

**TRANSACTIONS OF SOCIETY OF ACTUARIES
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**DIGEST OF DISCUSSION OF SUBJECTS
OF SPECIAL INTEREST**

INDIVIDUAL LIFE INSURANCE

Underwriting

A. Substandard

1. Under the numerical rating system for medical impairments, to what extent have companies relied on redundant extra premium charges in using underwriting debits lower than the extra mortality to be expected?
2. Do recent improvements in mortality indicate that the upper limits of the range of acceptance of risks in the standard class might be raised?
3. Has any meaningful experience yet emerged with respect to certain impairments which have been underwritten in recent years on a more or less experimental basis, such as diabetes, coronary artery disease, etc.?

B. Miscellaneous

1. What recent liberalizations have been made in accepting private pilots at standard rates? What are the statistical data supporting these changes?
2. What underwriting problems have arisen in connection with Cuban refugees?

Jacksonville Regional Meeting

MR. ALTON P. MORTON: Companies have, in meeting competition, relied in some small degree on any redundancy in extra premiums; they are thus merely recognizing the downward secular trend in mortality rates. Substandard extras, determined only a few years ago, are probably a little redundant at some ages in relation to currently emerging mortality levels.

The counsel of perfection would seek objective underwriting based on up-to-date debits, translated into extra premiums, determined from the most recent available data and resulting in the fairest possible charges. However, substandard extra premiums can only be modernized from time to time and at each revision the actuary must help the underwriter modernize any of his debits which may have been shaded a little in reflecting formerly redundant extra premiums.

Analogous to this problem was the somewhat common habit of actuaries, in setting gross premiums years ago, of understating the rapidly rising expense rates as an offset to redundant mortality charges contained in the outdated mortality tables used. While the resulting premiums were

gross guesses as to over-all adequacy, the only fair way of pricing is to find the proper cost ingredients and charge for them directly.

The application of the numerical rating system to modern medical impairments is similar and it behooves any company to keep extra premium charges reasonably modern and to use realistic debits based on the most modern available mortality statistics.

MR. FRANK G. WHITBREAD: The wording of the first question of section A implies that extra premiums have been redundant, that debits are a minimum measure of extra mortality, and that some system other than numerical rating might have avoided the situation implied.

In the infancy of the numerical rating system debit figures were approximately equal to the extra percentages of mortality above standard and extra premiums were based on similar mortality. Perhaps because of this and the resulting practices, many actuaries, underwriters, and medical directors assume that:

- (1) mortality studies should measure mortality as a percentage of some acceptable standard;
- (2) for premium calculation purposes, the mortality percentage experienced for a given issue age over the relatively short period of a study should be assumed to continue as a level percentage throughout life;
- (3) the extra percentage of mortality is the debit figure;
- (4) risks should be grouped in classes or tables in which debits are identical for all issue ages; and
- (5) the dividing line between standard and substandard is a level percentage at all ages, e.g. 120%.

These assumptions have tended to hide the primary aim of underwriting impaired lives, which is the determination of an appropriate dollars and cents charge to cover extra hazard.

Competitive pressures, as well as the need for proper charges, make necessary the revisions of ratings for particular impairments as often as additional information permits, although it is not practical to change extra premium scales very frequently. Allowance for a mortality standard different from that underlying the calculation of extra premiums requires some modification of the concept of equality of debits and extra percentage mortality but should not create the impression that the extra premiums are redundant.

In *TSA II* Mr. Pearce Shepherd said, "The various price classes must be of an arbitrary nature and do not necessarily bear any relationship to our current standard mortality, which is varying all the time. There is no particular need to change price ranges very often, but we must change

our labels from time to time as evidence indicates that certain impairments can be treated more liberally.”

It is well to recognize that changes of the past forty years have led necessarily to changes from the early conceptions of the numerical rating system and in the resulting assumptions which I listed above.

The Joint Build and Blood Pressure Study showed, when measured by the standard mortality of the study, extra percentage mortality in many areas markedly in excess of the debits in use for some years. As our extra premiums had not been changed for some years, we in the Lincoln National felt the time had come to change the mortality basis for extra premiums so that debits for high blood pressure would more nearly approximate the excess mortality on a current mortality base. This seemed preferable to modifying the debits to fit the existing premium basis. One reason for this preference was the growing impression that our extras were redundant which in turn encouraged extremely liberal underwriting.

