

Screening Relatives of Diabetics in Five Florida Counties

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THAT DIABETES "runs" in families has been recognized for many generations, but this knowledge is seldom applied to community diabetes detection programs if one judges by the literature. Screening relatives of persons with diabetes is a continuing activity in Florida. This report describes the detection project in Hillsborough, Jefferson, Madison, Suwannee, and Taylor Counties during the period January through June 1958.

Programs for diabetics in Florida began in 1935 when a member of the State legislature for Polk County, who was a diabetic, presented a bill to provide funds to purchase insulin for the indigent diabetics in the State. The legislature has appropriated funds for this purpose, included in the State board of health budget, for every year except one when the item was not included in the budgetary request. The appropriation for 1959 was approximately \$40,000.

In 1946 the Public Health Service conducted a diabetes screening demonstration among the general population of Duval County, including Jacksonville. The Service also provided educational services, conducted classes for diabetics, and made other studies. Subsequently the

State board of health used a trailer that toured various counties to conduct diabetes screening among the general population. The trailer service was discontinued about 8 years ago because of lack of funds.

One of the studies related to the 1946 demonstration undertook to determine the prevalence of undetected diabetes among blood relatives of known diabetics in Duval County. The basis for the study was the long-observed, familial pattern of diabetes confirmed by numerous genetic studies. In the Duval County study (1) during the 3-year period from 1947 to 1950, 1,741 relatives of diabetics were given laboratory tests for diabetes, and 73 new cases of diabetes (4.2 percent of those tested) were discovered. The percentage of cases detected among relatives of diabetics was found to be about five times as high as the percentage found in screening general population groups.

After several years during which casefinding activities based on screening relatives of known diabetics were not feasible, the Florida State Board of Health undertook in 1957 to capitalize on the unique opportunity afforded by the State's purchases of free insulin for indigent diabetics. In 1957 approximately 2,700 diabetics received part or all of their insulin through the State board of health.

Casefinding among relatives has several advantages which were helpful in reactivating the diabetes detection program in Florida. Screening can begin with small groups of persons and yet have a sufficiently high rate of yield to make a small program productive.

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Such a program is adjusted easily to the staff and funds available merely by contacting greater or smaller numbers of diabetics for the names of their relatives.

The pattern of administration of the insulin purchase program is ideal for involving local health departments in diabetes casefinding.

The State board of health purchases the insulin and keeps the records; local health departments distribute the insulin and contact the diabetics.

The 1958 diabetes detection project to screen relatives of diabetics was designed on a small scale. Its supervisor was a fieldworker from the chronic disease division of the State board of health. Local health department clinics did the screening, State and local staffs jointly participated in the followup of relatives, and the State laboratory ran the tests. The Public Health Service cooperated by supplying funds to assist the program operation and by analyzing the data for the period January through June 1958.

These criteria governed the selection of participating counties: (a) the number of indigent diabetics residing in the county; (b) location of the county; (c) the county health officer's desire to participate in the program; and (d) approval of the program by the county medical society. Because of local health department needs and interests, rather flexible procedures were established and the details of methods differed among the various counties.

In general, when the several criteria for par-

Table 1. Number of indigent diabetics, by age, race, and sex, five Florida counties, 1958

Age group (years)	White		Nonwhite		Total
	Male	Female	Male	Female	
Under 15.....	0	2	0	0	2
15-24.....	1	2	1	2	6
25-34.....	1	1	1	4	7
35-44.....	1	8	0	8	17
45-54.....	7	18	2	12	39
55-64.....	11	39	5	20	75
65-74.....	17	35	4	14	70
75 and over.....	9	19	2	2	33
Not stated.....	1	8	0	3	14
Total.....	48	132	15	65	263

¹ Includes race or sex not stated.

Table 2. Percentage of relatives tested by age group, five Florida counties, 1958

Age group (years)	Number named	Number tested	Percent tested
Under 15.....	176	122	69.3
15-24.....	127	59	46.5
25-34.....	138	56	40.6
35-44.....	142	67	47.2
45-54.....	122	60	49.2
55-64.....	79	35	44.3
65-74.....	45	21	46.7
75 and over.....	13	6	46.2
Not stated.....	93	26	28.0
Total.....	935	452	48.3

ticipation had been met in a specific county, a mailing list was prepared from the roll of diabetics receiving free insulin. A letter of explanation and a questionnaire was sent to each diabetic asking him to give the names and local addresses of his blood relatives, including parents, children, grandparents, siblings, aunts, uncles, and first cousins. Postage prepaid return envelopes were enclosed with the questionnaire. If possible, a visit was made to try to locate and interview diabetics who failed to return their questionnaires.

