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RECENT AND FUTURE UNDERWRITING TRENDS

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- Risk profile analysis
- Regulatory aspects
- Economic value of underwriting requirements
- Guaranteed issue replacement programs
- Chronological age versus biological age

MR. MEL C. MC FALL: I'll spend a few minutes on legislation. In the last ten years or so, we have seen an unprecedented level, I think you might say, of legislative activity that affects life and health insurance underwriting. We'll review some of that legislation and try to define its purpose and its impact on the life insurance industry.

Before examining specific pieces of legislation, I think it's important to emphasize a couple of points about legislation in general. First, legislation seems to have changed its focus as we've moved from the 1970's into the 1980's. Much of the legislative effort of the 1970's dealt with privacy. Our regulators now seem to be dealing with an issue that is, perhaps, even more fundamental than that, and that centers on the distinction between equality and equity. Specifically, much of today's legislation seems to be designed to increase equality, even at the expense of some equity.

A second point that should be emphasized is that increasing government inquiry and regulation is virtually inevitable. Our industry, actuaries in particular I think, must be prepared to fight ill-advised legislation as it develops, to continue our efforts to educate regulators and consumers, and to respond in a timely manner to new regulations as they are passed.

Now let's turn our attention to some of the specific legislation that has affected the industry in general and life and health insurance underwriting in particular. I'll focus primarily, almost exclusively, on legislation in the United States. Perhaps Bill will touch on Canadian developments, and perhaps, they parallel those in the United States as well.

Undoubtedly, the most significant proposed legislation at the current time is the so-called "unisex" legislation currently before the United States Congress. The House version of the bill is HR100 and that's entitled the "Non-Discrimination in Insurance Act." The identical Senate version,

S372, is entitled the "Fair Insurance Practices Act." That legislation was so widely publicized that I don't think I would serve any purpose by trying to go into the details of it today, but there have been four related developments that I think are worth reviewing briefly.

First, probably most importantly, a monumental industry education effort seems to have been successful with regard to this legislation, at least for the time being. The latest report on the bill from the American Academy of Actuaries Governmental Relations Watch indicates that the House Energy and Commerce Committee approved an amended version of HR100 that exempts the personal lines and is prospective only. Those two amendments addressed probably the two most objectionable features of the bill.

Second, the United States Supreme Court ruled in the case of Arizona Governing Committee versus Norris that it is a violation of Title VII of the Civil Rights Act of 1964 for an employer to offer retirement plans that involve products with costs and/or benefits that are determined on the basis of sex-distinct mortality tables. The precedent established by the Norris decision essentially requires employers to offer unisex retirement plans on a prospective basis. So in other words, Norris does what HR100 and S372 do--it does to retirement plans what they would have done, at least prospectively, anyway. A by-product of the Norris decision has been the necessity for blended-gender valuation mortality tables. A number of states have already passed legislation to permit blended-gender mortality tables for use in valuing retirement plan business.

Third, several states have introduced and considered legislation similar to HR100 and S372. At least one state, Montana, has passed such legislation. So the strategy there is to attack on a state-by-state level what they were unsuccessful, at least so far, in achieving on the national or federal level.

Fourth and finally, on August 16, 1984, a spokesperson for the National Organization for Women announced that the organization and two individual plaintiffs had filed a class action suit against Mutual of Omaha in the District of Columbia, alleging that Mutual of Omaha's sex distinct pricing of health insurance violates the District of Columbia's public accommodation law. NOW President, Judy Goldsmith, stated that NOW was turning to the courts because the massive lobbying efforts of the insurance industry were making legislative changes intolerably slow from their point of view.

While the Federal unisex bills and all the unisex activities are probably the most visible and potentially damaging pieces of legislation to the industry, there are several other important pieces of legislation that deal with various forms of alleged discrimination. So, we will touch briefly on some of those. Some 16 states have passed laws based on the NAIC's model regulation prohibiting insurance companies from unfair discrimination against the blind.

An additional 19 states have passed broader legislation that is designed to prohibit unfair discrimination by an insurance company against an applicant with almost any kind of physical handicap. There are some subtle differences from one state to another, but in general, these states consider it unfair discrimination, "to refuse to insure, or refuse to continue to insure, or limit the amount, extent, or kind of coverage

available to an individual, or charge a different rate for the same coverage solely because of a physical impairment, mental impairment, blindness or partial blindness, except where the refusal, limitation, or rate differential is based on sound actuarial principles, or is related to actual or reasonably anticipated experience."

Wisconsin is one of the states with this legislation, and they have taken, what I regard as a very positive step, by convening a task force of industry representatives and state insurance department representatives to try to clarify the meaning of the law. That last part there is kind of nebulous as to what it really means.

The task force has focused much of its attention, so far, on defining the meaning of "actual or reasonably anticipated experience." That's the part that is not very well defined. They also developed a bibliography of references that can be used to support risk classification decisions. That task force expects to issue a report with conclusions and recommendations in 1985.

Maybe the most recent development in the area of discrimination legislation was the introduction of the Federal bill designed to prohibit discrimination in insurance on the basis of blindness or degree of blindness. This bill, HR4642, is entitled, the "Fair Insurance Coverage Act." Presumably, the purpose of that act is similar to the purpose of the legislation now in place in 16 states, and more broadly, in 19 others. So there's a total of about 35 states, but HR4642 differs from the state laws in at least three important respects.

First, the Federal law requires that the basis for any discrimination be "clearly demonstrated through sound actuarial evidence." State laws require that discrimination be "based on sound actuarial principles or related to actual or reasonably anticipated experience." Now, on the surface it doesn't sound like there is a big distinction there, but I think there is general agreement and probably a good deal of concern if you think about it that the proposed Federal legislation is much more stringent than that required by the states. In fact, strictly interpreted, that wording would be very difficult to comply with.

A second difference is that the Federal bill applies to coverage already in force, whereas the state laws generally apply only prospectively.

And the third is that HR4642 provides for judicial relief including monetary awards and even punitive damages in appropriate cases. Punitive damages, to my knowledge, are not contemplated by the state laws.

At last report, just a few weeks ago, HR4642 was moving quickly, and it had gained fairly broad support. Congressman Florio, one of the bill's primary supporters, hopes to pass the bill yet this year. The American Council of Life Insurance has suggested some amendments that would make the legislation more similar to the existing state legislation.

Now we've touched on unisex legislation and activity as well as anti-discrimination legislation, and this is a fairly broad, wide spread

type of thing. There are also a number of other underwriting related regulations that have been passed in only a few states, but that are of some interest to underwriters nonetheless.

For example, in 1981, the State of New York passed a bill prohibiting discrimination against insurance applicants with a past history of treatment for mental disability, "unless such action is based on sound underwriting and actuarial principles reasonably related to actual or anticipated loss experience." There is that kind of nebulous language again. This legislation is undoubtedly well intentioned, but it has caused some significant difficulties for underwriters. Without detailed data on which to support a specific underwriting action, underwriters will generally tend to choose a fairly broad middle ground, and this results in subsidization of the poorer risks by the better risks.

Several states have passed laws prohibiting discrimination against proposed insureds with the sickle cell trait. As far as we know, the sickle cell trait carries no additional mortality as such with it, and most companies seem to have treated it in that fashion.

Two states have passed laws prohibiting discrimination against an applicant who was prenatally exposed to diethylstilbestrol, DES, prescribed to the mother. Years ago, DES was frequently prescribed to prevent premature births. Follow-up studies have showed that female children of mothers treated with DES during pregnancy have approximately four times the normal rate of cervical cancer. So there probably is a small amount of additional mortality associated with that.

The State of Massachusetts has enacted a bill mandating that a mentally retarded child of three years of age or older may not be declined life insurance for an amount of exactly \$1,500. This is another piece of legislation that is fraught with difficulties for the underwriter. The primary problem is that the mentally retarded comprise a large and, as you know, very diverse group. Risks range all the way from standard to uninsurable, but by lumping together all of the mentally retarded, including those that are uninsurable, Massachusetts has seemingly forced the better risks once again to subsidize poorer risks.

