Feasibility of a Multi-State Outcomes Program for Cardiopulmonary Rehabilitation

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Abstract One

Purpose: Outcomes validate program performance and patient benefits received from cardiac and pulmonary rehabilitation. However, outcomes have little meaning without test standardization and the ability to benchmark data with other programs. The purpose of this paper is to demonstrate the feasibility for measuring standardized outcomes in a large number of rehabilitation programs.

Methods: The subjects included 928 cardiac and 222 pulmonary patients from 35 cardiac and 31 pulmonary rehabilitation programs. The SF-36™ Health Survey, patient knowledge test, and Six-minute Distance Walk were administered before and after completion of the rehabilitation program. The patients completed rehabilitation according to the program guidelines at their respective site.

Results: Significant ($p<.05$) improvements were demonstrated for cardiac and pulmonary rehabilitation in each of the eight health concepts within the SF-36™. In addition, patient knowledge and distance walked significantly ($p<.05$) improved for both cardiac and pulmonary rehabilitation.

Conclusions: While this study does not document the effectiveness of rehabilitation for patients, it does demonstrate that the collection and analysis of standardized outcomes among many cardiac and pulmonary rehabilitation sites is feasible.

Abstract Two

The Indiana Society of Cardiovascular and Pulmonary Rehabilitation Outcomes Program provides standardized tools to measure outcomes and the opportunity to benchmark program performance with other cardiac and pulmonary programs. Outcome data collected from rehabilitation programs during the first year demonstrated significant ($p<.05$) improvements in each of the eight health concepts within the SF-36™, patient knowledge and distance walked for both cardiac and pulmonary rehabilitation. While this study does not document the effectiveness of rehabilitation for patients, it does demonstrate the feasibility for the collection and analysis of outcomes at multiple cardiac and pulmonary rehabilitation sites.

Introduction

For years, obvious clinical improvement recognized by both the patient and the clinician has not been documented in the medical field. Positive responses to “How do you feel?” have been sufficient to identify successful treatment. Many clinicians feel documentation of patient improvement is not necessary. While it is relatively easy to convince oneself of this patient improvement, it is another matter to convince someone else of the same improvement without the availability of quantitative data. For example, consider, the qualitative comment that a patient has “improved physical function,” versus quantitative data that “physical function increased 10 METs.” While both versions convey valuable clinical information, only the quantitative data allows all rehabilitation clinicians to recognize patient improvement. Quantitative data allows the comparison of different rehabilitation patients and programs. This same quantitative approach allows the comparison from one point in time to another for the same patient or rehabilitation program. Quantitative data also provides the means for program performance review and analysis by other stakeholders, including other healthcare providers and third party payers.[1]

As managed care continues to grow, cardiac and pulmonary rehabilitation programs will be asked to "prove" their worth. Outcomes are the tools to “prove” or validate program performance and the benefits patients receive from program participation. In addition, outcome measurement and reporting demonstrates accountability for the quality of patient care. Across the nation, some programs are collecting outcome data in an effort to demonstrate and report program effectiveness. However, this data has little meaning without test standardization and the ability to benchmark data with other programs. [2,3]

To meet this standardization and benchmarking challenge the Indiana Society of Cardiovascular and Pulmonary Rehabilitation (ISCVPR) initiated a comprehensive and ongoing outcomes program. The ISCVPR Outcomes Program provides cardiac and pulmonary rehabilitation programs with the tools to measure outcomes and the opportunity to benchmark program performance with other programs.[4] The outcomes, which will be measured over five years, include many parameters that fall into the clinical, behavioral, health and economic outcome domains. The outcomes program began in June of 1997 and has rapidly grown to include programs throughout the United States. This paper examines the feasibility of standardized outcome measurement, analysis and reporting among a large number of rehabilitation programs. For the purpose of benchmarking, pre and post rehabilitation outcome data collected over the first year is presented. Specifically, data from the SF-36™ Health Survey (SF-36™), patient knowledge tests, and Six-minute Distance Walk (6MDW) are reported.