An analysis of our substandard business by class or table rather than by impairment revealed that for younger issue ages the mortality percentage continues level until about age 55 and then gradually decreases. Apparently class mortality never reaches standard but may reach 115% in the seventies for the lower substandard classes and in the eighties for the higher classes. With increase in issue age the period of level mortality percentage gradually decreases; for issue age 60-69 some decrease in percentage becomes evident after 5 years. In setting up Lincoln's revised schedule of extra premiums in December 1961 we used a more modern table and also recognized the above experience by assuming some decrease in mortality percentage at the older attained ages. To the extent our former extras presumed a lifetime level percentage they might be considered redundant.

The change in mortality base, rather than suggesting redundancy, raises the question of the need for increasing all debits to offset the lower basic mortality. About six weeks ago Lincoln materially increased ratings for elevated blood pressure. These increases automatically carry over to other impairments which are commonly associated with hypertension. We are hopeful that this, together with closer attention to CVR factors in family history, will preclude the need for increased debits on any other impairments for a while at least.

MR. JOHN J. BYRNE: We, at the Lincoln National, made a three-pronged attack on the problem of modernizing our substandard pricing mechanism. First, a major revision of extra premiums was computed, resulting in reductions of 10% to 30%, with the smaller reductions occur-

ring at the higher ages. Recognizing declining mortality ratios by policy duration, we used as a standard the 1958 CSO basic table with a percentage loading which decreased at the upper ages. Second, we made changes in some of our major classifications of impairments, such as high blood pressure and diabetes. Third, we anticipate that any lack of tightness in underwriting will be corrected by stricter application of rules under the new premium schedule.

MR. DONALD J. VAN KEUREN: The customary practice of expressing substandard class limits in terms of level percentages of standard mortality for all ages is suitable only so long as it produces desired results. Among these are reasonable equity between the best and worst lives and, for any given plan and age, a series of standard and substandard premiums differing from class to class by reasonable amounts.

If the first substandard class mortality is a small added percentage of standard mortality rates the extra premium may be only a few cents at the younger ages where recent mortality experience indicates standard rates of 1 or 2 deaths per 1,000. This is not suitable from the merchandising viewpoint. However, at higher ages where standard mortality may be 10 or 12 deaths per 1,000, the same percentage extra mortality may produce quite acceptable premium increments.

These considerations have led us at the Metropolitan to adopt classification limits which are higher at the young ages and which vary by age. Our limits of standard mortality have been, since the beginning of 1960, 140% at ages 15 to 29, 130% at ages 30 to 39, and smaller limits for older ages.* At ages under 15 a 185% limit is used in order to avoid an impractical small extra premium for the first substandard class. Along with these higher thresholds, corresponding changes were made in upper limits of our first substandard class to maintain a suitable span of mortality percentages within the class.

It is interesting to speculate on the use of extra deaths per 1,000 as a measure of the class limits. An advantage would be fairly constant premium increments, although probably these too would need to be adjusted by age. The use of percentages has been so deeply instilled into our practice that much stronger arguments would be needed to justify a change to another system.

MR. NORMAN F. BUCK: The Lincoln National has been underwriting cases of diabetes, coronary artery disease, and chest pain for about 15 years. Reports on the experience have been presented before the Medical Section of the American Life Convention.

* **MR. WHITBREAD** quoted these same percentages for the Lincoln and added that at age 40 and up their limit is 120%.

A report entitled "Coronary Artery Disease and Chest Pain—A Continuing Experiment" was presented in 1958, based on issues of 1947 through 1956 carried to 1957 anniversaries. It covered 6,611 policies and 26,256 policy years of exposure with 182 deaths. While this was a relatively small and by no means mature experience, nevertheless meaningful patterns emerged.

Moreover, the results neatly confirmed an experimental method devised to grade the hazard all the way from well-diagnosed coronary episodes down to the vaguest chest pains. Under this method chest pain cases were classified on the basis of such factors as the location, quality and radiation of the pain; its onset, duration and frequency; family history; the presence or absence of hypertension, arteriosclerosis, and other cardiovascular disease. The definite coronary cases produced a ratio of actual to standard mortality of 416%. The chest pain cases showed 158% in total, grading smoothly down from 215% to 115% according to degree of resemblance to coronary cases.