That's probably enough on legislation.

As I mentioned at the beginning, the pace of legislative change has quickened significantly in recent years, and that pattern, I think, is likely to continue. Actuaries and underwriters (those that are kind of both), have a significant role to play in informing regulators and consumers about the fundamentals of risk selection, and I think we saw the impact of that effort with the unisex bill in attempting to influence legislation appropriately and assuring compliance with legislation once it's passed.

MR. DAVID T. WARNER: As one of the panelists mentioned on Monday, I can remember back when replacement was a dirty word. I am sure all of you have heard the term used quite frequently during this session. Well, you are going to hear it again because Hank Shaw is going to talk about some of the guaranteed issue replacement programs that some companies are using.

MR. HENRY D. SHAW: As Dave says, my first topic this morning is "Guaranteed Issue Replacement Programs." What are we talking about when we use that term? Well, you've all probably run into a few of these in the past year or so, and maybe some of you have one of these programs. As best I can tell, these programs started showing up maybe two or three years ago. It's still primarily a small company phenomenon, but not exclusively. A few of the bigger companies are getting into it, and more may follow. It's too early to tell yet, I think, whether it's becoming a trend, or only a morning glory that may lose its bloom. As yet, I am aware of only a handful of companies offering these programs.

As its name states, the program is a replacement vehicle. As Dave says, replacement is not quite the dirty word that it used to be. In its basic form, the policyholder with another company has only to surrender his existing coverage with that company, and he or she can take on coverage for the same amount with a company offering the replacement vehicle. Let's stick with the basic form of a guaranteed issue replacement program for the moment and talk about some of its characteristics. There are some variations that are not purely "guaranteed issue" programs, but have some of the attributes of these programs. I'd like to stick with more or less the basic form this morning.

To describe the basic guaranteed issue replacement program:

1. It's geared to replace the policyholder's contract with the other company, and it is required that the other company's contract be assigned for a surrender as part of the transaction, generally, within a short period of time after the effective date on a new policy.
2. It's generally (but not always) required that the contract to be replaced had been previously underwritten on a standard basis with what you could call normal underwriting. Guaranteed issue and other types of "non-normal" underwritten business are excluded. Some programs will duplicate whatever substandard rating was present on the original contract. In other words, they accept the rating the other company placed on that contract.
3. Generally, the contract to be replaced can have been in force no more than five years or so, to be eligible for one of these programs. There are some notable exceptions to this that have little, if any, restriction on length of time in force. They are fairly wide open programs.
4. In some cases, there is some screening, fairly informal, to exclude business written by certain agents or brokers or business written by companies noted for liberal underwriting. They want to screen out business that they think they might particularly get hurt on.
5. The minimum amount varies from program to program, but it's generally in the \$25,000 to \$50,000 range. For programs with no restriction on the length of time the original contract can be in force, a minimum amount requirement of this size will effectively eliminate most of the very old business which typically was written at amounts below those minimums.

6. The maximum amount of coverage that can be obtained under these guaranteed issue exchange programs, ranges from \$250,000 - \$300,000 up to as much as one million. There may be higher maximums I am not aware of. Of course, the maximum amount cannot be greater than the face amount under the contract to be replaced.
7. The maximum ages eligible for these programs are generally in the 55 to 65 age range with a few as high as age 80. Some programs offer pure guaranteed issue exchange up to a limiting age such as 55, and simplified underwriting at higher ages with a couple of health questions and an MIB check.
8. Waiver of premium is offered as often as not under these programs.
9. Typically, the contestable and suicide provisions don't start anew from the issue date of the guaranteed issue exchange plan. They run from the issue date of the original contract.

That roughly describes the major parameters.

There probably are as many variations in these programs as there are programs now in the marketplace. Those are some of the general ingredients.

The form of contract that fits best as a replacement vehicle under these programs is, obviously, universal life. It offers maximum flexibility in the premium schedule and provides a place for the cash values, if any, on the contract to be replaced.

Generally, full or nearly full compensation is paid on these exchanges, if the policy to be replaced is from another company and not your own company.

That describes these programs at least in broad terms. Now, why do these programs exist? What makes them work? What is their future? What are some of the pitfalls?

These programs exist because obviously, they are means of getting a bigger slice of the pie and placing more business on the books. They are a mechanism to capture business and customers, which seems to be the name of the game these days, and to do it relatively cheaply, by in essence taking advantage of another company's successful efforts in ferreting out the client and spending the money to do the risk selection and place the business on the books. The company with the guaranteed issue replacement program avoids most of those nasty outlays of resources.

Once a few of these programs are present in the marketplace as they are now, there is the inevitable, "we need this to" pressure from the field force in other companies for their companies to offer a similar program. I don't know about your companies, but we've already heard it from our people.

To make these programs work, you need an attractive replacement product with a good accumulation of values. By definition, you need a contract that performs better or appears to perform better than the contract being

replaced. You also need a flexible contract as the replacement vehicle and universal life fits that bill pretty well. You need to provide fast turnaround in handling all the paperwork and making the replacement to avoid dissatisfaction from the agent and the client. Finally, you need to pay full or nearly full compensation to make it attractive for the agent to do business with you.

What's the future of these programs? Well, in the current era of replacements, (not the dirty word it used to be), they are a fairly effective replacement tool, particularly for companies that deal heavily in the brokerage market. I think for the agents with the career agency companies, they may not have that many clients with coverage from other companies to use this program on.

With all of that, however, there are some pitfalls, and these may ultimately finally determine the fate of these programs.

A major pitfall is getting hit heavily by death claims on customers brought in under the program. This has happened to some of the companies offering guaranteed issue exchanges, particularly from claims at the higher ages. You could reason that there should be little, if any, anti-selection by the client; he or she is interested mainly in going to a more attractively priced and performing contract, and that is true. However, the same can't be said for the agent who has a large incentive to develop another stream of compensation from his client's business, and may know that there is little chance of getting a standard issue for his client except through a guaranteed issue, no questions asked, exchange.

Because of the risks in this business, and I'm not sure whether Mel would say this as far as Lincoln is concerned, the reinsurance companies may not want to participate in it or may do so only very cautiously. This may put a damper on the program with some companies.

Some of the companies with these programs are finding that they are not getting much business from it which hardly makes it worth their while to go to the trouble of developing the program.

Nevertheless, guaranteed issue exchange programs have a small toehold by now, even if tenuous, in the marketplace. That may remain tenuous or these programs may grow. If replacement is part of your marketing strategy in your company, maybe you ought to think about getting one of these programs in your arsenal. I would just ask that you stay away from replacing my company's business.

MR. WARNER: Several years ago, the Lincoln set up a program that was referred to as a coronary risk profile. I am sure that many of you are familiar with this in varying degrees, but Mel is going to give us a rather complete explanation of that program, and also share with us some of the results that they have seen so far.

MR. MC FALL: Specifically, it was in 1977 that Lincoln National began utilizing coronary risk factors in its underwriting of individual life insurance policies, both direct and reinsurance. Seven years is really a short time in which to evaluate an underwriting program of this magnitude, but we think that our experience is sufficient so far to convince us that the program has been generally successful.

Our sales experience and our placement rates confirm that coronary risk factor analysis has improved our underwriting competitiveness, especially on facultative reinsurance cases. In fact, competition was one of the key factors that prompted the development of coronary risk factor analysis in the first place. Our mortality experience provides some reassurance that our competitive gains were not offset by mortality losses—at least not losses that are attributable to coronary risk factor analysis. We are convinced that coronary risk factor analysis enables us to do a better job of differentiating the better risks from the poorer risks, and that's what risk selection is all about.

We'll look at coronary risk factor analysis from three perspectives:

1. Rationale behind the development of our system of coronary risk factor analysis.
2. Mechanics of the system.
3. Recent mortality experience.

I mentioned a minute ago that competitive forces provided the impetus that led to the development of coronary risk factor analysis. Included were the advent of substandard specialists companies, pressure from the field for more favorable underwriting actions, and the increasing popularity of reinsurance shopping.

