by 19.8% (n=50); thrice daily by 9.5% of physiotherapists (n=24) and four times a day by 1.2 % (n=3) of the respondents. On Post-operative day 3; the patient was made to walk a distance of 110 to 130 feet by 70.6% (n=176); 140 to 160 feet by 19.8% (n=50); more than 200 feet by 1.6% (n=4). The patient was made to walk a distance of 170 to

190 feet by 2.0% (n=5) as reported by respondents.

Ascending the staircase was initiated on the 5th Post-Operative day by 29.4 % (n= 74); on Post-Operative day 4 by 19.8 % (n= 50); on day 6th by 19.4% (n=49) and on the 7th Post-Operative day by 14.7 % (n=37) of the respondents. The graded functional evaluation prior to the discharge was done with 6-minute walk test by 73.8% (n=186); 2-minute walk test by 13.9% (n=35); shuttle walk test by 1.2 % (n=3) and 12 minute walk test by 8 % (n=2) of the respondents.

Phase I Cardiac Rehabilitation: the sternal Precautions

The sternal precautions are recommended for the healing period after surgery varied across phase in cardiac rehabilitation.(table 7). Sternal precaution during unilateral upper extremity rom exercises were given “always or frequently” by 60.7% (n= 153) of the respondents and bilateral upper extremity exercises by 73.4% (n=185). Pushing up from sitting position was used “always or frequently” by 46.4% (n=117) of the respondents. Supported coughing was encouraged “always or frequently” by 96.0% (n=242) of the respondents. Lifting weights was restricted “always or frequently” by 82.5% (n=208) of the respondents. Weight bearing through upper extremity was marked “always or frequently” by 43.3% (n= 109) of the respondents.

Discussion

The present study reported current practice patterns in Phase I cardiac rehabilitation following cardiac surgery in India. Following are the unique findings of the study:

- Phase I cardiac rehabilitation on Day 1 predominantly focused on breathing exercises, relaxation, incentive spirometry, cough and huff techniques and ROM exercises for the upper and lower limb.
- Day 2 of Phase 1 cardiac rehabilitation patient sitting with legs dangling at the edge of the bed.
- Mobilisation from bed to chair, sit to stand exercises and room mobilisation were started on post-operative Day 3 along with treatment techniques of Day 1 and Day 2 in phase I cardiac rehabilitation.
- Stair case climbing was started on post-operative Day 4 and Day 5. The frequently used functional evaluation test prior to discharge was 6 minute walk test.

- The most commonly used sternal precaution was supported coughing and bilateral upper extremity ROM exercises.

According to our study, only 80% of the respondents practiced pre-operative physiotherapy for patients after cardiac surgery. This is more than what is reported in countries like Sweden (88%) the United Kingdom (58%) Canada (39%) and Greece (53%) and less than in Australia and New Zealand (94%).^{5, 2, 6,-13}

According to our study, written physical therapy guidelines detailing the management of the cardiac surgery patient in the Cardiac Care Unit were used only by 76.6% of the respondents. Similar studies carried out in other countries showed that written physiotherapy guidelines were followed by 42% in Australia and New Zealand 72% in Sweden 63% in the United Kingdom 66% in Canada and 11% in Greece.^{3,6,2,1}

Our study showed that 97.8% of the respondents declared that they meet patients who are undergoing cardiac surgery routinely. The response rate in other countries was Australia and New Zealand (89%) Sweden (90%) the United Kingdom (95%) Canada (66%) and Greece (82%).^{3-5,1}

The current study shows that the patient received 3 treatment sessions a day by the physiotherapist during the first five days after surgery. Similar studies done in other countries showed that the frequency of treatment on post-operative days were 6 sessions in Australia and Greece^{1,3} 2 sessions of treatment in Sweden and the United Kingdom^{4,6} and only 1 session of treatment was received by patients in Canada.²

The breathing exercises are prescribed to patients with objective to improve the lung ventilation efficiency, gaseous exchange in the lung, improved diaphragmatic excursion and the mobilisation of secretions from the lungs.⁷⁻⁹ More than 90% of respondents in the present study practice breathing exercises in the first five post-operative days. According to the similar studies carried out in other countries, the breathing exercises were prescribed during the first five post-operative days following cardiac surgery by 98% in Australia and New Zealand 73% in Sweden 65% in the United Kingdom 100% in Canada and 82% in Greece.^{3,6,5,2,1}

