

CLINICAL STUDY

Cardiovascular Health Promotion for Children: A Model for a Parish (County)–Wide Program (Implementation and Preliminary Results)

Gerald S. Berenson, MD

Cardiovascular (CV) risk factors in childhood result in a lifetime burden on the CV system. The Bogalusa Heart Study, a prevention program for children, addresses behaviors and lifestyles associated with CV risk. This prevention program utilizes the substructure of a Parish (County) that can be a model for other areas. All aspects in educating school children—the classroom, physical activity, cafeteria, teachers, and parents with community involvement—are included. The program requires cooperation of parents, schools, physicians, and political and business personnel. Their collaboration helps implement and sustain the program. Understanding the origin of coronary artery disease, hypertension, diabetes, and now the obesity epidemic shows the need to develop a framework for improving lifestyles and behaviors beginning in childhood. In addition to nutrition and exercise, the program addresses tobacco, alcohol, and drug use, and societal problems such as dropping out of school, violent behavior, and teenage pregnancy. An initial accomplishment is the entry into all elementary schools, representing approximately 7000 children. Early results show reduction in obesity, increased physical activity, improved decision making, and healthy attitudes. This public health model is inexpensive by utilizing prior research findings and integrating into community resources. Health education of

children is an important aspect of preventive cardiology with a need for pediatric and adult cardiologists' involvement. Prev Cardiol. 2010;13:23–28. ©2009 Wiley Periodicals, Inc.

Cardiovascular (CV) disease is the major cause of mortality in industrialized countries.¹ Although there has been a marked reduction in heart disease during the past 3 decades in the United States, prevention of heart disease remains a major public health problem. Contributing to this problem is the epidemic of obesity,² which may shorten the lifespan of young individuals. The Bogalusa Heart Study has documented poor lifestyle as well as medical and social issues that involve the health of children and future CV diseases.^{3–6} Certain lifestyles, many of which can be prevented, have a harmful effect not only on the health of children but also on the economy of the community. Improving health of young individuals throughout a geographic area, such as a parish (county), can be accomplished by utilizing its substructure and educational programs.⁷

Although the Bogalusa Heart Study has focused primarily on CV diseases, it became obvious that children and young adults followed over 35 years develop preventable medical, dental, and social problems. These disabilities can be prevented by helping young individuals achieve healthy lifestyles, focus on good nutrition and physical activity, and understand the damaging effect of unhealthy lifestyles and importance of healthy attitudes.⁸ Considerations of prevention in childhood and for persons living in poverty have been addressed.^{9,10} The purpose of this communication is to describe the implementation of a prevention program, starting in childhood, that addresses both medical and social problems, in a total parish (county) as a model for other areas.

BACKGROUND

Over the past 35 years, the Bogalusa Heart Study has studied children and followed them into middle

From the Tulane Center for Cardiovascular Health, New Orleans, LA

Address for correspondence:

Gerald S. Berenson, MD, Tulane Center for Cardiovascular Health, 1440 Canal Street SL-18, Suite 1829, New Orleans, LA 70112

E-mail: berenson@tulane.edu

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Table I. Parish (County) Components Involved in Children's Health Promotion

School systems
Community support
Political, mayors, sheriff, coroner
Churches
Social organizations
Medical and dental
Business for program funding
News media

age (38–46 years). Clinical CV disease is associated with extreme obesity, tobacco use, excessive alcohol intake, inactivity, and poor nutrition. These unfavorable behaviors all start at a young age. Morbidity studies show that 60% to 75% of adolescents and relatively young adults have ≥ 1 CV risk factors. Abnormal cholesterol and lipoprotein levels, high blood pressure, and morbid obesity leading to type II diabetes are the major risk factors. Both an abnormal hypertension status (prehypertension and hypertension) and carbohydrate–insulin metabolic abnormalities (prediabetes and diabetes) exist as “silent” diseases.^{11,12}