But long before those factors manifested themselves, we recognized the magnitude of cardiovascular disease as a cause of death in the United States and Canada. I have some slides now that depict some of this. The first one (Slide 1) shows that cardiovascular diseases, primarily the coronary artery diseases, are the leading cause of death in the American male from ages 35 and up. The band down at the bottom represents major cardiovascular diseases as a cause of death. This is from Metropolitan Life's experience, and you can see that at about age 40, that jumps up there to become the leading cause.

It's precisely this same age/sex group—males 35 and up, where most substandard cases originate, and therefore, where most competitive underwriting problems exist. Our underwriting manuals are filled with various ratable impairments that tend to show up only after age 30, 35, or 40.

Having recognized that coronary disease, is in fact, the actual cause of death in a high percentage of substandard as well as standard cases, we asked ourselves a key question: is there some way to predict an applicant's relative risk of already having silent coronary artery disease, and eventually perhaps, dying from that disease rather than from the impairment for which he or she was rated? If so, we would have the means with which to sort out the better risks to whom more favorable competitive offers could be made. The answer to this question, fortunately, was "yes," and this is where the coronary risk factors and the coronary risk profile come into play in the risk selection process.

Studies in Framingham and other centers have demonstrated pretty conclusively by now that there are a limited number of so-called,

"coronary risk factors," that allow dramatically accurate predictions of whether or not a given individual already has or will soon develop significant coronary artery disease. Three of these risk factors have been identified as "major." They are total serum cholesterol, blood pressure, and cigarette smoking. I am sure you have read about and heard a lot about these coronary risk factors in recent years.

How predictive are these factors? The next three slides (Slides 2-4) were extracted from the American Heart Association's booklet entitled, Heart Facts. The data was derived from the Framingham study. Notice in this slide (Slide 2) how the probability of having a heart attack increases as blood pressure increases. The heart attack risk is represented by the striped bars, and you can see how dramatically it increases as blood pressure increases. We notice similar relations on the next two slides (Slides 3 and 4). The probability of having a heart attack increases as cholesterol increases, and cigarette smoking increases. When the coronary risk factors are viewed collectively in a profile, we see in this slide (Slide 5) that the danger of having a heart attack increases dramatically as the number of risk factors present increases. Persons with all three factors unfavorable have a six times greater chance of developing clinical signs of coronary artery disease in the near future than those with no such unfavorable factors, 82 to 13 if you can read the numbers there. Looking at the data in a more positive light, we can say that those with the good profiles have 1/6 the chance of dying of coronary disease as those with the poorest profiles. Realizing that nearly half of all deaths are due to coronary disease, you have some hint of the magnitude of the survival advantage afforded by a good coronary risk profile.

As we reviewed this data and other data similar to it, we realized that our traditional underwriting approach failed to recognize sufficiently the key factors that have a major impact on longevity. Specifically, of the three primary coronary risk factors, Lincoln National was recognizing only one, which was blood pressure, in most of its underwriting appraisals about seven or eight years ago. Total serum cholesterol and cigarette smoking were recognized only in extreme cases. I am sure that many other insurance companies were underwriting in a similar manner at that time. A few still are, I think. It was clear that we could do a much more effective job of risk classification, by utilizing in a more appropriate manner, our knowledge of the coronary risk factors and their effect on longevity. This led us to the development of our system of coronary risk factor analysis.

Our system is a numerical system. Weighted scores are assigned to each risk factor in accordance with that factor's relative contribution to the overall coronary risk profile.

Our profile contains six designated risk factors. As you would expect, the most important of these are the three major factors that we mentioned a minute ago. We refer to these as our primary factors. These factors are weighted more heavily, of course, because of their greater significance in predicting longevity.

In addition to the primary coronary risk factors, we look at family history of cardiovascular-renal disease, pulse, (both rate and rhythm),

and build. These additional factors do have some predictive value on their own, and they are nearly always known to the underwriter. We refer to these factors as supplementary factors.

Still other coronary risk factors exist, and may become known to the underwriter during the workup of a case. We include these in an "others" category of supplementary factors. ECG, time vital capacity, blood sugar, and HDL cholesterol are included in this group. These factors are similar to family history, pulse, and build in terms of their relative value in predicting longevity, but they differ in that knowledge of them is not customarily available to the underwriter. Of course, we don't want to order things like a time vital capacity or blood sugar just to complete a profile; but, on the other hand, we don't want to have such a rigid system that we preclude ourselves from using data that is predictive when it's available.

In underwriting each case, the Lincoln National underwriter records a score for each coronary risk factor. As I mentioned earlier, the primary coronary risk factors are weighted most heavily because of their greater potential influence on mortality. After recording each individual factor score, the underwriter adds them all together to derive a total net profile score. There are certain restrictions in the process; for example, the total of the "supplementary" factors is limited so as to preserve the dominance of the primary factors.

A positive net profile score under our system is favorable; the higher it is, the better. The reverse is true for negative profile scores.

We use the net profile score in one of two ways. On direct business, if the proposed insured is a standard risk, we use the net profile score to determine whether or not the proposed insured qualifies for our non-smoker or our preferred non-smoker discount. We use the net profile score in a similar fashion on many reinsurance cases. If the proposed insured is substandard, we use the net profile score to adjust the substandard rating-downward if the profile is favorable, and upward if the profile is unfavorable.

The value of the coronary risk profile depends on a number of variables. An important one is the impairment or impairments presented in a given substandard case. For example, suppose we have a 40-year-old male with "T wave changes" on his electrocardiogram. The Medical Director says to rate him +100. That's what we call Table D. Why? Because those T wave changes may be due to coronary disease. It's in this kind of setting that coronary risk factor analysis is most relevant, and most likely to be of greatest importance. If this prospect had a very poor coronary profile, then that fact combined with the electrocardiogram findings, would make it highly probable that coronary disease is present. But, if the profile were favorable, then you would have reason to believe that the original fears, as expressed by that Table D rating, could be reduced or maybe even eliminated.

In contrast, the value of profile analysis is more modest when the increased risk of death associated with an impairment is not due to an excess risk of coronary disease. Epilepsy is a good example of this. Excess deaths in epilepsy cases are due to brain tumor, accidents, and

other causes, but not coronary disease. So, the coronary risk profile is less relevant here than in the electrocardiogram example. Fewer profile credits or fewer profile debits, if any, should apply. To recognize this, Lincoln National's system does have a mechanism for adjusting credits and debits by the nature of the impairment. I should also mention that we generally allow no credits, no profile adjustment, for risks that are rated solely on a temporary flat extra basis.

I could go into further detail about coronary risk factor analysis and our system, but the time is limited and I did promise to comment on our mortality findings. So let me summarize four key ideas about coronary risk factor analysis:

1. It's a formalized system. We don't cut ratings indiscriminately.
2. We place the greatest emphasis on the primary coronary risk factors.
3. We recognize both good and bad factors. Equity would not be served appropriately without doing that.
4. The case-by-case variation in relevancy or predicted value has been recognized by our system.

Now, let's take a look at some preliminary mortality experience relating to our coronary risk factor analysis system. While the findings, as I mentioned earlier, provide tremendous encouragement that the system is working as we hoped it would, I have to add the usual disclaimer that it is still too early to draw many firm conclusions. The mortality results are based on only four years' issues, 1979 through 1982.

Because of the short time period involved, we still have no information on the long-term effect of coronary risk factor analysis, at least on insured lives. Also, it's too early to assess the influence of most of the risk factors individually.

This slide (Slide 6) shows our mortality experience relative to the 1965 - 1970 basic tables on direct standard business. We show results for four (4) ranges of total profile scores. You can see that those with the most favorable total profile scores--this would be our preferred non-smokers group--had by far the best mortality--50% of the 1965 - 1970 select rates. The slide shows pretty vividly that those with poor profiles had dramatically higher mortality--about three times as high as those with the best profiles, and almost twice as high as those with average profiles. The experience on those with unknown profile scores was not particularly favorable. Most of that business is non-medical business, where we simply don't have enough information to evaluate the coronary risk profile. This result, I think, should help to remind us that the medical examination does provide protective value that translates into mortality savings down the road. This is only four years' worth of business, so the mortality shows up fairly quickly.

