

The Insurability of Persons with Diabetes Mellitus

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HISTORICAL

Twenty-one years ago no one known to have diabetes mellitus could procure life insurance in the United States or Canada. While one can point to occasional exceptions, that generalization essentially reflects the underwriting practice of practically all substantial life insurance companies on this continent at that time. Today the diabetic patient under good medical control, with no complicating condition, can procure life insurance in almost any of these companies. This shift in underwriting attitude stems primarily from the dramatic increase in the diabetic patient's life expectancy since the discovery of insulin in 1922. There has also been an extension of classes of impaired risks accepted for substandard life insurance, as clinical and actuarial studies of the long-term prognosis of medically impaired lives have progressed.

Although the Sun Life Assurance Company of England was insuring diabetic persons in 1924, the Manufacturers Life Insurance Company of Canada is generally credited with being the first on this continent actively to solicit and insure diabetic individuals, beginning this practice in 1940. During the next ten years this company had insured 550 diabetic persons, 76 per cent of them in the United States, 20 per cent in Canada and 4 per cent elsewhere.¹ By the mid-forties, a few other companies had begun to accept diabetic risks.

Shortly after 1950, the practice of issuing life insurance to persons with diabetes had become almost universal among life insurance companies in the United States and Canada. The experience of the Fidelity Mutual Life Insurance Company exemplifies the general trend. This company first offered insurance to diabetic persons in 1950. Today diabetes ranks fifth in frequency among medical impairments compatible with insurability on a modified premium basis and fourth among those which are declined insurance on any basis. It accounts for 5 per cent of cases limited to substandard insurance and 6 per cent of those declined.

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With diabetes, as with many other conditions, it is not the presence or absence of the impairment but its severity, complications and amenability to medical control that determine insurability. Furthermore, in the individual action, a number of factors beyond the main impairment may influence final decision.

EARLY REQUIREMENTS FOR INSURABILITY

In the beginning, no diabetic person was considered insurable unless he was between thirty and sixty years of age, had been under careful medical supervision for three years, was considered to be a diligent patient of good economic status, had remained under good medical control with urine sugar-free most of the time, and was found completely free from any evidence of vascular complication or associated impairment of health. Applicants with blood pressure above 140/90 were excluded. Albuminuria, cylindruria or eye ground change was considered cause for declination. Electrocardiogram and X ray of the chest were required for diabetic applicants over age forty, for those applying for \$10,000 of insurance, the maximum issued at first, and for any whose diabetes had existed ten years. Abnormality in electrocardiogram or X ray was ground for declination. As late as 1949, 59 per cent of diabetic applicants failed to meet these rather rigid requirements and were declined for insurance. Only 19 per cent were found acceptable. Many, 22 per cent, dropped their applications without completing all appraisal requirements.

PRESENT INSURABILITY REQUIREMENTS

Insurance appraisal of the diabetic applicant is initiated by preliminary information from the applicant himself, submitted by way of the company's agent. A résumé of patient's record is requested from the attending physician and constitutes a major source of clinical data essential to risk evaluation. The customary examination by a qualified company medical examiner is then arranged, unless preliminary review has definitely excluded possibility of risk acceptance.

To be insurable at the most favorable premium rates our company now offers to persons with diabetes, the following requirements must be met:

- Age fifteen to sixty-five
- Good economic grade
- Personal history and habits satisfactory
- Average or near average weight
- Blood pressure not over 140 systolic or 90 diastolic
- Diabetes duration not over twelve years
- Diabetes controlled by 60 units or less of insulin daily
- Diet adequate to support normal weight and activity
- Urine sugar free in majority of specimens
- Blood sugar levels never over 160 mg. fasting or 250 mg. postprandial (Folin-Wu)
- No history of acidosis, or frequent or severe hypoglycemic reactions
- Good peripheral circulation
- No retinopathy, electrocardiographic abnormality or abnormality of X-ray findings
- Regular medical supervision, at least once a year.

