

# Re.FLECTIONS

RGA's Medical Underwriting Newsletter

## LETTER FROM THE EDITOR



Dear Readers:

As the name of this publication is *Re-flections*, it is fitting to periodically stop and reflect on some trends being witnessed in today's life insurance industry. We dedicate this edition to contemplating two separate issues, but issues that share some common elements.

The first article discusses crediting programs, and the second article looks at the need to quantify the value of increasing levels of medical information in making medical risk management decisions. Both of these articles are meant to stimulate lively discussion and dialogue with you, the reader. I welcome your comments and hope that you enjoy reading the articles as much as I enjoy bringing them to you.

J. Carl Holowaty, M.D.

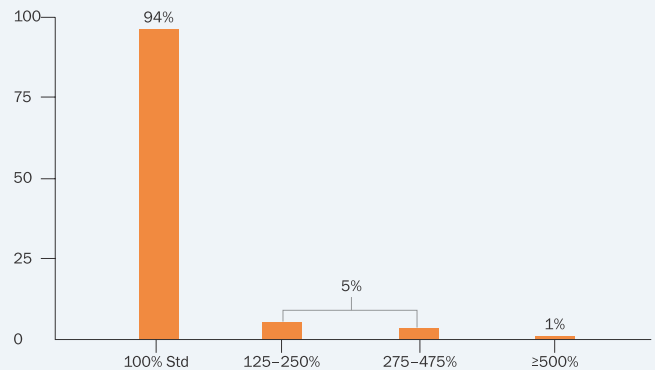
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## CREDITING PROGRAMS – “GIVING CREDIT WHERE CREDIT IS DUE”

by J. Carl Holowaty, M.D.

A basic tenet of mortality risk assessment is the credit-debit system. This approach to risk selection was mathematically formalized by Oscar Rogers and Arthur Hunter in the early 1900s. At the time, greater than 90% of the insurance-buying population was viewed as non-impaired or “standard” lives. This group was assigned a value of 100%. Those individuals identified as being impaired would require additional ‘debits’ to compensate for the expected excess mortality results they would produce. Conversely, those individuals with characteristics of greater-than-average longevity would qualify for ‘credits’, suggestive of better mortality expectations.

### Distribution of Mortality Risk Among Insurance Applications



Brackenridge, R.D.C and W. John Elder. *Medical Selection of Life Risks*. New York: Stockton Press, 1998.

Formalized Crediting Programs are currently gaining popularity as a mechanism to assist underwriters in making competitive offers on life insurance quotes. Well-defined credits are used in a variety of circumstances to adjust the ratings on applicants in order to move

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them from a particular substandard class to a better one, or from a substandard to a standard class. In some cases, application of credits allows movement from a substandard class to a preferred class. The most important consideration in the development of any successful program is to ensure that a rational basis exists for the quantity of credits and their appropriate application to individual cases.

Medical risk assessment has historically been largely based on an applicant's statement of health, as well as corroborating information derived from medical examinations. During the era of risk adjudication, credits were considered for a limited number of known factors, such as better-than-average parent or sibling longevity. Over time, however, additional risk selection tools such as blood and urine tests, blood pressure measurement and EKGs were incorporated into the risk assessment process. These provided additional insight into the risk of adverse mortality from some of the more common causes of death such as coronary artery disease (CAD) and diabetes. Since many of the more commonly used crediting programs today primarily consider credits for favorable factors predictive of CAD, it is reasonable to focus our interest in this condition, with the understanding that there may be broader applications of any conclusions reached.

Knowledge of the pathogenesis of CAD is certainly greater now than in the past. As underwriters we routinely obtain blood tests and attending physician statements that help evaluate the overall likelihood that CAD may exist in a specific applicant, as well as the severity of this condition when it is known to exist. In some cases, we may be aware of certain factors or tests, such as measures of coronary artery inflammation, that can help estimate the rate of progression of this often-insidious disease. As such, we have an abundance of disease-specific information that may be either favorable or unfavorable to that applicant. This wealth of facts may improve the accuracy of our risk assessments, but it also complicates the use of credits for favorable factors.