This slide (Slide 7) shows that those with the best total profile scores, both standard and substandard, were all non-smokers. That's because smoking is the most heavily weighted factor in our system, and you just can't qualify for the best profile score unless you are a non-smoker.

Over 80% of those in the group with medium profiles were non-smokers. This is significant because if you think back to the previous slide we have two groups. The average profile group and the best profile group composed primarily of non-smokers and the average profile group has 80% mortality compared to only 50% mortality for the best profile group. I think it's unlikely that the small percentage of cigarette smokers in the average profile group could account solely for a mortality differential of that magnitude. The differential must be attributable in part, at least, to differences in the other coronary risk factors.

Next, (Slide 8) we look at mortality experience by smoking habits for direct, standard cases. We see a familiar pattern; the mortality of smokers is about twice that of non-smokers. Again, we see a fairly unfavorable result for the unknown group. This suggests that if you don't differentiate your rates by smoking habit, that you are likely to attract a disproportionate share of smokers unless you have some kind of a captive market. I think that's more true today than it was a few years ago because of the preponderance of non-smoker/smoker rates.

This slide (Slide 9) shows our mortality experience on substandard cases--direct and facultative reinsurance combined--by smoking habits. For purposes of this slide, our expected mortality rates, (again from the 1965 - 1970 tables) are multiplied by the ratings on the actual cases. Again, we see that the mortality of the smokers is about two times that of the non-smokers. Remember this is substandard business. This suggests that smoking in conjunction with most medical impairments has a kind of a synergistic effect that results in dramatically higher mortality. The result in the unknown group again suggests a disproportionate percentage of smokers.

The next slide (Slide 10) in the series shows our mortality experience on standard facultative reinsurance cases - recently issued ones. Once again, we see the very unfavorable experience on those with poor profiles. But, unlike the standard, direct business, we don't see particularly favorable mortality on those with good profiles. On the surface, that might suggest some kind of a flaw in the system, but on further reflection, the result should not be surprising.

Our standard, direct experience is almost exclusively on individuals with no ratable impairment at the time of issue. Those with the best profiles comprise the group that qualifies for our preferred non-smoker discount. Their mortality should be very favorable, and it was.

Our standard facultative experience, on the other hand, is predominantly on individuals with some impairment; in fact, in the absence of an impairment, most of the cases would not be submitted to us facultatively in the first place. Those in the average profile facultative group have impairments that traditionally would carry a minor rating--for example, 25% or 50% extra mortality. In this group though, those modest ratings were all reduced to standard because of credits for moderately favorable profiles. Our mortality experience, while perhaps not particularly impressive for a block of standard business, is quite a bit better than one would expect on a block of slightly substandard business. Thus, we think the results do confirm the value of a good profile in reducing mortality.

Now, the results for the standard facultative risks with the best profiles, may be disappointing, at least initially, but they may be most impressive of all in the final analysis. Again, this group is comprised predominantly with impaired risks, some of whom have impairments that traditionally would be assessed ratings up to 125% extra mortality. That's what we call Table E. Yet, all of these ratings were reduced to standard because of the favorable profiles. So, I really feel that a favorable profile can have a significant effect on the rating. Our bottom line result, 108% mortality on risks that traditionally would be slightly substandard to moderately substandard show fairly vividly, I think, the benefits of a favorable coronary risk profile.

This slide (Slide 11) shows that mortality on standard facultative reinsurance is substantially higher than mortality on standard direct business.

This is predictable, given the nature of facultative reinsurance business. If we could show the mortality on shopped facultative business, I am sure it would be higher yet because shopping simply prevents the reinsurer from placing a representative spread of risks. In general, we have recognized that finding by increasing our prices for much of our facultative business. Other reinsurers have responded in a variety of ways to similar findings.

We are now putting the finishing touches on the first overhaul of our coronary risk factor analysis system. You might be interested in five of the refinements that we've made or will make soon, all of which are related to the mortality findings that I shared in the slides:

1. We have increased the debits for a poor profile to reflect the consistently unfavorable experience that we saw for that group. That, by the way, might result in our actually rating some heavy cigarette smokers.
2. We have increased the weight on cigarette smoking which emerged very clearly as the most significant coronary risk factor.
3. We have reduced the credits for very low total serum cholesterol readings. Our own studies and clinical studies seem to show that low cholesterol readings are associated with an increased cancer risk. There is less coronary risk, but an offsetting increase in the cancer risk. I'm not sure why that is, but it shows up as I indicated both in our own studies and clinical studies.
4. We found that the coronary risk profile has a larger absolute impact on mortality on substandard cases than on standard cases. The slide that showed the two-to-one relationship between smoker mortality and non-smoker mortality on substandard cases gave you a hint of that. So, we'll give more credits or debits for profile on a highly substandard case than we would on a slightly substandard case.

5. We have taken steps to eliminate double credits for non-smoking-one credit in the form of a reduction in rating for a favorable profile, and one credit in the price in the form of a non-smoker discount. We call that phenomenon double dipping. In general, we no longer reduce the rating for non-smoking if there is already a premium discount for non-smoking.

As I mentioned once or twice before, these preliminary findings confirm in general that our coronary risk factor analysis system has enabled us to distinguish the more favorable risks from the less favorable risks. We are anxious to accumulate some more data that will permit further fine tuning of the system.

MR. SHAW: This subject is the economic value of the Attending Physician's Statement (APS), medical, and other requirements. At the beginning of this panel, Dave Warner identified the panel members as experts on these subjects. Well, that's a lie, at least in my case. I would like to approach the subject from the perspective of someone who has had only brief exposure to the world of underwriting and little, if any, hands-on experience with cost/benefit studies. If you are looking for a scholarly thesis that probes the depths of the actuarial calculations involved in a protective study, then this would be a good time to make that phone call, step out to the bathroom, or call your airlines to reserve a seat on your flight back home. These dissertations have been done, and better than I could do them and have appeared in past Transactions and the Proceedings of the HOLUA, Home Office Life Underwriter Association and elsewhere. A recent excellent paper on this subject was done by a colleague of mine, Bob Reitano, (who is in this room today), which has been published in the Transactions.

What I'd like to do is to keep this presentation short because we are at the tail end of a fairly long three-day program here in Toronto, and because you have already sat through a fairly long panel discussion here, with more to come. I'd like to talk in fairly broad terms about what seems to be happening in the industry with various underwriting requirements along with some conjecture about possible future trends and about what it might all mean.

Let me start out by saying that my company still determines the limits below which we won't require routine ordering of our various underwriting tools by doing it the old-fashioned way. That is, by the use of the good old traditional cost/benefit study. Sure, we have introduced some new wrinkles in the calculations to show that we are not too stodgy, but basically we are doing it pretty much by the book. We do look at the limits our competitors are using, and in setting our limits, we do stretch our limits upward beyond the theoretical limits developed by our calculations in the interest of being as competitive as possible and improving time service, but we don't stray too far beyond our theoretical values. By the nature of our experience, we have quite conservative limits in many areas, and our agents, as you might expect, are unhappy about it and aren't too shy about letting us know about it.

We are looking now at how we set limits and at what has been happening in the industry, the marketplace, and at the value of our underwriting tools, and we are doing some serious thinking about where we go next. There is

not any one single path that is the right way to go. There is room for a number of different philosophies and different directions. However, there are some recurring underlying themes. So, I'd like to take a look with you at some of those philosophies, directions, and themes as they seem to be unfolding in the industry within the past few years and currently.