Pilot Study

In December of 1995 the Northeast Network of the ISCVPR began selecting tools and developing guidelines for the collection of outcomes in cardiac and pulmonary rehabilitation. The primary goal at that time was to demonstrate for the Indiana Medicare Intermediary that 36 rehabilitation sessions provided greater benefit to the patient than the 12 sessions they reimbursed for cardiac rehabilitation.

Tools for the pilot study were selected based on the following recommendations from the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) Outcomes Committee:[5]

- Outcome measurements should be integrated into routine clinical practice.

- The test should be at low or no cost to the patient.
- The tools selected should provide relevant and meaningful results.
- The testing protocols should be easy to administer and directions should be understandable to the patient and clinician.
- The tools should produce the same result when administered to the same patient or when administered by different clinicians.
- The tools should be valid measures of the desired characteristic.
- The tools should be sensitive enough to measure the changes resulting from programs of intervention.

In addition to the AACVPR selection guidelines, the SF-36™ Health Survey was selected because it is widely used and recognized among healthcare payers. While treadmill stress testing is the gold standard,[10] the six-minute distance walk provided a low cost and easily administered alternative test of physical function. In addition to measuring quality of life and physical function, it was felt that patient knowledge tests provided a means to examine the effects of patient education. Additional outcome measures were included through patient self-reporting, review of medical records, or additional laboratory testing.

By July of 1996, the six-month pilot study was initiated to test the practical application of these outcome tools and refine program guidelines. The pilot study was funded in part by an affiliate grant from the AACVPR. Following the pilot study, appropriate changes were made to the program guidelines and an implementation plan was formulated to facilitate the initiation of a statewide outcomes project. As recommended by the Indiana Outcomes Committee, the ISCVPR Board of Directors endorsed these tools for use in a statewide program measuring outcomes in cardiac and pulmonary rehabilitation.

Methods

During the initial implementation stage of the outcomes program, twelve training workshops were provided. These workshops were attended by 257 cardiac and pulmonary rehabilitation clinicians. The ISCVPR Outcomes Program Manual provides standardized guidelines for the collection of outcome data.[4] This manual was distributed at the workshops, via the Internet at http://www.odms.net/ and was included in the Outcome Data Management System™ software.[5] Additional questions concerning test administration and data collection were directed to the ISCVPR Outcomes Committee Chairperson.

The subjects included 928 cardiac and 222 pulmonary patients who participated in rehabilitation at 35 cardiac and 31 pulmonary programs. All programs volunteered to participate in the ISCVPR Outcomes Program. Each program selected some or all of the ISCVPR Outcome Program's tools to be administered to all patients participating in their rehabilitation program. If selected by the program, the patients completed a health survey, knowledge test and six-minute distance walk prior to beginning the rehabilitation program and again upon completion of the program. The outcome tools are re-administered at 6-months, 1, 2, 3, and 5 years. All follow-up test dates are based on the patent's entry date into rehabilitation. Table 1 provides demographic information for the cardiac and pulmonary programs and patients. Each patient completed rehabilitation according to the program guidelines at their respective site. The average number of rehabilitation sessions was 18 for cardiac and 26 for pulmonary rehabilitation. These sessions occurred over an average of 60 days for cardiac patients and 89 days for pulmonary patients.

Health Survey

The SF-36™ Health Survey[6] was administered before any interaction between the patient and the rehabilitation provider. The patient's health, health history, or emotions were not discussed with them before they filled out the survey and only the rehabilitation patient was permitted to answer the survey. The patient did not receive help from their spouses or family members. A translator was used if the patient did not speak English. If the patient was unable to read, the survey was given using the interviewer-administered script. It was explained to the patient that this survey was given to help gain a better understanding about his or her general health. Patients were reminded that this was not a test and there were no right or wrong answers. The patients chose the answer that best represented the way they felt. If the patient did not understand a particular item, the question was read to them verbatim, but not rephrased. When the patient returned the survey, it was carefully checked to see that it was complete. If it was not, the patient was encouraged to answer the remaining questions. The SF-36™ was scored using a algorithm provided by the Outcome Data Management System™ software package from Orion Software Development.[5] This scoring algorithm was licensed from the Medical Outcomes Trust.