The above requirements of the Fidelity Mutual Life Insurance Company are reasonably representative of general insurance practice today but will differ in some details in various companies. Neither clinical nor insurance opinion is fully stabilized as to factors affecting the diabetic patient's length of life.

During recent years, 35 per cent of our diabetic applicants have satisfied the above very selective criteria. An additional 36 per cent have still proved insurable on some basis because their departure from the basic criteria was not too great. Acceptable departures from basic requirements have chiefly been questionable control as evidenced by mild hyperglycemia or moderately excessive glycosuria, need of more than 60 units of insulin daily, diabetes duration exceeding twelve years, excessive weight or a blood pressure slightly above 140 systolic or 90 diastolic.

Diabetic applicants with marked departures from the above criteria have been considered uninsurable. In our recent experience, 29 per cent of diabetic applicants have proved uninsurable on any basis, chiefly because they have been found to be under obviously poor medical control, or have had frank hypertension or other impairment in addition to the diabetes. Most commonly, the associated impairments have been vascular.

DATA ESTABLISHING ORIGINAL DIAGNOSIS

Data on which the original diagnosis of diabetes has been based are important and can influence the basis

of insurability in the borderline case. A negative definition best serves brevity. For insurance purposes, our office considers an applicant nondiabetic if both his fasting blood sugar level and his two-hour level have remained below 120 mg. in venous blood by the Folin-Wu technic, a slightly higher level being permissible in two-hour capillary blood, by the Folin-Malmros method. With the Somogyi or similar method, these levels should not exceed 100 mg. With such blood sugar findings our office has disregarded glycosuria in any degree and has disregarded high peaks in the blood sugar curve.

An occasional applicant whom our company would consider as nondiabetic, as defined above, may be under medical observation because of glycosuria and a "high peak" in a sugar tolerance curve which is otherwise normal. Although many clinicians may consider such borderline cases as "potential diabetes" or "mild diabetes," insurance at standard rates is sometimes possible.

Detailed analysis of blood sugar studies in the clinical laboratory of the Fidelity Mutual Life Insurance Company has been previously recorded.² A later study by this company, on policies issued from 1935 to 1958, followed to policy anniversary in July 1959, covered 4,966 years of exposure on such normoglycemic glycosuria cases. All of these policies were issued at standard premium rates. During that quarter century, there were twenty-three deaths in this normoglycemic glycosuria group, whereas we would have expected a fraction over thirty deaths among a similar number of the general class of standard insured policyholders of same ages during this period. The fact that the mortality of these normoglycemic glycosuria cases was somewhat more favorable than the mortality of standard policyholders in general was very probably because of more rigid selection of the glycosuria group in other respects.

COMMENT ON VARIOUS QUESTIONS RELATING TO INSURABILITY

Much of diabetes underwriting must rest on medical judgment. Insurance experience is still meager. Changes in empirical underwriting rules appear from year to year as experience grows. Many diabetic persons who were considered uninsurable not long ago are considered insurable now. Some classed as uninsurable now will undoubtedly be considered insurable in the future as careful observation, recording and study replace clinical impression.

How soon after diagnosis is the diabetic patient insurable? Originally he needed to wait three years. Today, the patient with mild diabetes is usually consid-

ered insurable as soon as it is evident that he has come under good medical supervision and control. Sometimes that is almost immediately.

Does the length of time a person has had diabetes affect his insurability? Duration of diabetes affects the cost of insurance. Higher death rates have been anticipated among persons whose diabetes has existed more than ten or twelve years because of the high incidence of complications shown by numerous clinical studies. One of the more recent of such studies is that of MacNeal and Rogers³ who in 103 diabetic patients found 53 per cent with retinopathy, 37 per cent with some heart impairment, 12 per cent with impaired PSP excretion, 8 per cent with albuminuria and 32 per cent with peripheral vascular disease. Barker's⁴ recent observation of insured lives, however, suggests that past duration of diabetes may influence death rate among diabetic persons less than has been anticipated, when absence of complications has been demonstrated by careful medical study.