A letter was prepared and sent to each relative with a local address named by the diabetic. The letter explained the purpose and the importance of a diabetes detection test, invited the relative to have a test at the health department at a specific appointment time, and asked that he notify the health department if the time were inconvenient so that another appointment could be arranged. It suggested that the relative, if he preferred, go to his family physician for the test. The letter also listed several menus, each containing approximately 100 mg. of carbohydrates, and stated that one of these meals should be eaten 2 hours before the appointment for the test. When they had time, health department staff members visited and offered a blood test to relatives who had not reported to the health department or gone to their family physicians for a test.

In the screening, blood sugar determinations were made by the Somogyi-Nelson method. A level of 130 mg./100 ml. of venous blood or higher was considered positive. For some very young children, urine specimens were exam-

ined by the Tes-tape method. Relatives who screened positive were advised to see their physician for further study and diagnosis. If they felt they could not afford a private physician, they were advised to contact the health department for further information. Those returning to the health department were then handled according to local regulations. The referral physician or clinic made the diagnosis.

Results

During the 6-month period, 263 indigent diabetics in the five participating counties responded with information on their relatives. The distribution of the diabetics by age, race, and sex is shown in table 1. Their average age was 59 years. No effort was made to compare these respondents with diabetics from whom no information on relatives was elicited.

The diabetics identified 935 relatives, an average of 4 relatives per patient, and 452 relatives were tested. The percentage of relatives tested did not vary greatly by age except for a high response rate among children (table 2). In most screening programs in the general population the response rate in the older ages declines. It is possible that the direct, personal approach afforded by this casefinding method was responsible for the fact that the response rate did not fall off in the older age groups. Of course, the group was not large and other unknown, chance factors may have been operating in favor of this kind of response. Achieving

Table 3. Percentage of relatives tested by relationship to diabetic patient, five Florida counties, 1958

Relationship	Number named	Number tested	Percent tested
Father	13	7	53.8
Mother	28	17	60.7
Brother	83	25	30.1
Sister	121	57	47.1
Son	223	96	43.0
Daughter	291	155	53.3
Grandson	64	40	62.5
Granddaughter	61	41	67.2
Other blood relatives	51	14	27.5
Total	935	452	48.3

Table 4. Test results among relatives by age, five Florida counties, 1958

Age group (years)	Number of relatives tested	Number of diabetics found			
		Previously unknown		Previously known	
		Number	Rate per 1,000	Number	Rate per 1,000
Under 15	122	0	-----	0	-----
15-24	59	1	16.9	0	-----
25-34	56	0	-----	0	-----
35-44	67	1	14.9	0	-----
45-54	60	1	16.7	0	-----
55-64	35	3	85.7	2	57.1
65-74	21	1	47.6	2	95.2
75 and over	6	2	333.3	0	-----
Not stated	26	1	38.5	0	-----
Total	452	10	22.1	4	8.8

among the aged a response approximating the average rate for the entire group is particularly significant for casefinding purposes in view of the high prevalence of diabetes in this age group.

Table 3 shows the percentage of relatives tested by relationship to the diabetics supplying information. The female relatives had a higher response rate in each instance than the corresponding male relatives. The highest response rate was found in grandchildren, followed by parents, children, and siblings, in that order. The first column also shows the distribution of the relatives named according to relationship. As might be expected from the age distribution of the diabetic patients, the relatives most frequently named were children, siblings, and grandchildren. There were relatively few parents and only two grandparents (not shown separately).

Table 4 indicates that the rate for previously known diabetics among the relatives is 8.8 per 1,000 persons tested, which is equal to the recent national prevalence estimate for previously known diabetes (2). This is also similar to the rate of 9.6 per 1,000 obtained in other Florida casefinding programs in recent years. The yield in previously unknown diabetes was 22.1 per 1,000 persons tested. This is more than 2½ times the national estimated prevalence rate of

8.1 unsuspected cases of diabetes per 1,000 population and more than three times the yield of previously undiscovered cases in the average program reported to the Chronic Disease Branch, Public Health Service. In 64 screening projects with diagnostic information reported, the average program found 6 previously unknown diabetics per 1,000 tested.

Results by age among the relatives of diabetics follow a pattern similar to that in general population screening. The rate of diabetes discovered increases with age. Making use of this phenomenon could greatly increase the yield per person tested. If children under 15 years of age had been excluded, the yield would have been 30.3 previously unknown cases per 1,000 tested. If relatives under 35 years of age had been excluded, a yield of 41.9 per 1,000 tested would have resulted. This latter rate is over three times the rate of previously unknown cases found in screening adults in the general population in Florida. During the period September 1955 through January 1957, seven diabetes screening programs were conducted in the State among persons 30 years of age or over. In screening over 16,000 persons, a rate of 12.9 previously unknown diabetes cases per 1,000 tested was obtained.