Patient Knowledge Test

The Pulmonary Rehabilitation Health Knowledge Test [7] and Cardiac Rehabilitation Knowledge Test [3] were administered after the completion of the SF-36™. Like the health survey, only the patient was permitted to complete the knowledge test. It was explained to the patient that the test was voluntary, but that it provided helpful information regarding the quality of the education provided by the rehabilitation program. The same standards for test administration were used as for the SF-36™. When the patient returned the knowledge test, it was carefully checked to see

that the test had been completed. If it was not, the patient was encouraged to answer the remaining questions. The test was scored using an answer key. Unanswered questions were counted as wrong. The number of correct answers was recorded.

Six -minute Distance Walk

The Six-minute Distance Walk[4] (6MDW) was administered prior to or at the beginning of the first exercise session of the rehabilitation program and at the last exercise session of the program. Walks took place at about the same time of day, at least two hours following a meal and were the first activity of the exercise session. The test was administered in a suitable walking area like a quiet indoor hallway that was at least 100 feet in length. Patients with musculoskeletal problems that preclude walking such as intermittent claudication, paralysis, and pain were excluded from the test.

Prior to the walk, the patient's height and weight were measured and each patient rested in a sitting position for five minutes. After this rest period, blood pressure and heart rate were measured for all patients. Pulmonary patients also had oxygen saturation (SaO_2) measured. The patients were given specific instructions on how to perform the 6MDW. During the walk, specific words of encouragement were provided at 30-second intervals. The monitor walked behind the patient so as not to influence the patient's pace. Patients were told when 2, 4, and 6 minutes (stop) had elapsed. Pulmonary patients had SaO_2 monitored continuously during the test. If SaO_2 fell below 80%, the test was discontinued. The lowest SaO_2 observed during the test was recorded.

Immediately following completion of the walking test, the patients sat down and were evaluated for peak exercise data. This data included heart rate, blood pressure, Rating of Perceived Exertion (RPE) and total distance walked in feet for cardiac patients. Heart rate, blood pressure, SaO_2, Rating of Perceived Dyspnea (RPD) and total distance walked in feet were measured for pulmonary patients. RPE and RPD evaluated maximal effort by the patient. After the patient had rested for exactly five minutes, recovery heart rate, blood pressure and SaO_2 (pulmonary patients only) were measured.

Lipid Profiles

Lipid profiles, including Total Cholesterol, Low Density Lipoproteins (LDL), High Density Lipoproteins (HDL) and Triglycerides were collected in some cardiac programs. If these laboratory tests had been performed within six months prior to the start of the rehabilitation program they were included in the pre program data. Some programs provided these laboratory tests at entry into the program. At the completion of the rehabilitation program these laboratory tests were repeated and recorded.

Data Collection

Patient data was transferred to the state database through one of two ways. The majority of programs used the clinic edition of the Outcome Data Management System™ software package from Orion Software Development.[5] The challenges of collecting and analyzing data during the pilot study lead to the development of the Outcomes Data Management System™. This software application allowed clinics to enter and analyze outcome data on-site and to export to the state database via floppy disk or the Internet. Some programs submitted data in hardcopy format and

this data was entered by hand into the state database. All data was screened via computer macro to meet pre-determined value ranges. Obvious data errors were omitted from the database on a field by field basis. Values lying outside the data range were subject to confirmation from the collecting rehabilitation program.