Are juvenile diabetic patients insurable? Not today, in most companies. Our office has discouraged applications from diabetic persons under fifteen years of age, although some companies set age ten as the lower limit. The writer has reviewed most of the medical records of youthful campers at the Pennsylvania Camp for Diabetic Children. Records here from 1936 to date indicate that not many with juvenile diabetes can meet present insurability criteria as related to degree and stability of control. Of diabetic persons who have completed applications for insurance, 56 per cent below age twenty have proved insurable; at age twenty to twenty-nine, 67 per cent; at age thirty to thirty-nine, 86.5 per cent; at age forty to forty-nine, 67 per cent; at ages above fifty, 71 per cent; at all ages, 71 per cent. At young ages one meets the frequent problem of diabetes which is severe; at older ages one meets the frequent problem of vascular degeneration.

Does the amount of insulin needed by the diabetic patient affect his acceptability? Amount of insulin needed is considered an index of severity of diabetes. At first only those who could be controlled with 50 units or less daily were considered acceptable. Today, 75 units is a common upper limit for acceptance but patients needing over 50 or 60 units must usually pay a slightly larger premium for insurance.

What is the attitude of insurance companies toward diabetic patients who are being treated with the newer oral preparations? Opinion in insurance circles, like clinical opinion, differs widely. Some insurance medical officers⁵ have hesitated to consider orally treated pa-

tients acceptable on any basis. Some have considered them insurable but not eligible for so favorable a premium as patients controlled by insulin. In our office we have considered patients well controlled by diet alone as the most favorable of all, with patients well controlled by phenformin hydrochloride, tolbutamide, chlorpropamide or similar preparation, and patients controlled by small amounts of insulin in about the same category.

What is meant by "good control," for insurance purposes? The diabetic patient is considered under good control if he is on a well-balanced diet adequate to support normal weight and activity, voids specimens which are sugar-free most of the time and has shown periodic blood sugar levels not above 160 mg. fasting or 250 mg. postprandial by the Folin-Wu method. True blood sugar levels should be about 20 mg. lower. Degree of control is unknown in patients who rarely report to their physicians and such persons must be considered uninsurable. In uncomplicated diabetes, knowledge of good control is the most essential requirement for risk acceptance. Our office has examined a number of otherwise intelligent diabetic applicants who have been overconfident in self-control of diabetes and who at examination have revealed 3 per cent or more of glucose in a random urine specimen, with two or three hour postprandial blood sugar of 300 mg. or more. A favorable influence might be exerted on patient and physician alike if no diabetic patient were accepted for insurance unless he has habitually reported to his physician at intervals not exceeding six months.

Are patients with vascular complications insured? Evidence of vascular disease, such as absent dorsalis pedis pulses, vascular changes in eye grounds, and urinary findings suggesting nephropathy render the diabetic applicant uninsurable. While there has been a recent trend toward acceptance of some with slightly abnormal vascular findings, such acceptances are exceptional. Rigid requirements as to healthy blood vessels persist in spite of the fact that certain changes, such as demonstrable calcification of peripheral vessels, can sometimes be compatible with long life. A diabetic officer of our company, for example, had an X ray of lower leg because of injured ankle at age sixty-five in 1932. X ray revealed marked arterial calcification. This officer rarely missed a day of work, retired at age seventy-eight and died at age eighty-five, twenty years after frank calcification was demonstrated. The symptom of intermittent claudication did not appear until a few years before death. Diabetes was known to exist for over twenty years but record fails to show date of

onset. Although many clinicians can, from their records, exemplify similar long survivals with peripheral calcification, the individual with such findings is not today considered an acceptable risk for insurance.

