Impact and Costs Benefit Comparison of the Healthy Beat Curriculum: CD-ROM versus Live Presentation Formats

R Richins, N Christensen, M AIsraelsen, C Albrecht, C Washburn

Citation

R Richins, N Christensen, M AIsraelsen, C Albrecht, C Washburn. *Impact and Costs Benefit Comparison of the Healthy Beat Curriculum: CD-ROM versus Live Presentation Formats*. The Internet Journal of Nutrition and Wellness. 2008 Volume 7 Number 2.

Abstract

In spite of new insights into heart disease and increased availability of multimedia education, the number of programs available through self-paced compact disc (CD) or Web Course Tools is still minimal. Our objective was to create an independent learning course to decrease risks of cardiovascular disease, which would be comparable to traditional live instruction and available through CD or Web Course Tools. Both instructional methods resulted in positive heart healthy outcomes (weight, cholesterol, nutrition knowledge and behavior). Participants (n=118) over 18 years of age were recruited. The cost effectiveness of cardiovascular curriculum in both traditional (live teacher) and self-paced CD format was determined. After initial equipment purchases, The Healthy Beat program can be self sustaining with an enrollment fee of $60 per participant; an inexpensive option for cardiovascular education, which can reduce medication costs, and potentially prevent or lessen the mortality and morbidity of cardiovascular events.

Funding Disclosure: The Healthy Beat research and program were funded through a CURI, Community/University Research Initiative grant.

INTRODUCTION

Research concludes that cardiovascular disease, stroke, and hypertension involve significant social costs, and that various education programs to decrease the prevalence would lead to social gains [1]. There is a lack of comprehensive educational programs directed toward reducing cardiovascular disease (CVD) with an emphasis on food portioning skills, cooking skills, low fat cooking techniques, increasing fruits, vegetables and dairy products in the diet, and increasing exercise [23].

The cost of heart disease and stroke in the U.S. was nearly $330 billion in 2002. This was broken down to $199 billion spent on direct medical costs, $31 billion on lost productivity during illness, and $99 billion on loss of future productivity due to premature death. Each year over $33 billion in medical costs and $9 billion in lost productivity due to heart disease, cancer, stroke and diabetes are attributed to diet [4]. The increased cost of cardiovascular diseases and stroke in the U.S. for 2006 was estimated at $403.1 billion. This figure includes health expenditures (direct costs -- including physicians and other professionals, hospital and nursing home services, the cost of medications, home health care and other medical durables) and lost productivity resulting from morbidity and mortality (indirect costs) [4]. The estimated health care savings from utilizing the DASH diet alone was $200 billion over a 5-year cumulative period, with $37.5 billion coming solely from obesity prevention [5].

There are three major types of cost analysis, and all necessitate a pre-determined factor of intervention effectiveness measured by change in health status [6]. The most common type is cost-effectiveness analysis, especially in public programs and institutions [78]. The other two are cost-benefit analysis and cost utility analysis. Cost-benefit analyses are very useful, with costs and end-point benefits measured in dollar amounts and reported as a ratio [6]. For the scope of the computations in this study, the costs are calculated in dollars and the end-point benefits are measured by impact on health status and reported in the dollar amount saved per participant. This provides a comparison of the effectiveness and benefits of alternative education methods (or lack thereof). In a literature search of the cost effectiveness and benefits of intervention programs to reduce heart disease risk factors, most references refer to primary or secondary prevention of CVD and hypertension and not comprehensive education programs.

Creating a heart healthy curriculum can be cost effective when compared to short and long term health care costs. Our approach of reporting costs consisted of four major points: 1) Reporting the average cost of initial curriculum and CD development/distribution; 2) Calculating the average cost of initial curriculum and CD development at a Registered Dietitian salary plus the live presentation costs (including salary of instructor) to implement the program; 3) Estimated direct and indirect costs for cardiovascular diseases and stroke for 2006; 4) Potential cost savings on medications and hospitalizations, per participant, after using such a program.

There were one hundred and eighteen participants in the cost analysis group, and the results were limited to individuals within the state of Utah. All costs were reported in 2006 U.S. Dollars.

METHODS

PARTICIPANTS AND STUDY DESIGN:

Participants over the age of 18 were recruited in Washington, Beaver, and Sanpete Counties of Utah to participate in the traditional program with live instruction. Newspaper notices and flyers advertised the course to those with known CVD (previous myocardial infarction or heart attack (MI), stroke or hypertension), or were at risk for CVD (obesity, type 2 diabetes or a family history of CVD). Nutrition education assistants from the Expanded Food and Nutrition Education Program (EFNEP) also participated in the traditional program format. A second group, consisting of Utah State University Extension Service Agents, was recruited at an annual conference where participants received instruction for using the self-paced CD-ROM course.