Observations relevant to prevention show that children today are on average 12 pounds heavier, without being any taller. This finding reflects the obesity epidemic across the United States.² Obesity accelerates other CV risk factors such as higher blood pressure, abnormal serum lipids and lipoproteins, and type II diabetes in adolescence. In a similar Louisiana population, childhood type II diabetes has increased from about 1.05% to 1.8% in the past 5 years.¹³ Obesity, now a worldwide phenomenon, is the most consistent predictor of adult cardiac hypertrophy, left ventricular enlargement,¹⁴ increased vascular stiffness, and carotid intima-media thickness.¹⁵ Childhood asthma/bronchitis has increased from 7% to 14%.¹⁶ Tobacco use remains high, at 20% to 30% of high school children, with consistent use beginning in the 3rd grade, around 8 years of age.¹⁷ Alcohol use is similarly widespread and initiated early. Saturated fat, cholesterol, and sodium consumption far exceed the recommended levels. Watching TV and other sedentary behaviors occupy 2 to 6 hours daily, and the number of children who drop out of school varies from 20% to 46% in different schools. A majority (95%) of school children in Washington Parish participate in the “free” lunch program and have Medicaid but lack readily available medical and dental care.

The Bogalusa Heart Study has demonstrated that CV risk factors “track” at respective levels and predict future clinical heart disease.^{5,6} Unique findings at autopsy show risk factors at a young age relate strongly to underlying atherosclerotic and hypertensive changes.^{6,18}

FUNDING FOR THE PARISH PROGRAM

Initial funding for the program was obtained from a tax base by the Washington Parish Council. This fund was matched by the Louisiana Office of Public Health and smaller amounts were contributed by local businesses. A 2-year grant was provided by the Louisiana Area Health Education Center for Rural Programs. With available health education materials for children and experience from research, an effective and inexpensive program was developed.^{19–22} Two coordinators were recruited to oversee the 2 school systems in the parish. Each school was provided \$1000 for purchase of sports equipment. The principals were asked to appoint a teacher to spearhead the program in their schools, and each teacher was provided a supplement of \$50 per month for the school semester. This level of funding approximated \$10 per child for implementation over 1 and a half years.

PREVENTION COMPONENTS

The program addresses all aspect of the school environment. Table I shows parish components needed to support health promotion. “Health Ahead/Heart Smart,” a comprehensive health education program for elementary schools, was integrated into the parish prevention program.²² Earlier research with Health Ahead/Heart Smart materials involved both parents and children and was conducted by a multidisciplinary team.^{8,23} That research included detailed risk factor screening, education at elementary school grades, and teacher and parent involvement. It achieved a slowing of weight gain with growth of children and improved exercise performance, dietary intake, and participation by teachers and parents to improve their own lifestyles. Such risk factor profiling and research, although advocated, is expensive and is not generally applicable for a public health model, as currently being funded.

IMPLEMENTATION IN THE PARISH SCHOOLS

The parish includes approximately 7000 elementary school-aged children, and 17 schools throughout the parish and involves small rural communities. The Health and Prevention Program targets all elementary-aged school children and addresses both medical and social issues. Principals are requested to sign a contract indicating their willingness to put the program into their school. They are requested to appoint a health committee to help implement the program.

The comprehensive and coordinated health education component is introduced as the main intervention.¹⁹ It consists of the Health Ahead/Heart Smart classroom curriculum, a physical education program, “Super Kids/Super Fit,” and a nutrition program to improve food and drink offered in the schools.²⁴ Addressing the health of teachers and

involving parents and community are critical aspects for continuity of the program. Medical issues include control of obesity; use of tobacco, alcohol, and drugs; and the provision of medical care for children with asthma/bronchitis. An interaction between school nurses, if available, with local hospitals and physicians is encouraged. Social issues are also addressed, ie, prevention of sexually transmitted diseases, teenage pregnancy, violent behavior, suicides, and school drop-outs. Beginning in kindergarten, the program builds its medical and social messages by encouraging self-esteem, development of respect for one’s own health, and respect for parents, teachers, and peers. The curriculum materials, classroom and physical education, rely heavily on a behavioral orientation, theoretical constructs from research on adoption and diffusion, and concepts of social learning. The teacher guides contain goals, easily outlined lesson plans with a scope and sequence, and many hands-on activities designed for each grade level. Lesson plans are also designed for incorporation into regular subject matter because of time limitations. Each K-6 teacher receives an easily adaptable grade-level guide. School-wide activities (Table II) are suggested to encourage teacher and parent involvement. Table III lists some lesson plans included in the curriculum. The Health Ahead/Heart Smart classroom component culminates with a parish-wide 6th grade writing contest on morals and ethics.