One obvious fact of life is that the insurance business is much more competitive than in the past. With the expense squeeze that we are all faced with and with the top of the house in the company, decreeing that expenses will be cut x% next year, a natural place for the underwriting officer to look is at the money spent on ordering requirements. What am I getting for my money? Are there better ways of getting the information, and at less expense? What can be eliminated with minimal risk? How do I justify it? There is clearly more of a willingness to go to new approaches and to question old approaches. There is also more of a recognition that some of the tools that we spend a lot of time and money to get may really not be worth that much. For example, our company has gone very heavily to paramed exams, to the point where over 90% of our exams are done by para-med's rather than medical examiners. The entire industry has gone in this direction. The original supposition, when the industry started going to paramed services, was that the mortality on that business would fall roughly in the middle between mortality on medical and non-medical business. We were delighted to find initially, at least in my company and I suspect in many other companies, that paramed mortality was about as good as mortality on medically examined business. That is changing in my company, and again, I suspect in many other companies. For whatever reasons, paramed experience is looking a lot closer to non-medical experience than it has before. We even have questions about the real value sometimes of the information that we get from our medical examiners. In the industry, the gap between medical and non-medical is narrowing if what we call "medical" includes both medically examined and the paramed business. As the gap narrows, it's a lot easier to justify higher non-medical limits. When there are real questions about the value of the information you are getting on paramed exams or even on medical exams, is it worth spending as much money as you are laying out for them, are there better ways to get the information, and isn't it worth taking some risks by increasing your limits?

Similar reasoning would apply to information we get from inspection reports. Are there better ways to get the information currently provided by the inspection companies, or perhaps, better information and at less cost, with less time delays, and with less likelihood of disturbing the applicant in the process? There aren't any simple answers to these questions, but many insurance companies, as you know, have gone much more heavily to in-house inspections in the past few years.

There is, I think, much more of an explicit recognition in the industry that risk selection is not a separate step with little connection with the rest of the operation, but is an integral part of the marketing process. More and more, the home office underwriter is recognizing the agent as his primary customer, or at least as an important customer carrying equal weight with the applicant. Liberalizing the underwriting requirements and making it easier to place business on the books carries more weight these days with the applicants, but is also a way to make it easier to attract agents and brokers to do business with your company.

With all these considerations, and with the climate of high interest rates and high rates of inflation over the past few years until very recently, and with renewal lapse rates continuing to worsen, it's not surprising that we have seen a trend to dramatically higher limits for the ordering of most of our underwriting tools in this period. Million dollar non-medical limits aren't the rule in the industry now, but they are not completely the exception either, and for the larger companies, as well as the smaller specialty companies. (Of course, higher limits at the younger ages become window dressing to some degree. The meaningful liberalizations are at the higher ages, and some fairly dramatic liberalizations have been made by some companies, not all, at the higher ages.)

Despite good reasons for doing so, there seems to be a reluctance to acknowledge that we are getting fairly far away from the tried and true traditional cost/benefit approach. A company will go from a non-medical limit of \$100,000 or \$150,000 two years ago to \$500,000 today, but still maintain that they are "still using the same old traditional cost/benefit method,"-and they probably are! There is a lot of room within the traditional cost benefit method to get quite dramatically different results, depending on the creativity of your assumptions. What you use for assumptions about interest, lapse rates, and expense inflation will influence your results substantially. Some companies do their calculations the traditional way, but set their limits so that there is a cost/benefit return on average over the entire range at which an underwriting tool is not ordered, but not at every point in the range, meaning that at the upper end of the range, they are giving up more in mortality than they are saving in expense. Obviously, this approach will lead to higher limits than you would otherwise get.

What are the future trends? Well, I think that it is hard to tell. Interest rates and inflation rates have calmed down somewhat. The reinsurers have backed off from taking on some of the risks, that are placed on the books with little, if any, selection, so, the primary insurers can't look so easily to the reinsurers for support. There will continue to be companies that will want to put the primary emphasis on classifying the risk as precisely as possible, as opposed to taking more of a macro approach.

I think the trend to new tools that may be of value and alternate ways of getting the information and more precisely pinpointing what is really of value as opposed to what has always been done will continue. For example:

- APS continue to be a valuable tool despite the cost and time delays in getting them. I think the emphasis there is on finding better ways to get the APS information more quickly and sorting out cases where the APS really isn't needed, such as on a legitimate checkup examination.
- Certain traditional testings, such as x-rays and EKG's, are being de-emphasized more and more these days, and perhaps more valuable tools such as blood studies are being used more.

- MIB continues to be a valuable tool.
- Some companies see a great cost/benefit return in nicotine testing of urine specimens.

I could go on, but I might mislead you into thinking that I really do know something in depth about underwriting. So, I'm going to stop here and turn the program over to Dave.

MR. WARNER: Everyone seems to be talking about health programs and wellness these days, and I think all of this has something to do with the chronological versus biological age, so I will let Bill tell you all about that.

MR. WILLIAM M. LOUCKS: Although Mel suggested that I might talk about Canadian legislation, I am not going to do that.

There has been a bit of a disturbance recently about President Reagan's age, and last week the doctor who supervised his physical examination in May was quoted by the White House as having said, "Mr. Reagan is a mentally alert, robust man who appears younger than his stated age." Had they asked me, which they didn't, I would have suggested they use a more scientific comment such as, "Mr. Reagan's biological age is lower than his chronological age."

I've been asked to talk today on the distinction between chronological age and biological age, and I'm going to have to contain my discussion to the biological age side since the only thing I've been able to find out about chronological age is that it is the time from when you are born until the present. In actuarial terms, chronological age is strictly a retrospective determination. Biological age, on the other hand, is a prospective determination. You find a person's life expectancy and the chronological age that corresponds to that life expectancy is his biological age.

Individuals age at different rates. As a matter of fact, different parts of an individual age at different rates. Some people end up with premature grayness, some have premature baldness, others have premature heart disease. The latter affliction, of course, is a much more serious one from a mortality risk classification point of view.

The concept and implications of biological age have been used by insurance underwriters for a long time. They just have not referred to it as "biological age." The debit and credit method is the underwriter's way of adjusting chronological age to arrive at a biological age. The underwriting process is an attempt to determine the spot an individual now occupies on the age scale and the rate at which he is going to age in the future. Both of those compare to an average. The underwriter naturally places emphasis on the parts of the body that have a greater impact on mortality. Just as well, some of the people with premature grayness might not be happy.

I'm going to discuss three methods of determining an individual's biological age. These can all be used today with current technology.

The first involves in part, taking samples of body fluids or tissues and analyzing them to see how certain bodily functions perform relative to established norms. These vary from finding serum cholesterol levels taken from a blood sample to much more radical procedures. As far as I know, no one has gone so far as to suggest surgery as part of our risk selection process. Risk appraisers feel that many of these tests can provide us with significant information. For example, blood and urine tests have been used to assist underwriters in classification of risks for quite a while.

I'm going to talk about two reports that have been published. Each of these reports provides a calculation of biological age. G. A. Borkan of the VA Outpatient Clinic in Boston and A. H. Norris of Baltimore City Hospital published a paper in the Journal of Gerontology in 1980. Their investigation was based on data taken from a longitudinal aging study which included pulmonary function, blood and muscle movement, and strength tests. For each of the 24 variables included in the study, each participant's status relative to his chronological age peers was expressed in standardized units. The scores of a single individual, compared to the average, show that one person can have higher biological age scores on some tests than on others.

Borkan and Norris Variables

- *Forced expiratory volume (1 sec)
- *Vital capacity
- *Systolic blood pressure
- *Serum albumin
- *Serum globulin
- *Tapping time (medium targets)
- *Tapping time (close targets)
- *Reaction time (choice)
- *Reaction time (simple)
- Maximum breathing capacity
- Diastolic blood pressure
- Hemoglobin
- Creatinine clearance
- Plasma glucose (OGT test)
- Auditory threshold (4000 cps)
- Visual acuity
- Visual depth perception
- Basal metabolic rate
- Cortical bone percent
- Creatinine excretion
- Hand grip strength
- Maximum work rate
- Benton visual memory test
- Foot reaction time

I mentioned earlier that some parts of your body age at different rates than other parts. Can we show that first slide? As you can see, there are quite a few different variables that they looked at.