Results

The pre and post rehabilitation data presented were collected between July of 1997 and September of 1998 and are not inclusive of all the outcomes measured as a part of the ISCVPR Outcomes Program. Additional outcomes measured include: smoking and smoking cessation, diet compliance, prescribed medications and medication compliance, exercise program adherence, medical system utilization, and patient satisfaction. While their inclusion is important the magnitude of this study warrants their reporting under separate title.

Statistical Analysis

Comparison was a fundamental issue in the design of this study. Commonly, this type of study design is thought to have independent samples but that is not the case. If the samples are taken from different populations, and if there are not connections between the elements of one sample and those of the other, the independence assumption should be valid. But if the two measurements are taken on the same sample at different times or if there is any connection between elements of the samples, the two-sample *t* test, for example, is not appropriate. Therefore, any time you have any matching up or pairing of entities in two samples, as in "before" and "after" measurements on the same individuals, other methods of analysis must be used.

This study employs methods known as paired-sample analysis. The advantage of pairing observations is the control of variability that would otherwise obscure a real difference in means. In this paired-sample analysis, one can calculate the difference in an outcome measure between the two evaluations for the same patient, individual variability in observation cancels out the difference. Therefore, the individual-variability factor does not cause random variability in the paired-sample experiment.

Paired-sample methods involve calculating all differences of matched scores and then applying single-sample methods to the resulting sample of differences. The choice of the appropriate paired-sample test was determined by the distribution of the data. If the distribution of differences is roughly normal, the *t* test statistic should be used. If the distribution of difference is symmetric, the signed-rank test may be more powerful. All significance data presented in this document followed the *t* test statistic, although both methods provided similar conclusions.

Health Survey

The eight health concepts within the SF-36™ showed significant ($p<.05$) increases for both cardiac and pulmonary rehabilitation. The number of subjects, average change in scores form pre-program to post-program, standard deviation and level of confidence associated with each health concept are provided in Table 2. The average change in health concept scores from pre-program to post-program testing ranged from 4 to 37 points for cardiac programs and from 5 to 22 points for pulmonary programs.

Patient Knowledge Test

Patient knowledge demonstrated through the administration of the pre-program and post-program knowledge tests showed a significant ($p<.05$) increase in the average number of correct answers for both cardiac and pulmonary rehabilitation. Cardiac patients demonstrated a 3-point increase in the number of correct answers on the 40-question cardiac knowledge test. The average test score before cardiac rehabilitation was 29 correct answers. On average, pulmonary patients answered 23 of 40 questions correct before rehabilitation. Upon completion of the program, pulmonary patients had increased their average number of correct answers on pulmonary knowledge test by 6 questions. (Table 3)

Six-minute Distance Walk

Resting data was taken after a five-minute rest period and prior to the administration of the six-minute walk. Table 4 provides resting data for cardiac and pulmonary programs. Resting data measured for cardiac patients included weight, heart rate and blood pressure. Heart rate and diastolic blood pressure demonstrated significant ($p<.05$) changes from pre-program to post-program testing. Body weight remained unchanged for cardiac rehabilitation. Resting heart rate decreased 1 beat per minute while mean diastolic blood pressure decreased 2 mm Hg. Body weight, resting heart rate, blood pressure, RPD, SaO_2 and oxygen flow rate were examined as resting data for pulmonary patients. Systolic and diastolic blood pressure demonstrated significant ($p<.05$) changes from pre-program to post-program testing. Average systolic blood pressure decreased 2 mm Hg and diastolic blood pressure decreased 4 mm Hg from pre to post rehabilitation. Body weight remained unchanged for pulmonary rehabilitation.