"A Mortality Study of An Insured Diabetic Population" presented to the Medical Section in 1961 covered 8,918 policies with 52,345 exposure years and 633 deaths; it involved issues of 1946 through 1959 carried to 1960 anniversaries. This experience was large enough to provide significant patterns and clearly showed substantially higher mortality than anticipated.

One of the problems in studying the impairment is heterogeneity of the material due to the many factors affecting results. Among these are blood pressure, build, age at diagnosis, insulin dosage, duration of diabetes, and insured's age at time of issue, urinalysis, and degree of control of the diabetes. Three factors in particular carried markedly increased mortality ratios: poor control of diabetes, young age, and the presence of any other major impairment.

The over-all mortality ratio for the study was 382% of standard mortality. Because of interdependence of many of the factors the analysis is too complex to summarize here. Anyone not having access to the reports mentioned above, in the ALC *Proceedings*, is invited to request copies from the Lincoln National.

MR. MORTON: The Prudential conducted an experimental program for accepting unusual cases. These included unusual diabetics, chest pain cases, coronary histories, and miscellaneous other unusual and infrequently occurring impairments. Mortality studies showed that the fairly high ratings applied were well confirmed. Our experimental underwriting of fairly recent coronary cases showed that out of more than 100 cases to which very high ratings were applied last year, about 80% were not-taken;

this indicates the high cost of underwriting that must be borne by the cases actually placed.

DR. GOTTFRIED BERGER: My company, Cologne Reinsurance Company (West Germany), has had experience in underwriting substandard risks since World War I. Our approach has tended to emphasize the experience rating method versus a strict numerical rating system. Our underwriters are medical doctors with practical experience; their ratings are subject to statistical control.

We have a so-called declined risk pool in which nine European reinsurance companies participate. If a risk is declined by one of these nine companies, it may be accepted in the pool if three of the companies can agree on a rating. Of course, we have to limit the sums which can be insured by this pool. No data are available yet on the pool's experience; there have been only a few deaths so far in the 3 years of the pool's operation. Nevertheless, there has been an upward trend in acceptance limits due to over-all success of the pool.

MR. CHARLES M. STERNHELL: Concerning section B, the New York Life "joined the parade" in liberalizing ratings for certain private pilots in March of this year. We reduced our ratings from \$2.50 per \$1,000 to standard on two classes of pilots:

- a) those who have 100-399 solo hours experience and fly 100 hours or less annually, and
- b) those who have 400 or more solo hours and fly 200 hours or less annually.

The second question in subsection 1 is a little harder to answer. The intercompany experience for private pilots flying 100-199 hours a year was about 2.6 deaths per 1,000 in the period 1955-59. While pilots under age 27 and those with less than 400 solo hours were included, the volume of such cases was relatively small and should not materially affect the experience. The intercompany experience was more favorable for pilots flying less than 100 hours a year; this group, consisting largely of pilots with 100-400 solo hours, showed an aviation fatality rate of about one death per 1,000, which is within range for standard rate consideration.

In examining private pilots' death rates from all causes we found that deaths from nonaviation causes appear to be substantially higher than for standard risks generally. In particular the accidental death rate was high, indicating that private pilots may also participate in other avocations involving a considerable accident hazard.

In analyzing our business on private pilots we found their average policy size to be over \$30,000 or about 3 times the average size of all new issues. This characteristic would indicate some expense savings, to the

extent the higher average is not reflected in premiums, although any such savings would fall far short of the extra aviation deaths anticipated among these private pilots.

While we recognize that we were "stretching" a bit in accepting most private pilots at standard rates, we felt that being seriously out of line with our major competitors in this area would have created problems far out of proportion to the volume of business involved.

MR. VAN KEUREN: In addition to the usual requirements in underwriting private pilots dealing with minimum solo hours, annual flying time and age, there are also requirements relating to maintenance of aircraft and the presence of special hazards dependent on terrain and type of flying.