How important are the electrocardiogram and X ray of the heart and lungs in diabetic risk appraisal? Our office does not require such studies of the diabetic applicant unless he is over fifty years of age, has had diabetes for over ten years or is applying for over \$50,000 of insurance. Findings of prior electrocardiographic and X ray studies have frequently been included in reports from attending physicians. Only rarely have findings been reported as abnormal, probably because 62 per cent of our diabetic applicants have been under age forty and because over three fourths of them have had diabetes ten years or less. The high incidence of coronary deaths noted by Barker⁴ and others suggests that companies which require an electrocardiogram almost routinely may be wise. Chest X ray may be a little less essential. Tuberculosis is rare in the economic class represented by insurance applicants. Abnormality of heart and great vessels, as revealed by X ray, is perhaps not much commoner among diabetic persons than among the nondiabetic, at identical ages. The writer⁶ some years ago measured transverse diameters of heart and of frontal aortic silhouette in photofluorograms of 1,053 diabetic patients of Philadelphia clinics. These diameters were compared at various weights and ages with similar measurements on photofluorograms of 1,000 nondiabetic clinic patients. Thus analyzed, incidence of X ray abnormality of heart and aorta was not remarkably greater among diabetic than among nondiabetic patients, when age and build were identical. Photofluorographic technic, in the review mentioned, was inadequate for reliable study of aortic calcification.

What is the attitude of the insurance medical officer toward diabetic applicants on "free diet?" Such applicants generally fail to meet life insurance criteria for good diabetes control, if we define this therapeutic method as weight control with absence of ketonuria, disregarding hyperglycemia and disregarding degree or constancy of glycosuria. Weight control alone provides adequate diabetes control for some patients and these would be considered insurable, regardless of therapeutic terminology applied. Conservative medical management, as opposed to the "free diet" hypothesis, has been evident among most of our diabetic applicants.

LIFE EXPECTANCY AND DEATH RATES OF DIABETIC PERSONS

Life insurance experience has been of relatively short

duration and information concerning long-term prognosis in diabetes is, therefore, available only from clinical sources. The latest of a series of statistical studies of Joslin Clinic patients by the Statistical Department of the Metropolitan Life Insurance Company⁷ was released in 1957. This analyzed experience for the period 1947 to 1951 on patients first treated at the clinic in the years 1930 through 1951. The diabetic person at age ten was found to have a life expectancy of 44.3 years compared with 61.5 years at age ten in the general population; at age twenty, 36.1 years compared with 51.9 years; at age thirty, 30.1 years compared with 42.5 years; at age forty, 23.7 years compared with 33.3 years; at age fifty, 16.9 years compared with 24.7 years; at age sixty, 11.3 years compared with 17.2 years. In this study, diabetic life expectancy was almost three fourths of normal at ages ten to fifty; about two thirds of normal at age sixty.

Death rate among diabetic patients, as observed in the same study, was seven times the death rate in general population at age twenty; about ten times at age thirty; almost four times at age forty; about two and three-quarter times at age fifty, and about two and two-third times the death rate of the general population at age sixty.

In the above analysis, it must be remembered that the recorded death rates among clinic patients were among them all, with or without complications and regardless of severity or duration of diabetes or its degree of control. Diabetic persons accepted for insurance are without serious complications and are under adequate control. Mortality assumptions used by insurance companies are, therefore, based on expectation of lower death rates than those shown in the above study of clinic patients.

MORTALITY STUDIES OF INSURED DIABETIC PERSONS

Mortality studies of insured persons with diabetes must at present be considered as reflecting short-term prognosis. Sizable insured groups have only recently become available for observation and study. Published insurance experience is still meager. Studies to date, however, suggest that among carefully selected diabetic patients, meeting criteria outlined in this discussion, the mortality in early years after issuance of insurance may be relatively favorable, not very far above the mortality of the general body of standard insured policyholders. This is to be expected, as it is the vascular complications in diabetes that cause most of the deaths and these complications do not become common among diabetic patients until they have had diabetes for ten years

or more. The earliest insurance experience is Montgomery's 1947 review⁸ of 373 diabetic policyholders of the Manufacturers Life Insurance Company of Canada, with one death, the expected mortality not being stated. Montgomery later¹ estimated that diabetic policyholders of this company were showing a death rate from one and one-half to two times that of the company's general class of standard policyholders and commented that this experience was heavily weighted with recently acquired cases. At the time of this later review, the Manufacturers Life had insured 550 persons with diabetes, thirteen of whom had died.