Heart rate, blood pressure, and RPE were measured as peak data for cardiac patients while heart rate, blood pressure, oxygen saturation and RPD were measured as peak data for pulmonary patients. Distance walked during the six-minute testing period was measured in feet. Peak data was taken immediately upon completion of the six-minute. Table 4 also provides peak data for cardiac and pulmonary rehabilitation. Both cardiac and pulmonary rehabilitation demonstrated a significant ($p<.05$) increase in distance walked. Cardiac rehabilitation increased distance walked 319 feet while pulmonary rehabilitation increased distance walked 189 feet. Cardiac patients also experienced significant ($p<.05$) increases in heart rate (3 bpm) and systolic blood pressure (3 mm Hg). The changes for diastolic blood pressure and RPE were statistically inconclusive. Peak systolic blood pressure (-3 mm Hg), diastolic blood pressure (-4 mm Hg), and RPD (-0.3 points) decreased from pre-program to post-program testing for pulmonary patients while peak heart rate and SaO_2 were statistically inconclusive.

Lipids

Table 5 contains lipid profile data for cardiac rehabilitation. Total Cholesterol, Low Density Lipoproteins, and Triglycerides showed significant ($p<.05$) decrease from pre to post cardiac rehabilitation testing. The decrease in High Density Lipoproteins was statistically inconclusive.

Discussion

The present study indicates that cardiac and pulmonary rehabilitation outcomes can be measured through the SF-36™ Health Survey, patient knowledge tests and the Six Minute Distance Walk. The data presented represents mean patient outcomes associated with rehabilitation program participation. No effort has been made in this article to support or conclude that patient

participation in rehabilitation is more effective than non-participation. Research regarding the appropriateness of cardiac rehabilitation and its effects on patients have been summarized by the Agency for Health Care Policy and Research (AHCPR).[9] The authors are unaware of a similar summary for pulmonary rehabilitation. However, Dr. John E. Hodgkin has compiled a substantial bibliography of outcome studies in pulmonary rehabilitation.

Measuring rehabilitation program outcomes in terms of changes in the patient's quality of life continues to gain popularity. The data presented here confirms positive changes in patient reported quality of life through rehabilitation. While there may be more specific and sensitive tools to measure quality of life in select populations, the SF-36™ Health Survey was selected and used because it is a well recognized measure of patient functioning and well-being among health care providers. As a result of this tool familiarity, this data is more readily accepted and credible when data is reported to these groups.

Patient education is an important component of cardiac and pulmonary rehabilitation. Measuring improvement in patient knowledge may indirectly measure the effectiveness of the rehabilitation program's education component. Increased patient knowledge might ultimately influence lifestyle and behavior modification. The Pulmonary Rehabilitation Health Knowledge Test has been tested as a reliable outcome tool.[7] Similar testing has not been completed on the ISCVPR Cardiac Rehabilitation Knowledge Test. While both tests showed increases in patient knowledge it is unclear how much improvement should be expected from education during rehabilitation. Further investigation regarding education and behavior modification in cardiac and pulmonary rehabilitation is warranted.

Exercise is the major component of both cardiac and pulmonary rehabilitation. It seems reasonable to assume that physical function and other resting and recovery measures would improve with prescribed exercise. Some improvements were demonstrated through the 6MDW. The individual exercise prescription followed by each program is unclear. Frequency of exercise has been examined through many research studies. As a result of this research, the ACSM has developed guidelines that call for 3 to 5 days of exercise each week. All 35 cardiac and 27 of the 31 pulmonary programs indicated that their patients exercised three days per week in the rehabilitation program. The other four pulmonary programs indicated their patients exercised two days per week in the program. Based on the program days and number of exercise sessions presented in Table 1, one might conclude that the average cardiac rehabilitation patient exercised once every 3.3 days and the pulmonary rehabilitation patient exercised once every 3.4 days. This appears to indicate that the average exercise frequency among rehabilitation programs is only two days per week. Thus the average rehabilitation program failed to meet their prescription for exercise frequency and the minimum guidelines suggested by the ACSM. It is not known whether rehabilitation patients participated in exercise outside of the rehabilitation program. Obtaining prescribed exercise frequency or improving rehabilitation program attendance might result in greater improvement in distance walked.