Incentive Spirometry involves deep inspiration up to total lung capacity observed by visual feedback and this stimulates maximum sustained inspiration

and induces lung re-expansion^{10,11} According to our study, more than 80% of the respondents often recommended Incentive Spirometry postoperatively for cardiac surgery patients. In similar studies done on cardiac surgery patients undergoing Phase I Cardiac Rehabilitation, the usage of Incentive Spirometry was 63% in New Zealand & Australia, 33% in the United Kingdom, 17% in Sweden, 50% in Canada² and 80% in Greece.^{3,5,6,14}

To improve the mobility of the lower thorax, improve ventilation; help loosen the secretions; ease sternal circulation and healing Thoracic expansion exercises were given;⁷ The current study reported that more than 80% of the respondents practised thoracic mobility exercises on the first five post-operative days. Similar studies done in other countries reported that 63% in Australia 17% in Sweden 33% in the United Kingdom 50% in Canada and 80% in Greece practised thoracic expansion exercises on post-operative days following cardiac surgery.^{3,6,5,2,1}

Supported cough and huff techniques enhance the clearance of excess bronchial secretions, reduce the risk of atelectasis and pulmonary infection^[3,7] Our study reported that more than 80% of the respondents advise coughing and huffing. Similar studies done in other countries showed that Supported Coughing and Huffing practised during the first five post-operative days following cardiac surgery was 80% in Australia and New Zealand 70.75% in Sweden 83% in the United Kingdom 72% in Canada and 71% in Greece.^{3, 6, 5, 2, 1}

Percussion and vibration is given with the aim of dislodging or loosening bronchial secretions from the airways.⁷ The airway clearance techniques were commonly practised, 63.6% of physiotherapist's practised percussion and vibration on post-operative days after cardiac surgery. Similar studies done on cardiac surgery patients undergoing Phase I cardiac rehabilitation showed usage of Percussion and vibrations was 60% in New Zealand & Australia, 35% in the United Kingdom, 0% in Sweden and 63.7% in Greece.^{3,5,6,1}

Positioning promotes relaxation, reducing post-operative pain, helps in lung expansion and for draining of secretions.^{3,7} Our study reported that 71.16% of the respondents give positioning to the patient during postoperative days following cardiac surgery. Similar studies carried out in other countries showed that positioning practised during the first five post-operative days after cardiac surgery was 98%

in Australia and New Zealand 18% in Sweden 93% in the United Kingdom 6% in Canada and 37% in Greece.^{3,6,5,2,1}

Postural drainage therapy is commonly practiced to clear the secretions from lungs^[7] Our study reported that modified are postural drainage is given by 41% of the respondents on first five post-operative days following cardiac surgery. A similar study done in Greece showed that 34% of the respondents perform Modified postural drainage on post-operative days following cardiac surgery¹

The aim of the active exercises of upper limb (shoulder shrugging or shoulder circles, active exercises of the elbow and hand pumping exercises) are given to maintain joint range of motion and prevent joint problems in post-operative days.^[3] The current study shows that more than 90% of the respondents employ upper limb exercises. Similar studies done in other countries show that 98% in Australia & New Zealand 21.25% in Sweden 83% in the United Kingdom 89% in Canada and 23% in Greece utilize active exercises of the upper limb on Post-Operative days following cardiac surgery.^{3-5,2,1}

The ankle pumping exercises and heel slides exercises are continued are widely taught to cardiac surgery patients by the physiotherapist to prevent the risk of deep vein thrombosis and major complications such as pulmonary embolism.^{3,7} Our study showed that more than 90% of the respondents employed lower limb exercises for their treating patients in the first five post-operative days. Similar studies done in other countries showed that 83% in Australia and New Zealand 31% in Sweden 70% in the United Kingdom; 89% in Canada and 59% in Greece practice active exercises on the lower limb on post-operative days following cardiac surgery.^{3-5,2,1}

Early mobilisation results in enhancement of oxygen transport by eliciting cardio-pulmonary responses⁻³ The current study showed that bed side sitting was utilized by 69.4% of the respondents on the second post-operative day where as 84.9% employed chair sitting, 84.9% of respondents assisted the patients in standing and 73.8% of physiotherapist started room and corridor mobilisation on post-operative day 3. Stair case climbing was started on 4th post-operative day by more than 20% of the respondents. Similar studies reported that sit to stand mobilisation was initiated on the first post-operative day by 60% of physiotherapists and mobilisation like walking in the room and corridor was started on third post-

operative day by 49% of respondents in Greece.¹

Room mobilisation was started on post-operative day 2 by 17% of respondents and Corridor mobilisation was started on post-operative 2 by 50% of respondents in Canada. [2] In Sweden all physiotherapists mobilized their patients with sit to stand mobilisation on the first post-operative day, Room mobilisation was started by 79% of the physiotherapists and 93% of physiotherapists initiates Corridor mobilisation for the patients on third post-operative day.⁴

Most frequently used exercise tolerance test in post cardiac surgery is 6-minute walk test, which is employed by 73.8% of physiotherapists.¹² Similar studies done in other countries showed that the 6-minute walk test is used prior to discharge of the patient.