The Fidelity Mutual Life Insurance Company began insuring persons with diabetes about ten years ago. This company's experience is too short and too small to be meaningful from the statistical standpoint but to date reflects the rather favorable mortality picture that can occur in the early years after patients have met standards of insurability. With an insurance exposure of 581 policy years, there have been three death claims, approximating one and one-half times the number expected among an equal number of this company's standard policyholders of same age and during the same period of exposure. Coronary occlusion caused all three deaths.

Barker⁴ in 1959 summarized mortality experience of the Connecticut General Life Insurance Company as related to 777 policies issued to diabetic persons in the years 1946 through 1957, followed to policy anniversaries in 1958, and involving ten million dollars of insurance. Average duration per policy was five years, a short exposure for study of prognosis in diabetes. Seventeen persons with diabetes insured under twenty-three policies died during the period reviewed. The death rate among the diabetic insured was one and three-quarter times the death rate of this company's standard insured policyholders of similar age during the same period.

The foregoing relates to the entire class of diabetic policyholders. A favorable subgroup, including 468 policies and 60 per cent of all diabetic cases insured, was separately studied. Criteria for these include normal chest X ray and electrocardiogram in all cases and in other respects approximate criteria of the Fidelity Mutual, described earlier. These, the most favorable cases, revealed only three deaths in the same period and a death rate actually lower than that of standard policyholders in general. This portion of the study again illustrates the tendency for mortality to be relatively favorable in the early years after diabetic persons have met basic insurance requirements. It also suggests how

vital to prolongation of diabetic life is good weight control, conservative medical supervision and a diligent attitude on the part of the patient in following adequate medical advice.

Among the remaining 309 diabetics accepted for insurance not in this favorable class, chiefly because of moderate overweight, moderate elevation of blood pressure, larger insulin requirements, glycosuria, or inadequate dietary control or medical supervision, the death rate was over four times the death rate of standard policyholders in general.

Of the seventeen deaths in the entire study recorded by Barker, coronary heart disease caused twelve, and cerebral hemorrhage and diabetic acidosis one each.

SUMMARY

Persons with diabetes were first able to procure insurance on this continent in 1940. In the early stages of appraising such risks for life insurance, only one in five met requirements for acceptance. Today, almost three fourths of adult diabetic applicants are found to be insurable. Early diagnosis and treatment, resulting in part from over a decade of publicity and effort related to the annual Diabetes Detection Drive, have undoubtedly augmented this favorable trend. Presently anticipated mortality among insured diabetic lives is only a fraction of the mortality observed in the past among unselected clinic patients. Present insurance rates reflect this more favorable prognosis. Insurance mortality studies have to date justified the optimistic prognostic prediction regarding patients whose diabetes is diagnosed early, is uncomplicated and is under conservative medical control.

SUMMARIO IN INTERLINGUA

Le Assecurabilitate de Personas con Diabete Mellite

In iste continente diabeticos poteva obtener assecurantia le prime vice in 1940. In le prime tempores del evaluation del riscos in le assecurantia del vita, solmente un applicante in cinque poteva satisfacer le requirimentos pro le acceptation. Hodie quasi tres quartos del adulte applicantes diabetic es considerate como assecurabile. Iste tendentia favorabile sin dubita ha essite accelerate per precoce diagnose e tractamento, le qual resulta in parte de plus que un decennio de publicitate e effortio relative al annual Campania de Detection de Diabete. Al presente le mortalitate expectate inter diabeticos assecurate es solmente un fraction del mortalitate observate in le passato inter non-seligite patientes de clinica. Le presente premios de assecurantia reflecte ille plus favorabile prognose. Studios de mortali-

tate assecurantal ha usque nunc justificata le prognose optimistic in re le patiente con un diabete diagnosticate de bon hora e sin complication, qui es sub tractamento medical conservatori.