The cost associated with implementation of an outcome program is of concern to all rehabilitation clinicians. When outcome measurement is fully integrated into the clinical routine additional program cost is minimized. The cost of questionnaires are minimal compared to laboratory and diagnostic tests. Never the less some cost is incurred. Additional staff time may

be the largest cost incurred. It is estimated, through time studies, that when the 6MDW is integrated into the rehabilitation session and the administration of patient questionnaires are in close proximity to the exercise area the actual additional staff time required per patient may be less than 30 minutes. This time is inclusive of data entry into a computer system.

While a computer system and software was not required for the ISCVPR Outcomes Program this represents the single largest purchase for tracking outcomes. The Outcome Data Management Software™ ($450) provides the means to track, analyze and report outcomes while enhancing program marketing and continuous quality improvement. A Microsoft Windows-based personal computer capable of running this software can be purchased for less than $1000. This hardware and software greatly reduces the staff time associated with outcome measurement and is highly recommended by programs using this method. The software for benchmarking program performance was donated to the ISCVPR by Orion Software Development in exchange for word of mouth marketing to participating programs.

Conclusion

Collecting and analyzing information on the benefits patients' experience from participating in cardiac and pulmonary rehabilitation is invaluable in many ways. Outcome data can be used to: 1) Show potential patients how rehabilitation improves their quality of life quantitatively. This helps the clinician and patient focus on the health benefits of behavior change, education and exercise. 2) Focus on the quantitative clinical outcomes experienced by patients when rehabilitation professionals present program information to referring physicians. 3) Demonstrate to hospital administrators and department managers how beneficial the rehabilitation program is

for improving the health of patients in the community. 4) Clarify for managed care groups and insurance companies the medical benefits and subsequent cost savings of treating their insured members. 5) Contribute to a statewide or nationwide database capable of benchmarking the best practices in cardiac and pulmonary rehabilitation. The information that rehabilitation programs contribute can be used to dramatically improve the performance of rehabilitation programs and ultimately enhance patient outcomes.

Collecting patient and program outcomes is recommended by both the American Association of Cardiovascular and Pulmonary Rehabilitation[11,12] and the Joint Commission on the Accreditation of Hospital Organizations. This information, when collected, analyzed and reported documents individual patient progress and overall program effectiveness. While research on the effectiveness of cardiac and pulmonary rehabilitation should continue to be encouraged, the importance of program outcomes should not be overlooked. The incorporation of standardized program outcome measures in clinical programs across the country is feasible and enables the process of benchmarking. Benchmarking program performance will help to determine the best clinical practice methods in cardiac and pulmonary rehabilitation and encourage more effective methods and higher quality patient care in every rehabilitation program.

Author's Note

The data presented in this article can be used to benchmark rehabilitation outcomes. Benchmarking is appropriate only when standardized tests are administered at predetermined intervals. The ISCVPR Outcomes Program has standardized methodology to collect outcome data, which makes benchmarking possible. The process of benchmarking data represents the process of discovering the best practices in clinical rehabilitation. Over 150 cardiac and 120 pulmonary rehabilitation programs from across the nation are currently participating in the ISCVPR Outcomes Program. It is apparent that additional data collection and analysis will aid the discovery process and lead to continuous quality improvement for all cardiac and pulmonary rehabilitation programs. The ISCVPR invites and encourages outcome researchers to participate in the analysis and reporting of rehabilitation outcomes collected through this program. For additional information on program participation or data analysis please contact: Steven Jungbauer, M.A., M.B.A., Kosciusko Community Hospital, 1500 Provident Drive, Suite D, Warsaw, IN 46580, (219) 372-7674.