An excessive movement at the sternotomy site results in pain and discomfort secondary leading to a decreased inspiratory effort. So sternal precautions were advised for both sternal integrity and healing.¹³ Following cardiac surgery, during the first five post-operative days 96% physiotherapists practised supported Coughing and 73.4% of the respondents used the bilateral upper extremity range of motion exercises as a part of sternal precautions as where 82.5% physiotherapists practised weight-lifting restrictions. Similar studies carried out in other countries showed that 3% and 41% in Sweden 44% and 33% in Canada, and 22% and 24% in Greece of physiotherapists practise bilateral upper extremity ROM exercises and weight-lifting restrictions, respectively.^{4,2,1,15}

The response rate was as low as 42%. Therefore, this may not reflect the practice patterns of physiotherapists following cardiac surgery across India. The decision making process employed by the physiotherapists who responded to the questionnaire was not explored. Respondents may have answered the questionnaire according to what they thought and so the responses may not be representative of actual practice. Future research should be focused more on the specific assessment and treatment techniques used by physiotherapists on cardiac surgery patients during pre- and post- operative day.

Conclusion

The routine use of breathing exercises, thoracic expansion exercises, cough and huff exercises techniques were started on post-operative day 1 by post-operative day 2 dangling of lower limb at edge of the bed was started along with exercises done on

post-operative day 1.

Mobilisation, which includes chair sitting, room, and corridor mobilisation started on post-operative day 3 and stair case climbing was started on fourth post-operative day. The most commonly practised sternal precautions were supported coughing, weight lifting restrictions and bilateral upper extremity range of motion exercises during the post-operative days.

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The data used to support the findings of this study are available from the corresponding author upon request

Author contributions: All authors contributed significantly in study design, data gathering and manuscript preparation and editing.

Table 1: Demographic Data

| Variables | Responses | Frequency (n=252) n (%) |
|---|---------------|-------------------------|
| Number of beds in practicing hospital | None | 25(9.9) |
| | < 100 | 12(4.8) |
| | 100-200 | 47(18.7) |
| | 200-500 | 98(38.9) |
| | >500 | 70(27.8) |
| Qualification | B.P.T. | 143(56.7) |
| | D.P.T. | 2(0.8) |
| | M.P.T. | 105(41.7) |
| | Ph.D. | 2(0.8) |
| Working Experience as a Physiotherapist | Upto 1 year | 94(37.3) |
| | 1-5 years | 71(28.2) |
| | >= 5 Years | 29(11.5) |
| | <=6 months | 58(23.0) |
| Working Experience in CCU | Upto 1 year | 103 (40.9) |
| | 1-5 years | 12(4.8) |
| | >= 5 Years | 53(21.0) |
| | <=6 months | 84(33.3) |
| Common Cardiac Surgery | Both | 146(57.9) |
| | CABG | 102(40.5) |
| | Valve Surgery | 4(1.6) |

| Variables | Responses | Frequency (n=252) n (%) |
|--|------------------|-------------------------|
| Cardiac surgery/day | >= 10 Operations | 4(1.6) |
| | 1-3 Operations | 186(73.8) |
| | 4-6 Operations | 50(19.8) |
| | 7-9 Operations | 12(4.8) |
| Length of stay in hospitals for cardiac surgery patients | >= 10 days | 49(19.4) |
| | 3-4 days | 13(5.2) |
| | 5-6 days | 75(29.8) |
| | 7-8 days | 115(45.6) |
| Physiotherapy guidelines Or Protocol | No | 59(23.4) |
| | Yes | 193(76.6) |
| Preoperatively Physiotherapy | No | 30(11.9) |
| | Yes | 222(88.1) |

Table 2: Phase I Cardiac Rehabilitation: Frequency and assessment of Physiotherapy in Post-Operative days.