Of the participants that were initially tested back in 1958, 15% of them had died during the period ending in 1977 when Borkan and Norris prepared their report. It was found that 9 of the 24 variables that they looked at showed a statistically significant difference in measurement between the dead and living participants. These nine variables are marked with an asterisk. The biological age of the dead participants was also higher in ten of the remaining 15 tests and none of the five tests indicating a lower biological age were statistically significant.

The second report that I will talk about was prepared by K. S. Brown and W. F. Forbes, both of the Department of Statistics at the University of Waterloo. It provided a method for the estimation of biological age using a multivariate analysis in order to account for interactions among the variables used in the calculation. From the information published in the Framingham study related to the probability of developing cardiovascular disease during the next eight years, they developed a biological age table with five variables. The variables are sex, chronological age, smoker versus non-smoker, serum cholesterol level, and systolic blood pressure.

Brown and Forbes Example

NONSMOKER

Serum Cholesterol	Systolic Blood Pressure						
	100	120	135	150	165	180	195
185	36	37	39	40	42	44	46
210	37	39	40	42	44	46	49
235	39	40	42	44	46	49	52
260	40	42	44	46	49	52	55
285	42	44	46	49	52	55	60
310	44	46	49	52	55	60	70
335	46	49	52	55	60	70	73

SMOKER

Serum Cholesterol	Systolic Blood Pressure						
	100	120	135	150	165	180	195
185	39	41	43	45	47	50	53
210	41	43	45	47	50	53	56
235	43	45	47	50	53	56	63
260	45	47	50	53	56	63	71
285	47	50	53	56	63	71	74
310	50	53	56	63	71	74	75
335	53	57	63	71	74	75	77

This is the table that they provided as their example. The table shows that biological age of a male whose chronological age is 45 and who has the serum cholesterol and systolic blood pressure level that are shown here. As you can see from the table, a 45-year-old non-smoking male with

a serum cholesterol level of 235, who has a systolic blood pressure level of 120, would score a biological age of 40. That is the third column over and fourth line down. If he was a smoker, his biological age would be 45.

I mentioned earlier that the basis for this age determination is the probability of developing cardiovascular disease during the next eight years. The biological age determined here by Brown and Forbes, is therefore, related only to cardiovascular disease. Since this cause of mortality makes up only a portion of the total probability of death, other influences on mortality would also have to be analyzed to make a complete determination of biological age.

There are some drawbacks to the methods used for each of these studies. They include that the tests are fairly expensive to perform, the testing process is inconvenient to an insurance applicant, the tests take quite a bit of time to complete which would result in delays in the issuing of policies. I'm sure that wouldn't make our agents very happy. There is a question of what tests should be performed and how much weighting should be applied to each of these in the risk classification process.

The second method for determining biological age is a result of a concept that was put forward in 1960 by Harvey Geller of the U. S. Public Health Service.

These are basically questions that are asked on a "Health Hazard Appraisal" test and are used to estimate the effects of certain specific risk factors on mortality. For example, if a person answers that he smokes a package of cigarettes a day, the risk of arteriosclerotic heart disease is assumed to increase by 50%, while the risk of lung cancer is assumed to double.

Let's look at the effects that certain answers might have on one item considered in the analysis. Vascular lesions affect the central nervous system, and are the result of several possible underlying causes. The factors influencing this have been included in the table for males ages 30-34.

Vascular Lesions Affecting the Central Nervous System

		Multiplicative	Additive
Blood Pressure	(Use the higher of the systolic and diastolic factors if multiplicative; use both if additive)		
Systolic	200		2.3
	180		1.3
	160		.5
	140	.9	
	120	.4	
Diastolic	106		3.3
	100		1.3
	94		.3
	88	.8	
	82	.4	
Cholesterol Level	280		.8
	220	1.0	
	180	.5	
Diabetic	Yes		2.0
	Controlled		1.5
	No	1.0	
Smoking	Cigarettes		.2
	Cigars/Pipe	1.0	
	Stopped	1.0	
	Nonsmoker	.8	

The multiplicative factors are multiplied together and added to the sum of the additive factors to determine a weighting. The weighting is then applied to the proportion of deaths in the age range that are caused by this problem. For example, if a person has a blood pressure of 140/88, you use the greater of the two multiplicative factors, (that's a .9 and a .8 above). If his cholesterol level was 180, you would multiply the .9 factor by .5 and you get a .45, and then if the person is a controlled diabetic, you would add 1.5 to it. Finally, if he smokes cigarettes, you would add another .2. The total factor then would be 2.15. The probability of death from the vascular lesions affecting the Central Nervous System, would therefore, be 2.15 times normal. And if the normal probability of death from that is 2.6% of total deaths, then the mortality for the person who has these attributes, is 2.99% greater than normal.

A similar approach is then taken for other causes of death and the sum of the additional risks when combined with normal mortality, determines the person's probability of death in total. This, in turn, shows his biological age, which is equal to the chronological age with the same calculated mortality rate.

This method of biological age determination could be used for insurance underwriting. In fact, many of the questions asked in the test are the same as those we ask in our non-medical application forms:

Nonmedical Factors

Smoking levels	Medical history
Alcohol use	Family history
Exercise level	Occupation
Use of seatbelts	Physical (height, weight)

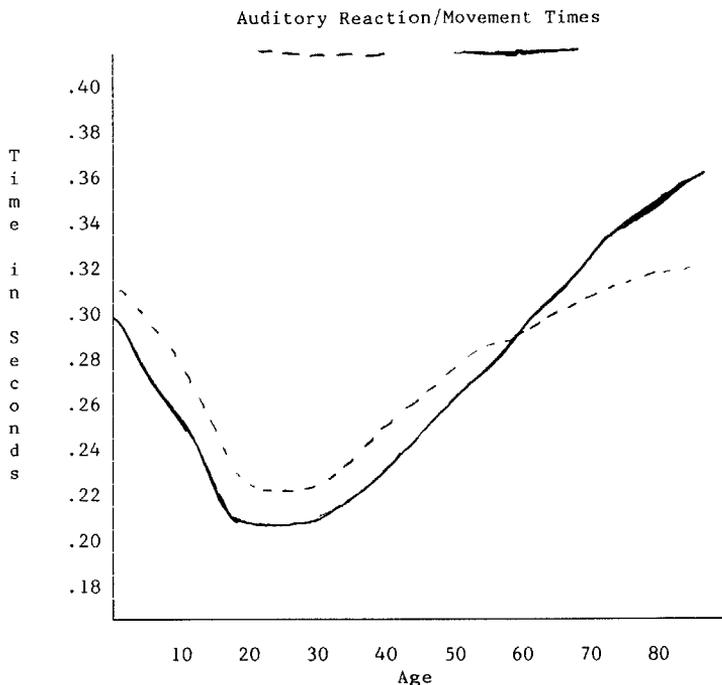
There are drawbacks to this method of finding the biological age: the factors result in a very complicated calculation, although they are fairly easy to program on a computer; reliance must be made on information provided by the person taking the test and much of the input is non-verifiable; and the effects of different factors on the various causes of death are, I suspect, set on a fairly arbitrary basis. The weightings, however, are easily determined since the mortality rate by cause of death is already known.

The third method of calculating biological age allows us to find biological age without taking bodily fluids or pieces of flesh. It's just as well. At Mutual Life of Canada, we have recently been involved in the testing of a microcomputer system which calculates biological age on the basis of scores on a number of age sensitive tests:

Microcomputer Variables

Incomplete picture recognition	Maximum breathing capacity
Auditory threshold	Touch sensitivity
Auditory reaction time	Sequence memorization
Visual reaction time	Tapping time
Muscle response	Visual accomodation
Vital capacity	Decision time
Forced expiratory volume (1 sec)	

The peripheral attachments had to be used on the microcomputer and they included earphones, breathing apparatus, a lens system, and a mechanical vibration system, and a specialized keyboard.