Table 1. Demographic Information

	Cardiac Patients	Pulmonary Patients
Number of Programs	35	31
Number of Patients	928	222
Mean Age (years)	63.3	67.9
Mean Height (inches)	67	66
Number of Males	622	98
Number of Females	306	124
Average Program Days	60	89
Average Rehabilitation Sessions	18	26

Table 2. SF-36™ Health Status Survey

Cardiac						
Health Concept*	**n**	**Pre**	**Post**	**Δ**	**SD**	**p**
Phys. Functioning	702	50	70	+20	24.4	p<.05
Role-Physical	700	28	65	+37	48.2	p<.05
Bodily Pain	704	67	80	+13	23.3	p<.05
General Health	703	62	66	+4	14.3	p<.05
Vitality	702	47	61	+14	19.9	p<.05
Soc. Functioning	704	66	85	+19	26.4	p<.05
Role- Emotional	698	53	75	+22	45.7	p<.05
Mental Health	702	72	77	+5	16.5	p<.05
Pulmonary						
Health Concept*	**n**	**Pre**	**Post**	**Δ**	**SD**	**p**
Phys. Functioning	177	33	44	+11	20.1	p<.05
Role-Physical	177	27	49	+22	46.0	p<.05
Bodily Pain	175	70	76	+6	22.2	p<.05
General Health	176	45	50	+5	14.9	p<.05
Vitality	177	39	52	+13	20.1	p<.05
Soc. Functioning	177	63	79	+16	26.5	p<.05
Role- Emotional	176	50	72	+22	47.5	p<.05
Mental Health	177	66	76	+10	17.2	p<.05

*Health concept scores range from 0-100 points. Changes (Δ) represent increase in points from pre-program to post-program.

Table 3. Knowledge Tests*

	n	Pre	Post	Δ	SD	p
Cardiac	695	28	31	+3	4.5	p<.05
Pulmonary	190	23	29	+6	6.2	p<.05

*Knowledge test scores could range from 0-40. Change (Δ) represents increase in number of correct answers from pre-program to post-program.

Table 4. Six Minute Distance Walk

Cardiac						
	n	**Pre**	**Post**	**Δ**	**SD**	**p**
Weight	792	184	184	0	6	ns
Resting Heart Rate	899	75	74	-1	12.8	p<.05
Resting Systolic BP	900	128	128	0	20.2	ns
Resting Diastolic BP	900	73	72	-1	11.2	p<.05
Peak Heart Rate	829	95	98	+3	18.3	p<.05
Peak Systolic BP	837	146	149	+3	30.6	p<.05
Peak Diastolic BP	836	75	76	+1	13.4	ns
Peak RPE	780	11	11	0	2.0	ns
Distance Walked*	832	1248	1567	+319	518.1	p<.05
Pulmonary						
	n	**Pre**	**Post**	**Δ**	**SD**	**p**
Weight	205	165	165	0	7	ns
Resting Heart Rate	218	85	86	+1	13.2	ns
Resting Systolic BP	220	129	127	-2	16.6	p<.05
Resting Diastolic BP	220	75	71	-4	13.1	p<.05
Resting RPD	131	1	1	0	0.7	ns
Resting O2 Flow Rate	129	1	1	0	0.7	ns
Resting SaO2	220	94	94	0	4.5	ns
Peak Heart Rate	218	106	106	0	15.16	ns
Peak Systolic BP	212	145	142	-3	23.15	p<.05
Peak Diastolic BP	212	80	76	-4	15.03	p<.05
Peak SaO2	216	90	90	0	10.25	ns
Peak RPD	146	2.4	2.1	-0.3	0.82	p<.05
Distance Walked*	216	947	1136	+189	252.85	p<.05

*Distance walked was measured in feet. Change (Δ) represents increase in number of feet walked from pre-program to post-program.

Table 5: Lipid Profiles

Cardiac						
	n	**Pre**	**Post**	**Δ**	**SD**	**p**
Total Cholesterol	98	200	178	-22	47	p<.05
LDL	82	126	111	-15	43	p<.05
HDL	86	41	36	-5	38	ns
Triglycerides	90	206	185	-21	81	p<.05

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