| Variables | Responses | POD -1 (n=252) n(%) | POD- 2 (n=252) n(%) | POD-3 (n=252) n(%) |
|---|-------------|---------------------|---------------------|--------------------|
| Is physiotherapy involved? | No | 11(4.4) | 2(8) | 3(1.2) |
| | Yes | 241(95.6) | 250(99.2) | 249(98.8) |
| Physiotherapist takes assessment on respective days | No | 23(9.1) | 15(6.0) | 26(10.3) |
| | Yes | 229(90.9) | 237(94.0) | 226(89.7) |
| Frequency of Physiotherapy Interventions | 1 times | 38(15.1) | 16(6.3) | 25(9.9) |
| | 2 times | 79(31.3) | 92(36.5) | 98(38.9) |
| | 3 times | 114(45.2) | 128(50.8) | 117(46.4) |
| | 4 times | 13(5.2) | 12(4.8) | 10(4.0) |
| | No response | 8(3.2) | 4(1.6) | 2(0.8) |

N: number; %: percent

Rehabilitation: Post-Operative Day 1

| SR. NO | Physiotherapy | Always Or Frequently n (%) | Sometimes n (%) | Seldom Or Never n (%) |
|--------|------------------------------|----------------------------|-----------------|-----------------------|
| 1. | Breathing techniques | 234(92.9%) | 4(1.6%) | 14(5.6%) |
| 2. | Relaxation techniques | 217(86.1%) | 15(6.0%) | 20(7.9%) |
| 3. | Thoracic Expansion Exercises | 176(69.8%) | 27(10.7%) | 49(19.4%) |
| 4. | Incentive Spirometry | 217(86.1%) | 10(4.0%) | 25(9.9%) |
| 5. | Coughing & Huffing technique | 202(80.2%) | 32(12.7%) | 18(7.1%) |
| 6. | Modified Postural Drainage | 90(35.7%) | 60(23.8%) | 102(40.5%) |
| 7. | Percussion and Vibration | 150(59.5%) | 50(19.8%) | 52(20.6%) |
| 8. | Positioning | 189(75%) | 22(8.7%) | 41(16.3%) |
| 9. | ROM Exercises | 210(83.3%) | 15(6.0%) | 27(10.7%) |
| | 1. Upper limb | | | |
| | 2. Lower limb | | | |
| 10. | Mobilisation | 101(40.1%) | 42(16.7%) | 109(43.3%) |
| | 1. Dangle | | | |
| | 2. Upto to chair | | | |
| | 3. Sit to Stand | | | |

N: number; %: percent

Table 4: Phase I Cardiac rehabilitation: Post-Operative Day 2

| SR. NO | Physiotherapy | Always Or Frequently n(%) | Sometimes n(%) | Seldom Or Never n(%) |
|--------|------------------------------|---------------------------|----------------|----------------------|
| 1. | Breathing techniques | 249(98.8%) | 2(.8%) | 1(0.4%) |
| 2. | Relaxation Techniques | 216(85.7%) | 22(8.7%) | 14(5.6%) |
| 3. | Expansion Exercises | 217(86.1%) | 9(3.6%) | 26(10.3%) |
| 4. | Incentive Spirometry | 232(92.1%) | 8(3.2%) | 12(4.8%) |
| 5. | Coughing & Huffing Technique | 214(84.9%) | 23(9.1%) | 15(6.0%) |
| 6. | Modified Postural Drainage | 106(42.1%) | 50(19.8%) | 96(38.1%) |
| 7. | Percussion and Vibration | 165(65.5%) | 53(21.0%) | 34(13.5%) |

| SR. NO | Physiotherapy | Always Or Frequently n(%) | Sometimes n(%) | Seldom Or Never n(%) |
|--------|----------------------------|---------------------------|----------------|----------------------|
| 8. | Positioning | 181(71.8%) | 26(10.3%) | 45(17.9%) |
| 9. | ROM Exercises | | | |
| | 1. Upper limb | 226(89.7%) | 11(4.4%) | 15(6.0%) |
| | 2. Lower limb | 231(91.7%) | 6 (2.4%) | 15(6.0%) |
| 10. | Mobilisation | | | |
| | 1. Dangle | 175(69.4%) | 25(9.9%) | 52(20.6%) |
| | 2. Upto to chair | 143(56.7%) | 41(16.3%) | 68(27.0%) |
| | 3. Sit to Stand | 97(38.5%) | 33(13.1%) | 122(48.4%) |
| 11. | Ambulation in the Room | 87 (34.5%) | 43(17.1%) | 122(48.4%) |
| 12. | Ambulation in the corridor | 41(16.3%) | 42(16.7%) | 169(67.1%) |