All diabetes cases were found among the parents, children, and siblings of diabetic patients

Table 5. Test results among relatives by relationship to diabetic patient, five Florida counties, 1958

Relationship	Number of relatives tested	Number of diabetics found			
		Previously unknown		Previously known	
		Number	Rate per 1,000	Number	Rate per 1,000
Father	7	1	142.9	0	-----
Mother	17	3	176.5	0	-----
Brother	25	0	-----	1	40.0
Sister	57	2	35.1	3	52.6
Son	96	1	10.4	0	-----
Daughter	155	3	19.4	0	-----
Other blood relatives	95	0	-----	0	-----
Total	452	10	22.1	4	8.8

Table 6. Ratio of diabetic relatives per 100 diabetic patients responding to the program, by age of diabetic patient, five Florida counties, 1958

Age of patient (years)	Number of patients	Diabetic relatives			
		Previously unknown		Previously known	
		Number	Ratio per 100 patients	Number	Ratio per 100 patients
Under 35	15	0	-----	0	-----
35-44	17	2	11.8	0	-----
45-54	39	1	2.6	0	-----
55-64	75	2	2.7	2	2.7
65-74	70	5	7.1	2	2.9
75 and over	33	0	-----	0	-----

(table 5). These groups comprised the largest fraction of the relatives named.

Most of the diabetics were discovered among the relatives of patients who were 55 years of age and over (table 6). Patients under 35 years of age named no relatives who were found to be diabetics.

The results in finding previously unknown

Table 7. Comparison of the rates of previously unknown cases of diabetes among relatives of diabetics in Duval County, Fla., study 1947-50, and five Florida counties, 1958

Age group (years)	Duval County, Fla., study		Five Florida counties	
	Number tested	Rate of previously unknown diabetes per 1,000 tested	Number tested	Rate of previously unknown diabetes per 1,000 tested
Under 15	316	(¹)	122	(¹)
15-24	277	3.6	59	16.9
25-34	366	21.9	56	(¹)
35-44	342	52.6	67	14.9
45-54	201	89.6	60	16.7
55-64	154	116.9	35	85.7
65 and over	77	129.9	27	111.1
Not stated	8	(¹)	26	38.5
All ages	1,741	41.9	452	22.1

¹ No cases found.

diabetes cases in this study are not as great as those obtained in the Duval County study (1). The rates by age group in both studies are compared in table 7. No cases of diabetes among relatives under 15 years of age were found in either study. The greatest difference was in the age bracket 35-54 years in which the five-county project had a much lower yield. The factors accounting for these differences are not known.

Discussion

Screening relatives of diabetics has proved to be a practical method of finding cases of diabetes in Florida. Through a unique program of insulin distribution, indigent diabetics can be reached readily. Elsewhere, various ways can be used to develop similar programs. The relatively large diabetes clinics of most general hospitals and outpatient departments provide excellent sources from which to obtain a diabetic population. In some areas it may be possible to secure names of diabetics from local physicians cooperating in casefinding. Diabetics could be reached with informational materials through their physicians or pharmacists and invited to participate by referring relatives for testing. In general community casefinding programs all persons found to have diabetes should be interviewed to obtain information on relatives who could be offered a blood screening test.

In planning diabetes programs, we would reiterate suggestions often made but infrequently heeded, suggestions whose worth has been borne out again by experience in this project. Concerted education and information efforts greatly reduce misunderstandings and problems and improve participation all along the line. Personal interview or personal followup after distributing the initial questionnaire increases

participation by diabetic patients. Likewise, personal fieldwork improves the response rate of the relatives and their followthrough to diagnosis when indicated. Since a number of relatives were not screened because of working hours, some evening clinics seem to be highly desirable to improve response. Costs have not been studied in this project, but it is clear that a somewhat greater investment to insure a high response rate is warranted when the yield in previously undetected cases is high.

As previously indicated, the yield rate can be significantly increased by not testing persons under 15 years of age. Of course, this rule need not be followed strictly if it reduces rapport with diabetic patients and their relatives. It also may be desirable to test only grandparents, parents, siblings, children, and grandchildren if it is necessary to limit the program.

Summary

A total of 263 indigent diabetics in five counties of Florida named 935 relatives, of whom 452, or 48.3 percent, were tested for diabetes. The rate of previously known diabetes was 8.8 per 1,000 tested and the yield of previously unknown cases of diabetes was 22.1 per 1,000 tested. This yield is more than three times the usual yield in diabetes screening programs in general population groups. While the number of diabetics found was small, the results support previous findings that this is a practical casefinding method with a high rate of yield.

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