Regarding solo hours the reports of the Committee on Aviation indicate a fatality rate during instruction periods about one-third that of pilots in pleasure flying but about double that of pilots in noncommercial business flying. In any case, completion of training and minimum solo hours seem to be reasonable requirements of applicants as indication of emerging flying patterns.

The reports do not clearly indicate rising fatality rates with increasing annual flying time nor any leveling off for a large number of hours. The experience consistently shows a lower fatality rate when annual flying time is less than 100 hours. Over the years 1955-60 the rates shown per 1,000 pilots are: 1.1 fatalities for less than 100 hours, 3.3 for 100 hours or more, and 2.7 for 100-199 hours.

As to age of pilot the 1954 report of the Committee showed the lowest fatality rates at ages 30-34, for all classes of flying combined, with substantially higher rates for ages under 30 and somewhat higher for ages 35 and over. Some information on the effect of pilot's age is provided in statistics published by government agencies such as CAB's Statistical Review of General Aviation Accidents in 1959, and the Federal Aviation Agency *Statistical Handbook*. The latter gives an age distribution of licensed private pilots, although, lacking an indication of the amount of flying, it probably overstates the exposure; so far as the figures go, however, they indicate the lowest fatality rates at ages 25-39, with the rates about 25% higher for ages under 25 and ages 40-59. For ages 60 and up the rate is appreciably higher although based on a small number of deaths. Despite the unknown incidence by age of the probable overstatement of exposure it is evident we should not assume that the favorable rates at ages 25-39 will continue for life.

The CAB report mentioned above also tabulates fatal accidents by factors relating to cause. Lacking exposure data, their effect on fatality

rates is a matter of opinion. However, noting that, of 249 fatal accidents in pleasure and personal business flying, two-thirds occurred among pilots with more than 300 hours experience and nearly three-fifths with over 1,000 hours, one can conclude that fatal accidents are not limited to pilots with little experience.

The study showed weather to be a factor in about one-third of the accidents. CAB reports on accident investigations show an impressive number involving an experienced pilot who took off into or continued his flight in adverse weather or continued a flight in darkness when not qualified for instrument operation. This evidence suggests that the underwriter should seek information about the applicant's character as well as his experience and his annual flying time.

It seems to me that the available information justifies granting standard insurance to selected private pilots flying relatively few hours per year provided they qualify as to training and financial ability to maintain their aircraft and do not engage in hazardous types of flying, and also provided the extra mortality does not exceed the company's limit for standard. In addition, greater selectivity is needed for issue ages under 25 and over 40, since at these ages increased mortality rates are to be expected.

MR. HARWOOD ROSSER: With regard to subsection 2, the Gulf Life has considered a limited number of applications from Cuban refugees and we have been highly selective in this regard. We do not care to accept a risk if there is any chance of his return to Cuba. This boils down to applying certain requirements as follows: (1) employment preferably in at least a semiprofessional, stable, and reasonably well-paid occupation; (2) ability to speak English; (3) evidence of permanency, such as home-buying, citizenship application, etc.; and (4) the spouse must also be in this country. As a practical matter this represents practice rather than experience, since most of our applicants have menial jobs or can't speak English.

MR. WILBUR H. ODELL, JR.: The unusual factors in underwriting short-term residents generally are:

1. Meager background information: attending physicians' statements and prior inspection coverage often unavailable; poor English leads to misrepresentation, difficult to detect.
2. Adaptation problems: language, and family separation; symptom is lack of steady employment in suitable occupation.
3. Unreliable inspection report due to language difficulties with informants.
4. Relatively high acquisition costs due to multiple inspections, etc.

Prudential's normal practice is to accept only if plans are evident for permanent residence in the U.S. or Canada.

Regarding Cuban refugees, additional problems are present:

1. Most do not have permanent visas.
2. Political hazards exist, e.g., underground and "cloak and dagger" activities not revealed by inspection.
3. An increase in illegal activities other than underground.
4. Grade of risk and persistency are important.

Most important is a possible new government in Cuba resulting in mass return of refugees, with problems of economic rehabilitation and of foreign exchange rights to maintain premiums. Prospects of good persistency are very doubtful.

Prudential's underwriting of this class of business is middle of the road. We require six months apparently permanent residence, reasonably good finances and occupation. Double indemnity is available only after two years' U.S. residence. Known underground activities cause rejection; some accepted when undetected are part of the price for trying to accommodate selected Cuban refugees.

