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**EFFICIENT MANAGEMENT OF
CARDIOVASCULAR RISK SCREENING PROGRAMS**

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Since the Kennedy Space Center (KSC) Cardiovascular Screening Program started in 1984, we have made many changes to accommodate the growing number of participants. As a result of these changes, screening of KSC employees has become more efficient and productive.

Overview

The Health Education Program at Kennedy Space Center is divided into twelve monthly programs:

1. Cardiovascular Screening
2. High Blood Pressure Screening
3. Colorectal Screening
4. Employee Assistance Program Month
5. Environmental Health Month
- 6-12. A variety of topics or timely subjects.

Employees are surveyed frequently to get their opinion of the program, what they like and dislike, possible improvements, and ideas for future programs. In the last survey, the topics of interest to most people were:

1. Exercise and Fitness
2. Diet and Weight Control
3. Stress
4. Nutrition
5. Back Care.

The Health Education Program

The Health Education Program has grown from 4,281 participants in 1984 to 16,528 in 1991. We have already passed that number in 1992. Exhibit 1 shows the growth of the entire program, by year, since 1984.

Exhibit 1. Summary of Health Education Program (Entire Program)

Year	Number of Participants
1984	4,281
1985	5,921
1986	5,209
1987	7,814
1988	8,517
1989	10,712
1990	12,618
1991	16,528

The Cardiovascular Screening Program

Participation in the Cardiovascular Screening Program has grown from 508 in 1984 to over 4,000 in 1992. Exhibit 2 summarizes this growth. As a result of the dramatic increase in the number of participants, we have had to streamline the program to make it as efficient as possible.

Exhibit 2. Summary of Cardiovascular Disease Screening Program

Year	Number of Participants
1984	508
1985	859
1986	1,260
1987	1,742
1988	2,302
1989	3,485
1990	3,402
1991	3,797
1992	4,056

Screening for cardiovascular disease is our most popular program. It is held each February in conjunction with National Heart Month at all three medical facilities; OHF, LAC, and CAC, every Monday through Friday from 0630 to 0900.

Participants in the program fill out a comprehensive questionnaire which includes:

1. Demographic Data
 - a. Family Health History
 - b. Current Health History
 - c. Smoking and Exercise History
2. Blood Pressure Measurement
3. Blood Samples for analysis of cholesterol, triglycerides, HDL, and Glucose.

Participants are logged in when they arrive and are given a number. This number is put on the questionnaire, the laboratory slip, and the blood sample tube. All blood samples are checked to be sure that the name and number are correct on the tube before being sent out for analysis. If any lab value comes back extremely high or low, the participant is called and asked to repeat the test for verification. We have had cholesterols over 500, triglycerides over 3,000, and glucose over 600.

After all of the data are collected and entered into a computer, the risk factor is calculated by the computer using tables modified from the Framingham Study. Parameters used are age, sex, blood pressure, total cholesterol, and smoking habits. The cholesterol/HDL ratio is also calculated.

The Results Package

Each person who has taken part in the program is then sent a results package which includes:

1. Participant's lab values
2. Average population ranges for all values listed
3. An explanation of relative risk
4. Elevated risk factors the employee must modify to reduce risk

5. Risk factor values from previous years
6. A health information packet containing information on heart disease, exercise, diet, and smoking.

People with abnormally high test results are contacted personally by telephone or called in for a meeting for further clarification of the results and counseling. They are then referred to their personal physician for further evaluation.

Improvements in the Program

The Cardiovascular Screening Program at KSC has greatly improved since 1984. During the first few years:

1. It took 1/2 to 1 hour in the Medical Facility to complete the screening.
2. It took 3 to 4 weeks to get the results, because:
 - participants filled out the questionnaire at the Medical Facility on the day of the screening;
 - two registered nurses took blood pressures;
 - one laboratory technician drew blood;
 - after receiving the data from the lab, I calculated the risk factor from a table;
 - I filled out the results letter by hand; and
 - I addressed and stuffed the envelopes and mailed the results.

In 1992, we screened over 4,000 participants, and it took 5 to 15 minutes at the Medical Facility and 3 days to 1 week to get the results.

The screening of KSC employees takes a great deal of teamwork and cooperation by everyone in the Medical Department. Some days over 300 people go through the screening in 2-1/2 hours. We are pleased with the efficiency of the program, but most gratifying is that the KSC employees tell us how quick and easy the process is. A description of the changes made to achieve this improvement follows.

1. **The Questionnaire**

In 1984:

The questionnaire was filled out on the day of the screening, and took between 15 and 45 minutes to complete. This questionnaire completion process required the use of rooms with tables and chairs and someone had to be present to answer questions. This resulted in a lot of confusion and patient flow problems.

At Present:

We now have questionnaires available at all three Medical Facilities, starting the third week in January. These questionnaires can be picked up at any time, completed at the participant's leisure, and brought in on the day of the screening. This saves each participant at least 30 minutes in the Medical Facility. While we do have questionnaires available for anyone who has not filled one out ahead of time, 98 percent of the participants complete them before they arrive.

2. **The Schedule**

We have held the screening every Monday through Friday from 0700 to 0900 each February since 1984, but, as the number of participants grew, the lines became very long. Part of the solution was to add an extra 1/2 hour to the screening time. We now start at 0630. This has greatly improved the flow and shortened the lines. Each year we look at attendance data at each facility and add or subtract days as needed. We have also added extra days for our second shift from 1400 to 1600.

3. **Staffing**

In 1984:

We had two registered nurses taking blood pressures and one laboratory technician drawing blood.

At Present:

There are 5 or 6 registered nurses and EMT's taking blood pressures and 4 laboratory technicians drawing blood. We have a dedicated data input clerk for the screening and can get additional help if the workload increases. We utilize clerical staff to send out the results.

4. **Patient Flow**

Each year we re-evaluate patient flow in each facility to determine where it can be improved. Signs and arrows now direct participants to each station. We put the information on the blood sample tubes when the employee is logged in at the beginning of the screening. In the past, laboratory technicians did this before drawing blood, which created long lines at the laboratory station.

5. **Additional Laboratory Values**

In the first few years we had separate cardiovascular and diabetes screenings. We combined these two screenings in 1986, saving time, money, and an additional venipuncture for our employees. In 1989 we added HDL because of its importance in predicting heart disease. Our participation increased dramatically in that year.

6. **Automation**

Our greatest improvement has been in automation, which has greatly increased productivity.

- We now have a program to calculate the risk factor and cholesterol/HDL ratio.
- The computer now prints the results letters and the mailing labels.
- Our data input clerks put all of the demographic data into the computer or update the data that is already in the computer.

- Laboratory values received from the hospital laboratory are dumped into our database, saving time and assuring greater accuracy.
- All of the data from 1984 to 1992 is now in a computer program. This can be called up on my desk computer if an employee needs a printout for all of the previous years that he/she has participated in the screening.
- I receive a daily printout of all participants as well as a printout of the high risk results. I use this to call employees who need counseling and referral. This saves a lot of time. Formerly, I had to go through each printout and determine which participants were at high risk.

Plans for 1993

In 1993 we plan to add cholesterol/HDL ratio history along with risk factor history. This will enable an employee to measure his/her progress from year to year. We are also planning to calculate LDL and include this information in the results letter.

While employee screening is a tremendous undertaking for the Medical Department, it is a very important aspect of the employees' health and well being. We are always looking for areas of improvement.