After completing the curriculum, participants in both groups completed a final evaluation of cholesterol, anthropometric measurements, knowledge, and physical activity endurance as measured by a six minute walking test, to assess the effectiveness of the two delivery methods.

Incentives were awarded according to completion of goals and achievement. These included a recipe book entitled "Keep the Beat" from the National Heart, Lung and Blood Institute (for those who completed half of the sessions), and gift certificates to grocery stores/ other healthy food items (for those who met weight loss goals). It was originally proposed that the Extension Agents pay $30 for the tests and CD. Upon completion of the course content and the two data collection days, the Extension Agents would be reimbursed for their participation. This technique was designed to prevent a high drop out rate and is supported by current literature [$_{910}$]. For this particular study, the Extension Administration chose not to implement this strategy; however it should not be ruled out for future use of the program. The initial group of "community" participants attended at no cost, whereas the future cost for this program will be $30-$60 per participant to make it a self-sustaining program.

CD-ROM CONTENT

Each lesson script was edited and reviewed by eight registered dietitians from Utah, Idaho and New Mexico, and the two lessons on physical activity were edited and reviewed by the department head of Exercise Science at Utah State University. Activities that accompanied each session incorporated learner centered teaching guidelines [$_{11}$] and criteria to generate active learning by not simply memorizing information but instead would:

- encourage the practice of making healthy choices daily
- extend those daily choices into healthy patterns
- personalize and apply the information gained

CD-ROM MULTIMEDIA

To make the CD "user friendly" and to enhance the learning experience, an opening menu page was created to present:

- organized navigation links to each session
- lesson scripts that follow the recorded sessions
- learning activities that accompanied the sessions
- additional recipes
- "directions for use" and "troubleshooting tips"
- Color schemes, readable fonts, learning enhancing interface, clear audio, and overall aesthetic appearance combined the senses to facilitate effective learning. (See Figure 1)

Figure 1

Figure 1: Menu Page for CD-ROM

Breeze Presenter provided options for narration of PowerPoint in order to author a self-paced, e-learning course with future options to support high-impact content such as video. Breeze is a web communication system that allows interaction with an audience through multimedia [12]. Breeze is deployed using Adobe Flash Player, allowing the participants to view the CD on a majority of office or home computers. University Extension sites have access to Breeze, which allows future classes to be held with on-line meetings. In order to participate, Utah State University purchased a Breeze system in 2002. This initial purchase of Breeze allowed Cooperative Extension unlimited access at no cost to produce the Healthy Beat Program; however a recording microphone is required (average cost of wireless microphone is $50 or PC microphone system is $10). Extension Agents each received a CD of the curriculum (to use at home or at work) every other week, at their convenience.

RESULTS

COST COMPARISONS OF ASPECTS OF THE HEALTHY BEAT PROGRAM AND HEALTHCARE COSTS

In approximately four months the curricula was written, organized, edited, and recorded. The curricula development was developed in an average length of time according to distance education experts at both Utah State University and Brigham Young University. The process and results of calculating the costs of this program were relative and comparable to what is commonly employed for curriculum development and authoring of content on CD-ROM. The cost of curriculum development (at an RD salary of 35.00/hour x 318 hours) is approximately $11,130. Most teachers, Extension Agents, and/or Registered Dietitians would have access to CD/DVD authoring, menu page/interface creation and duplication equipment at an educator's rate ($25/hr, $2.50/ CD unit, a unit being a completed CD with label and packaging) which is substantially less than industry rate (average $130/hr, $3/ CD unit) (Table 1).

Figure 2

Table 1. Cost Estimates of Developing CD-ROM and Curriculum for a 10 week class of 40 participants

	Raw Material Costs	Production Costs through the University $25/hr $2.50/CD**	Production Cos Industry Rate $1 $3.00/CD**
CD's	$7.20	$100	$120
Label's / Packaging	$26.40		
Duplication Equipment	0	$25.00 / hr	$130.00 / hr
Recording Equipment	0		
Authoring/Menu page Creation	0		
Curriculum ¨	$11,130	$11,130	$11,130
Totals	$11,164	$11,255	$11,380

* $9.00/pack of 50 CD's, $20.98/pack of 40 CD Labels, $6.68/pack of 50 CD covers
** Price per CD unit includes labels and packaging, 1-2 hours for authoring/ duplication
¨ Research, organizing information, typing, editing, recording classes. RD Salary $35.00/hr x 318 hours

Initial curriculum/program development costs added to the costs of actually implementing the program using live instruction was $12,475 - $12,796 depending on instructional salaries (Table 1). Live presentation costs averaged $711. This included: handouts, food, nutrition labels and menus for activities, and incentives. If the CD only is used for instruction, the costs are only $11,308 (includes approximately $53 for supplemental teaching materials). Teacher salary for this time period was $830. Estimated equipment costs were: $2,000 for the Cholestec machine, (Cholestech LDX, Cholestech, Hayward, CA), and $100 for a weight scale.