NUTRITION PROGRAM

Dietary changes involve utilizing commodities and US Department of Agriculture and state recommendations and vending machine choices. The focus is largely to reduce refined sugar, saturated fat, and sodium by helping with food purchases through commodities, meal planning, and training of cafeteria workers.²⁴ Cafeteria managers are provided a “school lunch manual” and in-service training. Children visit the cafeteria as an interactive nutrition exercise. As an incentive, cafeteria workers are provided a Heart Smart apron.

PHYSICAL FITNESS

The physical activity component, Super Kids/Super Fit, provides classroom and physical education teachers with a physical education curriculum accompanied by a “menu box” of approximately 75 noncompetitive exercises adaptable for all ages. Some exercises are designed for classroom teachers if physical educators are not available. The physical activity program is based on “Feeling Good” by Kuntzleman²⁵ and the work of Virgilio.^{26,27} Physical activity is promoted as exercise for a lifelong activity, “a lifestyle for fun.”

TEACHER AND PARENT PROGRAMS

Teachers are encouraged to obtain their own risk factor profile. As an example, we conducted risk

Table II. Suggested Activities to Involve Parents and Teachers

Kick-off event Health week (Heart Smart Week) Health fair Newsletter (including recipe modifications, new recipes, health information) Afternoon Lifestyle Program for Teachers (ie, walking club, menu planning) Role Model Program (parents, business leaders, professionals, athletes) Nutrition club (cafeteria manager and upper-grade students) Upper-grade students teaching in lower grade Big Buddy Program to teach safety (ie, wearing seat belts, helmets) Geographic Fun Run Planting club to grow garden of fresh vegetables
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Table III. Selected Classroom Materials for Teacher from the “Health Ahead/Heart Smart” Curriculum

Health Ahead/Heart Smart curriculum. A unit on wellness activities tests students on a word search, examples: blood pressure, health, cardiovascular, etc Vocabulary definitions, examples: ventricle, wellness, artery, platelets, hypertension, saturated fat, etc Review food groups, understand the pyramid Commercial trap: TV and/or radio, healthy vs unhealthy foods Pledge to reduce, fat, salt, sugar to be signed by a parent. Taste before you dine Governor’s program on abstinence Body reactions to stress, life on a fast lane Illustrate wonderful sensation floating on a cloud as a relaxation technique President Fitness Challenge—before and after results—includes weight, sit ups, quarter-mile run, push ups, sit and reach, flexed arm hang, shuttle run Cigarette and smoking prevention Importance of self Words to live by: compassion, respect, etc

factor screening on 140 school teachers in the Washington Parish school system with the aid of local hospital nurses and technicians and a home health care business. Expected overweight and obesity were common. Untreated hypertension, uncontrolled hypertension, and poor control of diabetes were found as expected from the adult black-white population.^{4,5}

Teachers and school nurses are encouraged to maintain a “health passport” on each child to follow height, weight (body mass index), blood pressure, and vaccinations, while parents are encouraged to participate in a volunteer committee

to help implement various school activities, shown in Table II. Health-oriented teachers, by improving their own lifestyles, help motivate children to develop healthy attitudes. Newsletters from schools are used for communication with parents.

INVOLVEMENT OF COMMUNITY SUBSTRUCTURE TO SUPPORT THE CHILDREN'S HEALTH AND PREVENTION PROGRAM

Since the program is community-wide, it strives to affect lifestyles of adults who interact with children. The program emphasizes teachers and parents as important role models who also interact with the dynamics of the community to support health education in schools.

Political

Mayors in both Bogalusa and Franklinton, major communities in the parish, gave their support. The parish coroner and sheriff have become involved for their influence on legal age of purchasing tobacco and alcohol and their role in preventing violent behavior. Safety within schools and after school hours is being emphasized. This also includes making playgrounds and walking and bicycle paths available and safe.

Medical

Presentations have been made to the Washington Parish Medical Society and to employees of Bogalusa and Franklinton hospitals requesting their support. Their interaction with the school nurse is important because they provide a referral base for medical problems, eg, asthma/bronchitis, diabetes, and morbid obesity. Medical personnel can provide in-service training.