Our experiment involved testing of almost 900 people, and included having the participants complete a non-medical insurance application form. We believe that the results have some merit. We saw many people known to live a healthy life style who achieved a biological age much younger than their chronological age and the converse also held true. I'm embarrassed to admit that I ended up older on this one.

The tests are fun for the participants to perform. They take very little time to complete, and the results are obtained immediately. Of course, there are some drawbacks: the testing process requires the use of a microcomputer and the peripheral attachments; there is a question of which tests should be used, and how much weighting should be applied to each of them; and most important is the fact that the tests have not yet proven themselves. There is, however, sufficient evidence of a relationship between age and these test results to lead me to believe that this method could be used for finding biological age.

These three methods of determining someone's biological age are certainly not independent. There is quite a bit of overlap in the variables that are considered. Each method has some deficiencies, but I suspect that each could be used today as an underwriting tool. Perhaps some combination of the "Health Hazard Appraisal" and the microcomputer system is an answer.

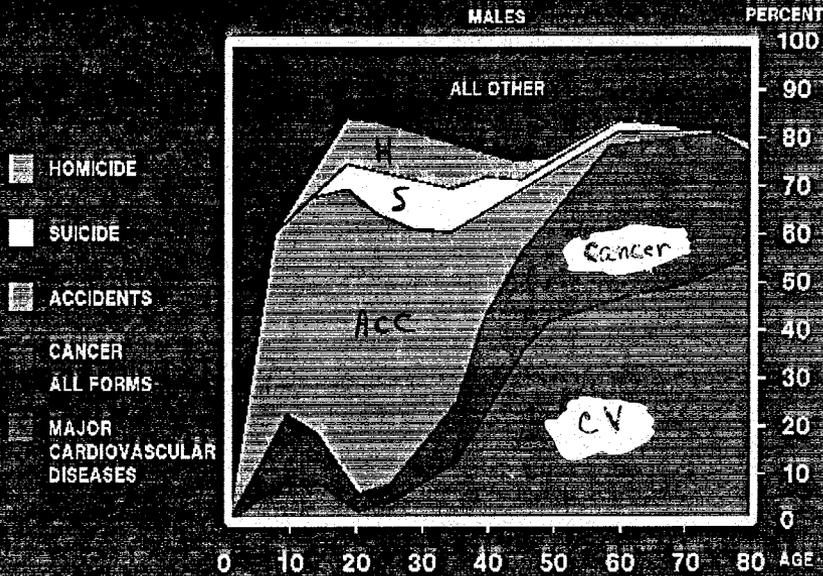
Traditional underwriting methods currently lead to several problems which must be addressed. The continuing squaring of the mortality curve through the significant reduction in some causes of mortality such as hypertension has resulted in other causes of death becoming more important as a percentage of total deaths. There is an increased emphasis being placed on non-medical items such as lifestyle. The future is going to bring more problems since technology now appears to be on the horizon for the extension of the life span. Human rights legislation may eliminate some risk classes such as sex or disability from even being considered by us.

I believe that the major underwriting problem in our industry today is the use of non-verifiable data for risk classification. In order to eliminate the use of this non-verifiable data, which is quite often just a proxy for lifestyle, it's important that we develop new measures to be used for underwriting purposes. The most significant use we make of non-verifiable data today is in the smoker/non-smoker area. Currently, an applicant's word of honor is all that is used to determine whether or not he is a smoker.

Our sales at Mutual Life this year are going to be about 50% non-smoker. It's going to represent some three billion dollars worth of insurance. That's a lot of faith to put in the honesty of our applicants, as well as the honesty of the agents selling the business. If a person claims to be a non-smoker, it's difficult and expensive to prove otherwise at the time of the application, and that difficulty changes to impossibility by the time you get the death claim a few years later.

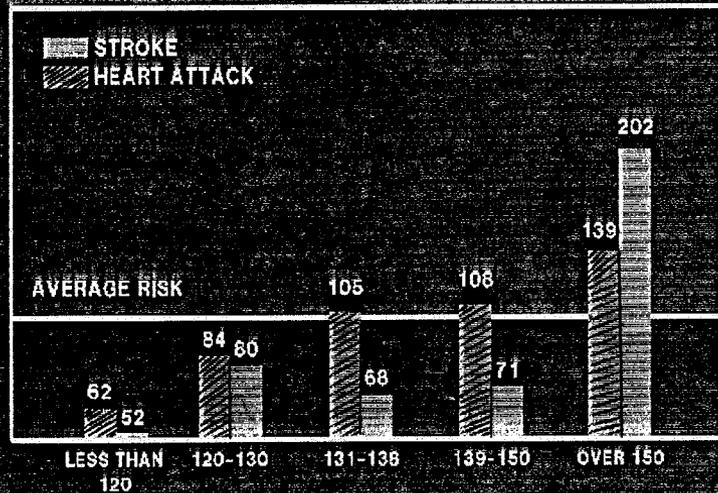
In conclusion, I'll reiterate that there are tests available today that could be economically used to help determine an applicant's risk classification, and the insurance industry should be involved in finding new ways of assessing risks. I think we have some tools, and we should start using them.