N: number; %: percent

Table 5: Phase I Cardiac Rehabilitation: Post-Operative Day 3

| SR. NO | Physiotherapy | Always Or Frequently n(%) | Sometimes n(%) | Seldom Or Never n(%) |
|--------|------------------------------|---------------------------|----------------|----------------------|
| 1. | Breathing techniques | 248(98.4%) | 1(0.4%) | 3(1.2%) |
| 2. | Relaxation techniques | 204(81.0%) | 29(11.5%) | 19(7.5%) |
| 3. | Expansion Exercises | 228(90.5%) | 10(4.0%) | 14(5.6%) |
| 4. | Incentive Spirometry | 240(95.2%) | 6(2.4%) | 6(2.4%) |
| 5. | Coughing & huffing technique | 214(84.9%) | 24(9.5%) | 14(5.6%) |
| 6. | Modified Postural Drainage | 116(46.0%) | 36(14.3%) | 100(39.7%) |
| 7. | Percussion & Vibration | 166(65.9%) | 38(15.1%) | 48(19.0%) |
| 8. | Positioning | 168(66.7%) | 33(13.1%) | 51(20.2%) |
| 9. | ROM Exercises | | | |
| | 1. Upper limb | 238(94.4%) | 6(2.4%) | 8(3.2%) |
| | 2. Lower limb | 235(93.3%) | 6 (2.4%) | 11(4.4%) |
| 10. | Mobilisation | | | |
| | 1. Dangle | 185(73.4%) | 23(9.1%) | 44(17.5%) |
| | 2. Upto to chair | 214(84.9%) | 18(7.1%) | 20(7.9%) |
| | 3. Sit to Stand | 208(82.5%) | 20(7.9%) | 24(9.5%) |
| 11. | Stair Climbing | 49 (19.4%) | 38(15.1%) | 165(65.5%) |
| 12. | Walking | 186(73.8%) | 28(9.5%) | 42(16.7%) |

N: number; %: percent

Table 6: Phase I Cardiac Rehabilitation: Mobilisation on Post-Operative Days

| Post-operative days | Questions | Responses | Frequency (n=252) n(%) |
|---------------------|---|---------------------|------------------------|
| POD-2 | Distance patient is made to walk | 20-50 feet | 137(54.4) |
| | | 60-70 feet | 23(9.1) |
| | | 80-90 feet | 10(4.0) |
| | | No response | 82(32.5) |
| | Frequency of ambulation | 1 times | 50(19.8) |
| | | 2 times | 95(37.7) |
| | | 3 times | 24(9.5) |
| | | 4 times | 3(1.2) |
| | | No response | 80(31.7) |
| POD -3 | Distance patient is made to walk | >= 200 feet | 4(1.6) |
| | | 110-130 feet | 178(70.6) |
| | | 140-160 feet | 50(19.8) |
| | | 170-190 feet | 5(2.0) |
| | | No response | 15(6.0) |
| | Stair case climbing | 4 th day | 50(19.8) |
| | | 5 th day | 74(29.4) |
| | | 6 th day | 49(19.4) |
| | | 7 th day | 37(14.7) |
| | | No response | 42(16.7) |
| | Functional evaluation test prior to discharge | 12 minute walk test | 2(8) |
| | | 2 minute walk test | 35(13.9) |
| | | 6 minute walk test | 186(73.8) |
| | | Shuttle walk test | 3(1.2) |
| | | No response | 26(10.3) |

Table 7: Phase I Cardiac Rehabilitation: Sternal Precautions

| Techniques | Always or Frequently n (%) | Sometimes n(%) | Seldom Or Never n(%) |
|--|----------------------------|----------------|----------------------|
| Unilateral Upper Extremity Range Of Motion Exercises | 153(60.7) | 39(15.5) | 60(23.8) |
| Bilateral Upper Extremity Range Of Motion Exercises | 185(73.4) | 28(11.1) | 39(15.5) |
| Pushing up from Sitting Using Upper Extremity | 117(46.4) | 55(21.8) | 80(31.7) |
| Supported Coughing | 242(96.0) | 2(0.8) | 8(3.2) |
| Lifting Restrictions | 208(82.5) | 11(4.4) | 33(13.1) |
| Weight Bearing through Upper Extremity | 109(43.3) | 25(9.9) | 118(46.8) |

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