If the self paced program is utilized, the teacher will still need to make phone calls, email reminders to participants and duplicate CDs for the participants. The suggested enrollment fee would then be $60. These details are described in Figure 2.

- $20 for the two lipid tests (@ $10 each for a pre and post program evaluation.
- $20 for materials ($711 ÷ 40 participants = $17.70)
- $20 for teacher salary ($830 ÷ 40 participants = $20.75)

Figure 3

Figure 2: Program Implementation Costs

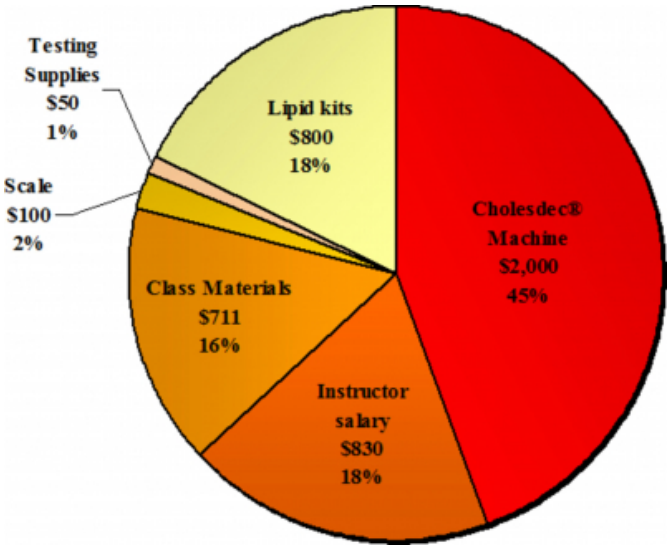

Table 2 represents the estimated direct and indirect cost (in billions) of CVD [4]. The cost of hospitalization for a heart attack or a stroke is 114.8 billion dollars, and the costs of medication for heart disease, high blood pressure or a stroke are $21.2, $24.4, and $1.3 billion dollars totaling $161.7 billion dollars [4].

Figure 4

Table 2 Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke. United States 2006.

	Heart Diseases**	Coronary Heart Disease	Stroke	Hypertensive Disease	Heart Failure	Total Cardiovascular Disease*
Direct Costs						
Hospital	81.3	41.8	15.5	6.2	15.4	114.8
Nursing Home	20.7	10.9	14.3	4.2	3.9	42.6
Physicians/Other Professionals	19.7	11.1	3.1	11	2	38.3
Drugs/Other Medical Durables	21.2	9.8	1.3	24.4	3.1	50.1
Home Health Care	5.2	1.6	3.1	1.7	2.4	11.8
Total Expenditures*	148.1	75.2	37.3	$47.5•	26.8	257.6
Indirect Costs						
Lost Productivity/Morbidity	21.9	9.6	6.4	7.7		35.6
Lost Productivity/Mortality++	88.5	57.7	14.2	8.3	2.8	109.9
Grand Totals*	258.5	142.5	57.9	63.5	29.6	403.1

Note: (-) = data not available.

* Totals don't add up due to overlap

** Category includes coronary heart diseases, heart failure, part of hypertension disease, cardiac dysrhythmias, rheumatic heart diseas, cardiomyopathy, pulmonary heart disease, and other less defined heart diseases.

• Tome Hodgson and Liming Cai (Medical Care 2001) estimated that healthcare expenditure attributed to hypertension that could be allocated to cardiovascular complications and other diagnoses totaled $108 billion in 1997

++ Lost future earnings of persons who will die in 2006, discounted at 3%.

Another significant factor in controlling CVD is prescribed medications. Local pharmacies were contacted and prices were reported for a month's prescription (30 pills, 1/day) of brand name Zocor, Lipitor, and Crestor with 20 mg – 40 mg doses. Without insurance, the average range was $110 - $160 for 20 mg-40 mg doses. Generic brand options are available for Zocor averaging $100 per month. Insurance coverage would decrease the personal expense to an individual depending on provider, as would the situation of the drug, being formulary or non-formulary (old vs. new brands). Age, medical history and blood tests determine what dose is necessary, and depending on improvements in diet and exercise, a physician can scale back the dose or even completely wean younger patients off the medication.