We might be doing the mass of refugees a very doubtful favor were we to succeed in selling them large quantities of insurance. For their premium dollars, from which substantial agents' commissions were paid as though for permanent insurance, we might find we had given them poor value in the form of very temporary insurance.

MR. BYRNE: The Lincoln has handled a substantial number of applications from Cuban refugees. Back in 1960, many applications for large amounts came from quite successful people. Now we are noticing a substantial shift in socio-economic status, as implied by Mr. Rosser. Generally, if the applicant has been employed six months and otherwise seems to meet the obstacles mentioned by Mr. Odell and Mr. Rosser, we accept with a \$5 permanent extra, on which there is no commission. We are watching this experience closely.

Chicago Regional Meeting

MR. FREDERICK C. MORROW: In the Occidental, when we revised the underwriting manual following publication of the *1951 Impairment Study*, we did rely to some extent on assumed redundancies in our extra premium charges, particularly when the experience called for a much higher percentage debit than we had been assessing.

However, there were other considerations that had greater influence on the modification of the experience mortality ratios than the allowance for

redundancy in our extra premium scale. One of the considerations was that only in a few instances could an experience ratio be translated directly into an underwriting debit. In most cases the experience was divided into very broad classes so that any comparison could be made only with some assumed composite debit for all classes. Another consideration that entered into the evaluation of our ratings was the recent improvement in mortality for many impairments. More accurate diagnosis of impairments, and increased strictness or liberality in selection due to past unfavorable or favorable experience, to competition and to mortality improvement, were additional factors that were taken into account.

MR. ALDEN T. BUNYAN: Because extra mortality on medically substandard cases appears to have declined, the Phoenix Mutual has in certain instances, particularly at the older ages, been shading the ratings called for by our underwriting rules. However, with our recent adoption of lower extra premium rates we do not now have margins to warrant continuation of that practice.

MR. STUART E. TINKER: Because the determination of the upper limit for the standard class is a part of the larger problem dealing with the determination of the number of substandard classes and their ranges, it may be helpful to consider the main factors entering into their determination. They are:

1. Equity, which would lead to a large number of classes with narrow ranges.
2. Practical considerations, which would lead to a small number of classes with wide ranges.
3. Competition.

I have purposely not listed the general level of mortality as an important factor in establishing the number of classes and their ranges. Usually any improvement in mortality is rather gradual and once the structure of the classes has been established subsequent improvements can be handled within the existing class structure by the following means:

1. An adjustment in dividends or gross premiums.
2. A change in the classification of particular impairments, when studies indicate that a change in mortality has taken place.

Of course, mortality improvements can be handled by adjusting class limits as suggested by the question posed. However, this may involve the limits for one or more of the substandard classes as well as for the standard. Frequent changes in the class limits would not be desirable; thus, I believe that the more common method described above is preferable.

This discussion may suggest a precision which is not attained in practice. Within the recent past there has been a tendency to broaden the standard class, without changing the limits, by various means, some of which are:

1. Widespread use of nonmedical underwriting along with a liberalization of the nonmedical evidence required.
2. Liberalization of aviation, occupational and overweight ratings.
3. A tendency to squeeze some younger lives into the standard class because the cost of the medical evidence might exceed the cost of any extra mortality.

MR. ANDREW C. WEBSTER: There is one underwriting axiom which should be borne in mind in considering any apparent improvement in mortality, and that is that the results which are obtained by the imposition of a certain set of criteria can be maintained only if the same criteria are continued. Fundamentally the purpose of selection is to avoid anti-selection—and antiselection will persist, irrespective of any improvement in mortality.

It may be possible to enlarge the standard ranges, but it is well to remember that in underwriting we are dealing with two groups of lives. The first is the group with medical impairments where we have reasonably accurate statistics as to mortality and the extra premiums can be calculated accordingly. The other group consists of those cases which are properly described as borderline because of intangibles, and in this group I think it is dangerous to attempt to widen the standard class.