Businesses and Social Societies

Meetings at the Chamber of Commerce and social societies help the awareness of health promotion and need for support of school activities. Involvement of businesses is paramount as a resource for funding. A major industry provided some funding by noting that offspring of their employees are students and as a contribution to the community. Meetings with the Civic League, Retired Teachers, several church groups, and the Rotary Club were held and reported in local newspapers.

News Media

The news media are important to inform the community of development of a prevention program for children throughout the parish. To popularize health prevention, articles are encouraged to appear in parish newspapers, eg, the parish-wide essay contest on ethics and morals with pictures of winners.

ACCOMPLISHMENTS

Previous research using this program for 5th grade students indicated risk factor changes with an average weight reduction, decreased levels of systolic and diastolic blood pressure, and reduced triglycerides. An interesting change related to diet was noted in the top quartile of students selecting ≥ 3 CV healthful school lunches. These students had the most weight/height reduction.²²

In the current parish-wide program, after one and a half years, accomplishments were reported by school coordinators that indicated an effect on attitudes and behaviors. The level of funding is inadequate for an overall risk factor profiling of the students, details documenting improvement of lifestyle changes, an evaluation of fidelity to the curriculum, and teacher performance with regard to the health curriculum. Schools are obtaining height and weight and, if a school nurse is available, blood pressures are obtained. A health passport for each student is requested to document body mass index, vaccinations, and specific medical problems.

It must be emphasized that a limited amount of research and evaluation of effectiveness can be attained with this low level of support and in a short period. Detailed studies had been reported earlier on the school model and have shown its effectiveness on both children and parents.^{8,22,23} The initial goal for a broad public health program is to get it introduced and continued. A number of teachers have expressed a liking for the program and importantly some have begun to internalize the information to improve their own lifestyles. Eventually a diffusion of information can occur on the objectives and role of health education and projected are eventual long-term effects on lifestyles and risk factors.

This comprehensive health and prevention program is currently being implemented in all 14 public elementary schools in Washington Parish, 2 private schools, and 1 Catholic school. For monitoring and preliminary evaluation of the program, approximately 3000 4th through 6th graders are participating in pretest and post-test questionnaires utilizing open-ended personal comments. Students are encouraged to freely express their thoughts and ideas about health. Even in the short timespan of 2 years, a random selection of tests from each school shows that there is already some evidence of healthier lifestyles and attitudes by both teachers and students. Data on body mass index measurements indicated that 10% of the children are obese while some 30% to 40% are overweight. These are immediate targets for improvement.

An example of health improvement was shown by records from 1 elementary school observation on 120 students in 6th, 7th, and 8th grade, aged 11 to 14 years. The findings show the potential impact on students' health. Table IV shows observations

Table IV. Changes in Body Weight and Quarter-Mile Run Times During a School Semester

		AVERAGE LB (RANGE)	
Changes in Weight			
August		124 (61–234)	
May		128 (65–241) ^a	
Weight gain (N=63)		1.3 (1.0–21.0)	
Weight loss (N=22)		7.1 (1.0–38.0)	
Incomplete data (N=35)		–	
		AVERAGE MIN (RANGE)	
	No.	BEFORE	AFTER
Change in Time for Quarter-Mile Run/President Fitness Challenge			
Gained	86	3.4 (2.1–7.4)	2.3 (1.4–3.3)
Lost	2	2.2 (2.2–2.3)	2.3

^aExpected weight gain with growth: ~7 lb.

with school beginning in August and repeat measurements in May after one semester. Upon implementation of the program, one third lost weight, even with expected 5- to 6-lb gain with growth. Table IV shows results using the President's Fitness Challenge and improvement of time for a quarter-mile run. These are among multiple classroom activities related to health.

SUMMARY

Preliminary results involving elementary schools in a rural geographic area show the possibility of implementing health promotion throughout a parish. With interested volunteers and some funding, the model can be adopted and altered for other areas. The goal is as important as the usual academic subjects. Cardiologists are encouraged to support such programs since they understand the importance of prevention and the potential impact of heart disease and poor lifestyles.

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