The cost for the CD curriculum would have a comparison of $60 for class participant verses a savings of $110 - $160 per year when a prescription medication is discontinued. More cost savings or a higher rate of cost effectiveness would occur with prevention of a stroke or heart attack.

ANTHROPOMETRIC AND BIOCHEMICAL IMPROVEMENTS

The cost effectiveness of a healthy heart program only has credibility if it is effective in reducing risks for cardiovascular disease. There was a significant improvement in cholesterol level, weight, and nutrition knowledge at the p = 0.05 level in both live instruction and use of the self-paced CD course. The details have been submitted separately in another article.

DISCUSSION

Compared to other findings in literature, this study also indicates that self paced programs can be cost effective and utilized for a variety of educational needs [113]. A simple analysis of the data shows that it is possible to reduce the complications of heart disease and adverse health expenditures with use of the Healthy Beat curriculum on CD-ROM. The numerical data used in these calculations will be unique to future uses of the program. Calculations are influenced by the number of participants in a class, whether the class is held live or through distance education with the CD, how many times the program is utilized in a year, and how many CD's are created for future purchasing. This provides vital education, lipid panel testing, appealing food samples, support and discussion groups, which are essential for long term adherence. Many benefits can be drawn from adhering to a heart healthy curriculum, whether the method of delivery is a live classroom setting or through multimedia instruction. These benefits may include: longevity, quality of life, and lower cost per month of prescriptions for high cholesterol medications.

CONCLUSION

The Healthy Beat curriculum on CD, and assessment

procedures for behavior and knowledge change, are effective instruments for education and instruction of a heart healthy lifestyle to reduce hypertension and cholesterol, and to increase application of nutrition and physical activity concepts. A CD version of the curriculum can be a cost-effective alternative to traditional teaching methods.

References

1. Division for Heart Disease and Stroke Prevention. A Public Health Action Plan to Prevent Heart Disease and Stroke Web site. http://www.cdc.gov/DHDSP/library/action_plan/the_challenge.htm. Updated May, 12 2006. Accessed May 12, 2005.
2. Luepker RV, Murray DM, Jacobs DR Jr, et al. Community education for cardiovascular disease prevention: risk factor changes in the Minnesota Heart Health Program. Am J Public Health. 1994;84(9):1383-93.
3. Christensen NK, Williams DP, Pfister R. Cost Savings and Clinical Effectiveness of an Extension Service Diabetes Program. Diabetes Spectrum. 2004;17(3):171-175.
4. American Heart Association Web site. http://www.americanheart.org. Updated 2008. Accessed Oct 21, 2006.
5. McCarron, DA, Heaney, RP. Estimated healthcare savings associated with adequate dairy food intake. Am J Hypertens. 2004;17:89-97.
6. Brosnan CA, Swint JM. Cost Analysis: Concepts and Application. Public Health Nurs. 2001;18(1):13-18.
7. Jameson, KP. Implementing Benefit-Cost Analysis: Theory Meets Reality. Journal of Management Studies. 1981;18(4):411-423.
8. Spears, M, Gregoire M. Foodservice organizations: A managerial and systems approach. 5th ed. New Jersey: Prentice Hall; 2004.
9. Graffagnino CL, Falko JM, La Londe M. Effect of a Community-Based Weight Management Program on Weight Loss and Cardiovascular Disease Risk Factors. Obesity. 2006;14:280-288.
10. Pruitt, RH, Privette, AB. Planning strategies for the avoidance of pitfalls in intervention research. Journal of Advanced Nursing. 2001;35(4):514-520.
11. Phillips, JM. Strategies for Active Learning in Online Continuing Education. J Contin Educ Nurs. 2005;36(2):77-83.
12. Adobe Webpage. http://www.adobe.com/products/breeze/. Updated 2006. Accessed September 21, 2006.
13. Cox RH, White AH, Gaylord CK. A video lesson series is effective in changing the dietary intakes and food-related behaviors of low-income homemakers. J Am Diet Assoc. 2003;103(11):1488-1493.

Author Information

Rachel Richins, MS, RD
Utah State University

Nedra Christensen, PhD, RD
Utah State University Extension

Marlene AIsraelsen, MS, RD
Utah State University

Clint Albrecht, MS, RD
Utah State University Extension

Carolyn Washburn, MS
Utah State University Extension