MR. EDWARD A. LEW: The Metropolitan's limited experience on nearly 700 carefully selected diabetics insured from 1952 to 1960 shows a mortality ratio of about 350% of standard (based on 28 deaths). The mortality ratio at ages under 45 is about 400%, while at ages 45 and over it is about 340%. The mortality in the first three years has been relatively high but drops thereafter to about 270%. While this small experience is not statistically significant, it is entirely in line with that of other companies.

For more than 30 years the Metropolitan has collaborated with the Joslin Clinic of Boston, Massachusetts, in following up and analyzing the sizable experience on diabetics treated there. The most recent experience covers about 6,000 patients treated at the Joslin Clinic since 1950 and traced to 1961. Compared to the death rate in the general population of New England, the mortality of these diabetics was:

Attained Ages	Males	Females
20-29	6.9 times population mortality	8.8 times population mortality
30-39	6.7	9.5
40-49	3.1	3.8
50-59	1.8	2.9
60-74	1.7	2.4

This latest study, as well as earlier ones, brings out that (a) the absolute death rates among diabetics have not exhibited any significant differentials by sex, and (b) at attained ages under 40 the mortality rates of both male and female diabetics have been very high, but at attained ages 50 and over the rates have been only two to three times those of the general population. The long-term outlook for juvenile diabetics remains very poor, especially if the disease has reached the stage when vascular changes appear.

It is too early to tell whether the use of oral drugs during the past decade has had any beneficial effect on the longevity of diabetics.

With respect to coronary artery disease, our Associate Medical Director, Dr. George Robb, has developed a standard procedure and more significant criteria for the interpretation of the double standard two-step exercise test originally devised by Dr. Arthur Master. Metropolitan studies of insured lives with EKG irregularities indicate that Dr. Robb's criteria provide significant evidence of the existence of latent coronary insufficiency; these criteria depend on the magnitude of the depression in the ischemic ST segment in any lead on a post-exercise EKG. More specifically, the Metropolitan's small experience shows that individuals with an ischemic ST segment depression under 1 mm. had a mortality about twice normal (based on six deaths), those with a depression of from 1 to 2 mm. showed a mortality of six times normal (based on eight deaths), and those with a depression of 2 mm. or more experienced a mortality about 16 times normal (based on nine deaths). While these figures are too small to serve as a reliable index of the associated mortality, they provide evidence that the magnitude of the ST segment depression serves as a highly discriminating test of the severity of coronary insufficiency. Other types of EKG irregularities, notably the ST junction depression, did not appear to be significant in Dr. Robb's findings.

Numerous clinical studies of coronary disease show a wide range of mortality following a "mild coronary." The difficulty seems to be that the term "mild coronary" can be seriously misleading. In many instances a "mild coronary" is merely the initial step in a fast developing pathologi-

cal process. It is therefore necessary to study the factors which materially affect survivorship.

The Society's Committee to Study Possible Usefulness of Outside Sources of Medical Impairment Data, jointly with the Mortality Committee of the Association of Life Insurance Medical Directors, has made arrangements with the Veterans Administration for a mortality study of as many as 25,000 patients admitted to Veterans Administration hospitals for coronary disease. It is anticipated that, in several years' time, extensive mortality data will be available bearing on survivorship of individuals hospitalized for coronary incidents and on the factors (such as high blood pressure, cholesterol levels, etc.) which materially affect survivorship after a coronary incident.

Some highly pertinent information as to the mortality among seriously impaired lives has been assembled in Europe by an organization known as COINTRA (Coopération Internationale pour les Assurances sur la Vie des Risques Aggravés) and also by the Life Insurance Companies Institute for Medical Statistics at the Oslo City Hospitals. For instance, the proceedings of the former organization show that the experience among diabetics in Denmark, going back to 1925, has been quite similar to that of the Joslin Clinic. The 1956-1960 experience among male patients with myocardial infarction treated in Oslo hospitals shows the following mortality ratios for (a) men without other impairments and (b) all men, whether with or without other impairments. This investigation has also brought out that associated hypertension or a history of severe cardiac pain were particularly important factors adversely affecting survivorship.