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⁴ Barker, N. J.: Paper presented at Annual Meeting of the Canadian Life Insurance Medical Officers Association, Niagara Falls, Canada, April 24, 1959.

⁵ Diabetes: Panel Discussion. *Proceedings Medical Section of American Life Convention*. 55-80, 1953.

⁶ Sheridan, J. T.: Unpublished data collected at time of Philadelphia 1945-47 Tuberculosis Survey, among 3,106 diabetic clinic patients.

⁷ Longevity of Diabetics: *Statistical Bulletin*, Metropolitan Life Insurance Company, New York, N. Y. Volume 38, March 1957.

⁸ Montgomery, R. C.: Some observations concerning the insurability of the diabetic. *Journal of the American Society of Chartered Life Underwriters*, Sept. 1947.

Two aspects of the composition of the diabetic diet continue to receive attention. The first is the effort to provide carbohydrate in a form which can be better utilized by the diabetic than glucose. Fructose is known to be metabolized by the liver in the diabetic state at essentially normal rates. The comparatively rapid rate at which fructose is converted to glucose by liver, intestine and perhaps other tissues in the diabetic makes the added expense of substituting fructose for glucose hardly practical. The possible usefulness of sorbitol in diabetic diets was first suggested by Thannhauser in 1929. Although this sugar alcohol enters the metabolic processes of the liver by conversion to fructose, its slow rate of intestinal absorption is advantageous in diabetes (*Nutrition Reviews* 14:236, 1956; W. H. Olmsted, *Diabetes* 2:132, 1953).

The blood sugar changes which occur in diabetic patients when eating 200 gm. of an ice cream containing 36 gm. of sorbitol have been reported by C. R. Shuman, R. L. Kemp, R. Coyne and M. G. Wohl (*Am. J. Clin. Nutrition* 4:61, 1956). In mild or moderately severe diabetic patients the feeding of sorbitol ice cream as addition to the usual diet did not significantly alter the diurnal blood sugar in some patients with severe diabetes. E. P. Joslin (*Treatment of Diabetes Mellitus*, Tenth Edition, Lea and Febiger, Philadelphia, 1959) comments favorably on the use of sorbitol as a glucose substitute and sweetening agent in diabetic diets. Sorbitol would appear to have promise in providing slowly absorbed carbohydrate between meals and at night for

individuals prone to hypoglycemic attacks.

The second aspect of the diabetic diet which has received current attention concerns the possible harmful effect of fat in the diabetic diet. The suspicion is widespread that the diets with a high proportion of calories as saturated fatty acids formerly advocated in diabetes may have promoted the development of atherosclerosis. The enhanced frequency with which diabetic patients fall victim to many of the complications of atherosclerosis makes the possible role of diet in this process of great significance. The recent experimental findings demonstrating a cholesterol lowering effect of unsaturated fatty acids of the linoleic type (*Nutrition Reviews* 15:1, 1957) suggests that this information be translated into recommendations concerning the sources of fat permitted a diabetic patient. However, direct evidence of the protective effects of unsaturated fatty acids upon the development of the atherosclerotic lesion in man is still lacking, making major qualitative shifts in fatty acid intake unjustified.

Measures which achieve a moderate increase in unsaturated fatty acids without altering the type or taste of foods in the present menu can have little objection. This limited goal can be achieved by substituting certain vegetable oils and margarines of high content of unsaturated fatty acid for saturated fats widely used at present. It is hoped that clarification of this important question will soon be forthcoming.

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