PERCENT OF DEATHS FROM SELECTED CAUSES, 1980
STANDARD ORDINARY POLICYHOLDERS - METROPOLITAN LIFE INSURANCE COMPANY

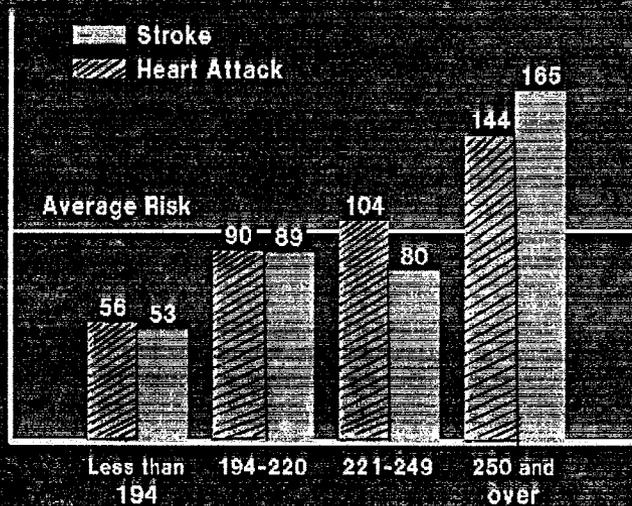


SLIDE 1

SYSTOLIC BLOOD PRESSURE

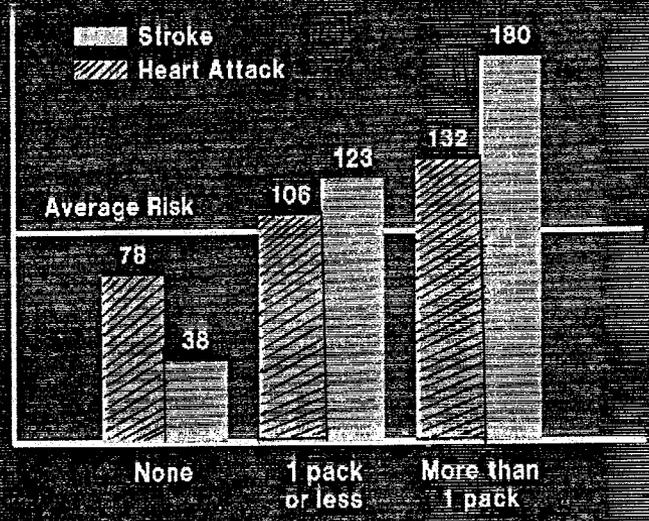


Total Cholesterol

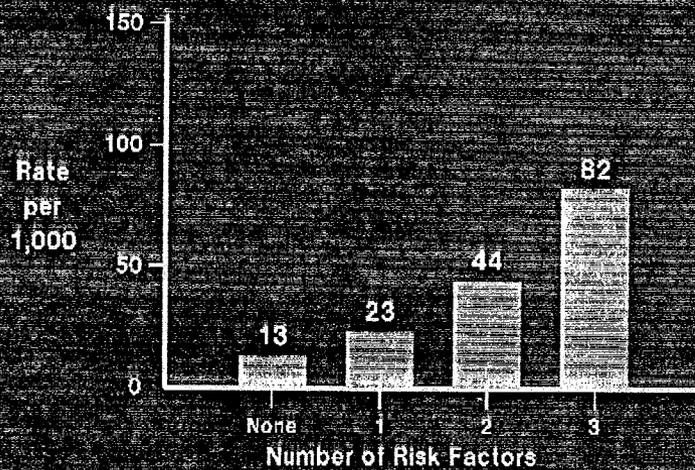


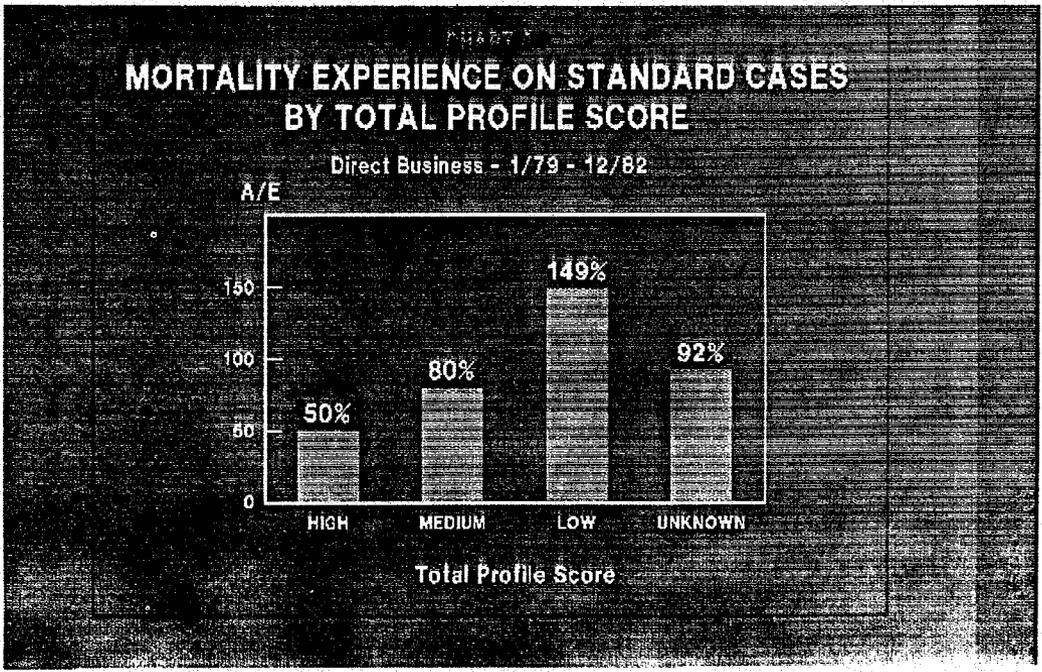
SLIDE 3

Cigarette Smoking



Death From CHD (By Number Of Major Risk Factors)





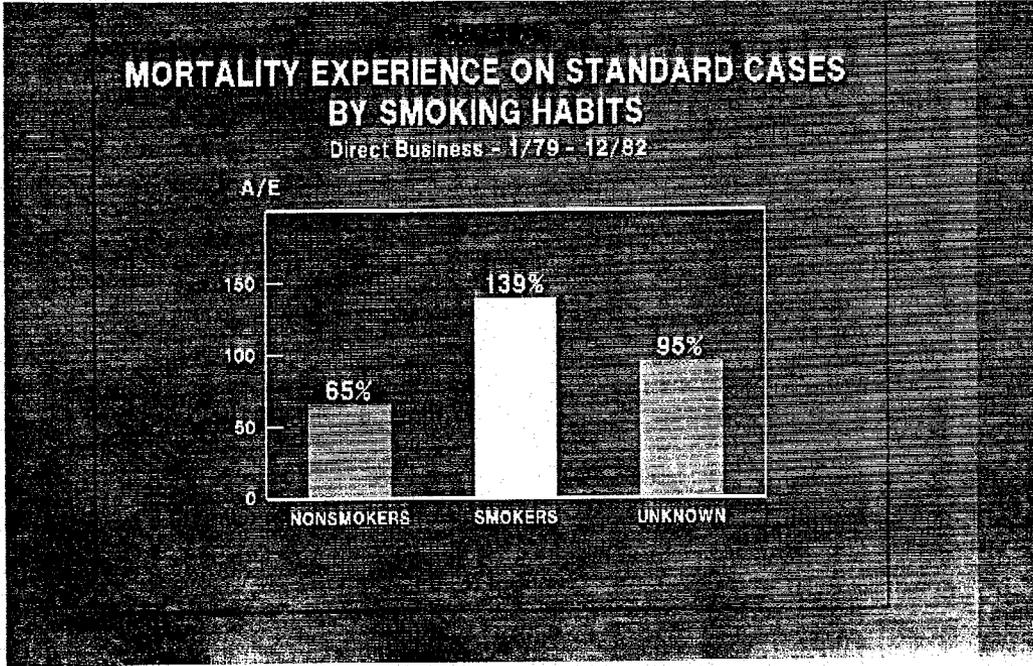
SLIDE 6

% NONSMOKERS BY TOTAL PROFILE SCORE AND RATING

Direct Business - 1/79 - 12/82

	High Score	Medium Score	Low Score
STANDARD CASES	100%	82%	3%
SUBSTANDARD CASES	100%	86%	17%

SLIDE 7

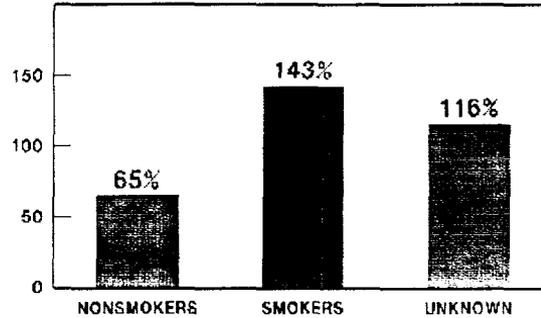


SLIDE 8

CHART D
**MORTALITY EXPERIENCE ON SUBSTANDARD CASES
BY SMOKING HABITS**

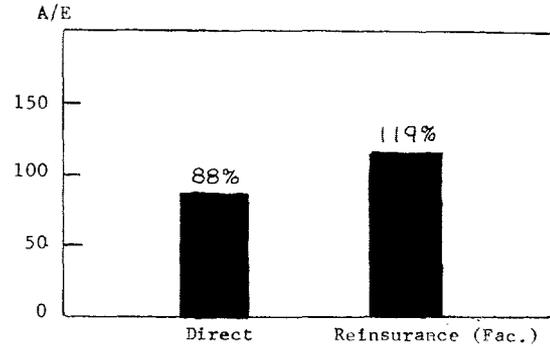
Direct and Reinsurance (Fac) Combined
1/79 - 12/82

A/E x Rating



MORTALITY EXPERIENCE ON STANDARD CASES

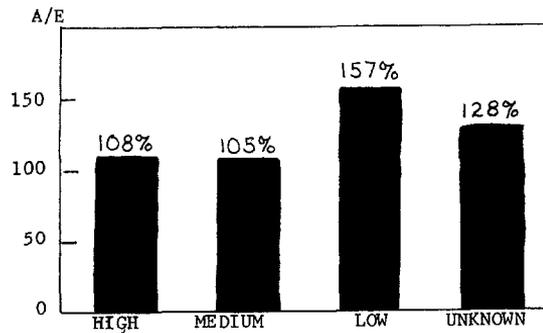
Direct vs. Reinsurance (Fac.) - 1/79-12/82



SLIDE 10

MORTALITY EXPERIENCE ON STANDARD CASES
BY TOTAL PROFILE SCORE

Reinsurance Business - 1/79-12/82



SLIDE 11