Attained Ages	Men with Myocardial Infarction and No Other Impairments	All Men with Myocardial Infarction
30-49.....	500% (13 deaths)	700% (22 deaths)
50-64.....	330% (103 deaths)	400% (169 deaths)

MR. ROBIN B. LECKIE: In the Manufacturers Life we first started offering life insurance to diabetics in 1940. Since then there have been 149 deaths involving 202 policies for a total death benefit of \$2,490,000. The company has always been strict in the underwriting of the diabetic. He must be under adequate supervision and without history of significant diabetic, renal or cardiovascular complications. An EKG and chest X-ray are required whenever the amount exceeds \$15,000 or the age is over 40.

A recent study was made of the experience from anniversaries in 1950 to 1960 covering an exposure of 10,388 policy years with 123 policy deaths on 94 lives for an amount paid of \$1,354,000. The over-all ratio of actual to expected was by number 215% and by amount 168%, the ratios being calculated according to the 1946-1949 Basic Select and Ultimate Table.

Although it is difficult to draw legitimate conclusions from a study with so few deaths, nevertheless a conclusion was drawn whenever we could satisfy ourselves, within statistical limitations, that the results did follow from the factor measured. These are some of the results and conclusions:

1. 70% of the deaths were cardiovascular, 9% renal.
2. Mortality increased with duration from onset of diabetes as measured from the date of issue.
3. Diabetics who had contracted the disease in childhood showed very high mortality, although exposure was too small to be significant.
4. Older diabetics with a fairly recent diagnosis at issue, who were taking little or no insulin and were under strict supervision, showed mortality only a little higher than standard.
5. Diabetics with borderline EKG abnormalities had very high mortality, as did those with albuminuria or high blood pressure.
6. The higher the insulin dosage the higher the mortality. Mortality generally decreased with the frequency of blood sugar determination.
7. The over-all higher mortality by number than by amount was attributed to:
 - a) larger policies at the older ages where the mortality was light;
 - b) more careful underwriting on large policies;
 - c) the generally better supervision of the well-to-do.
8. There was no significant trend by policy duration, although the mortality did appear to increase with duration.

The conclusion we have arrived at from our experience and from the results of other companies is that many diabetics can be insured at a reasonable extra premium if they are carefully underwritten and are under careful supervision. Our best diabetics are rated at less than 150%. Debits are charged for:

1. Anything but the best supervision and control.
2. Age at issue under 30.
3. Onset more than 10 years prior to issue.
4. Sugar in the urine.
5. Insulin intake over 25 units.
6. Other impairments, particularly cardiovascular-renal.

MR. BRIAN L. BURNELL: I work for the Canadian Branch of the Mercantile and General Reinsurance Co. of England and would like to talk to you about our company's experience in the United Kingdom.

During the past few years we have been running four special pools for substandard risks and in order to obtain some degree of homogeneity we have limited these pools to lives who are resident in the United Kingdom. The first three pools are easily described by their names, namely diabetic pool, blood pressure pool, and coronary pool. The fourth pool is described as declined risk pool. This last mentioned pool is divided into three main sections—cardiovascular, respiratory, and digestive. The ratings which we use for these pools are not entirely experimental. For example, our diabetic pool ratings were originally based on some statistics from a large diabetic clinic in England. Before we started the coronary pool we had access to the claim records of an English company which has been writing noncancelable accident and sickness business for the past 50 years. The ratings in the blood pressure pool were, to some extent, experimental since the statistics available in respect of very high blood pressures (for instance 200/118 and over in our group number 5) are very meager. The standard of selection for the cases which are offered to the three main substandard pools is extremely high and any case with any associated minor impairment is normally thrown into the declined risk pool. Incidentally, it is our usual practice in the U.K. to offer only endowment assurance plans to the very highly substandard risks (such as blood pressure group 5 mentioned above) and the majority of these are placed with a decreasing lien rather than an extra premium.

It is our feeling that the environment and the general pace of life in the United Kingdom do have some effect on the expectation of life of people suffering from high blood pressure and coronary disease, and for that reason, although our statistics will eventually be of considerable value to life companies in Britain, the results may not be of direct application to other parts of the world. In fact, in recognition of this we have tended to use a somewhat different approach in other parts of the world for rating some of these impairments.

MR. FRED DE BARTOLO: Concerning section B, in the American United we developed a formula for expected aviation deaths on the hypothesis that the aviation death rate per hour of annual flying time decreases for each added hour of solo experience. The President of the National Pilots Association, testifying to the Congress a year ago, said that the pilot's lack of proficiency accounted for most of the noncommercial aviation deaths in 1960.

In our formula, the aviation death rate per hour of annual flying time is equal to $a/(\text{Solo Hours}) + b$, where the constants a and b are respectively the human proficiency factor and the mechanical error factor. The

values of *a* and *b* were estimated at .0045 and .000005 respectively. The intercompany data for private pilot classifications were used as a basis for testing the reasonableness of the formula and the constants.

The number of aviation deaths per thousand private pilots with *S* solo hours and *A* annual flying time is then given by the following integral:

$$\int_s^{s+A} \left(\frac{4.5}{t} + .005 \right) dt$$

$$= 10.362 [\log_{10}(S + A) - \log_{10} A] + .005A .$$

By means of this formula the expected aviation deaths can be calculated by policy year, assuming a constant annual flying time. A few examples are given below.

SOLO HOURS AT ISSUE: ANNUAL FLYING TIME:	140 60	140 90	400 190	1,000 235
Policy Year	Extra (Aviation) Deaths per 1,000			
1.....	1.91	2.68	2.70	2.12
2.....	1.48	1.94	2.21	1.96
3.....	1.23	1.67	1.93	1.84
4.....	1.07	1.34	1.76	1.76
5.....	.96	1.19	1.63	1.69
6.....	.88	1.09	1.54	1.64
7.....	.81	1.01	1.47	1.61

A review of the extra deaths by policy year suggests the possibility of using temporary flat extra ratings in place of the customary permanent flat extras. These are some of the advantages of the temporary flat extras:

1. They appear to be a closer fit to the pattern of extra mortality related to private flying.
2. The aviation hazard is, in varying degrees, a temporary hazard rather than a permanent one.
3. Companies that do not pay commission on temporary flat extras will have more extra premium available to cover the extra mortality.
4. They reduce the number of requests to remove the aviation rating and thus will save administrative expenses.
5. They are more readily accepted by the public.

The disadvantage of the temporary extras is that a private pilot who increases his annual flying time, after issue, is given an automatic rate reduction that may not be deserved.

MR. LEW: The Aviation Committee is endeavoring to get some information as to the possible bearing that accumulated experience has on the

hazard of private pilots. Thus far, however, this information is not available and I think that the process of liberalization has essentially reversed the Society's motto and has simply been one of substituting impressions for facts that are nonexistent. It must be said, however, that there is always the possibility that future experience will be better; thus, in making use of past experience to predict future experience, some allowance may be made for the improvement.

MR. ROBERT D. MURRAY: Last year, Continental liberalized the underwriting of private or student pilots. We are accepting, at standard rates, pilots over age 25 with 100 or more solo hours if their flying is kept within "moderate limits." These "moderate limits" have been defined as "less than 150 hours of yearly flying" if the logged hours were under 400, or "less than 200 hours of yearly flying" if the logged hours were over 400. This liberalization was undertaken for competitive reasons and without the benefit of statistical data.

In underwriting the Cuban refugees we have found it difficult to obtain adequate inspection coverage and details of past medical history, to assess the hazard entailed in the applicant's early return to Cuba under adverse conditions, and to appraise the financial aspects including persistency.* Generally, those age 40 and over who have their families here, reside outside the Miami area, and are in the professions or have adequate means, are accorded routine underwriting. For the remainder, we have either postponed or limited the issue to small amounts without supplementary benefits. We have not attempted to cover any of the additional hazards peculiar to this class of business through exclusions or extra premiums.

MR. FREDERICK E. RATHGEBER reviewed the discussion presented at the Jacksonville regional meeting by Mr. Wilbur H. Odell, Jr., concerning underwriting of Cuban refugees.

MR. GEORGE W. CHALMERS: Confederation Life was doing a very large amount of business in Cuba before the revolution and consequently we have some extensive files on many of the Cuban refugees.

Generally speaking, we have run into a number of difficulties similar to those described by previous speakers. Therefore, we have required a Cuban in the Miami area to be there for at least one year before we will consider him for insurance. We do not impose the same restrictions on Cubans in other areas such as Puerto Rico or Venezuela. We also require a reasonable income and that his family be with him.

*MR. RATHGEBER indicated that the Prudential also has experienced similar difficulties.