Credits are generally meant to be applied when there is an expectation of 'better than average' mortality. When deciding on a parameter to be used in a crediting program, an important consideration is to decide if the parameter in question truly does this. For instance, does a normal value of total serum cholesterol really imply a better-than-average outcome? Total cholesterol is generally accepted as one measure of CAD risk, and normal levels are known to be correlated with lower CAD prevalence than higher-than-

normal levels are. When establishing normal lab ranges, it is common to include about 95% of the population within the bell-shaped curve of results. Thus, if normal serum cholesterol qualifies an applicant for credits, the majority of the population would be expected to qualify. When using any other parameter of CAD risk, including BP measurements and resting EKGs, one should expect that the majority of the population would similarly be assessed as 'normal' and therefore qualify for credits.

Clearly it is important to establish a reasonable test-result level to serve as the basis for crediting; otherwise, nearly every individual will qualify for that credit. This might be construed as essentially a free credit, available to almost all applicants. While lower levels of total cholesterol are better than higher levels, as with most lab tests there is a point at which too-low a level may represent more detrimental outcomes. This clearly needs to be avoided.

Some crediting parameters, such as the presence of a normal EKG, are also problematic for different reasons. For example, it is hard to envision what would constitute a 'better than average' EKG. In addition, while this test has some value, it is not uncommon to see a normal EKG pattern even in the presence of known CAD. On a more positive note, some tests such as exercise tests can indeed establish a better-than-normal functional capacity, which is increasingly accepted as a measure of overall mortality expectation.

Another consideration when evaluating the validity of credits is to determine how they should be applied. For example, if a credit is being given for favorable CAD risk factors or test results, should this credit be given to applicants with a known history of CAD, all those substandard risks except those with CAD, or to all substandard risks? In fact, current crediting programs have used all of these approaches without clear consensus.

If a person has known CAD, including a history of a myocardial infarction or a stent procedure, will having a favorable BP or cholesterol actually reduce the risk of further events? This is a difficult question. While higher cholesterol and BP readings generally correlate with risk levels for the development of CAD, it is also not unusual to develop CAD with a history of normal lipids or normal BP. Approximately 35% of CAD cases occur in people with normal lipids. Giving credits for normal cholesterol in this segment of the population with known CAD history may be questionable at best.

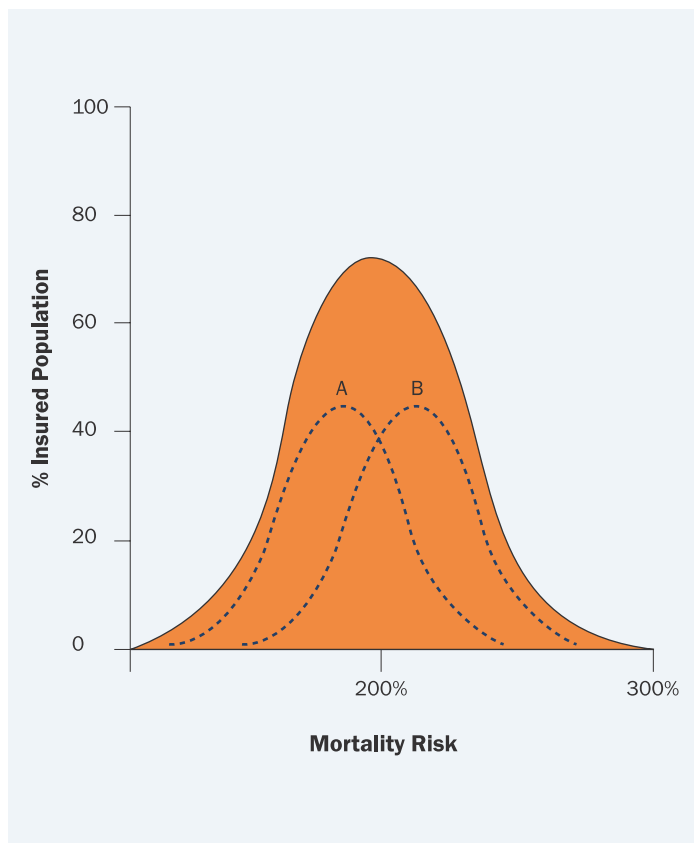
If an applicant has a history of a non-cardiovascular condition, such as biopsy-proven liver disease, will favorable

CAD risk factors change the ultimate course of the ratable condition? While it could be argued that all-cause mortality could be affected by lowered risk for a non-synergistic common cause of death such as CAD, this may be hard to substantiate in many cases. For example, if a 35-year-old applicant has moderately severe liver fibrosis from chronic hepatitis C infection that is resistant to treatment, would his better-than-average CAD risk factors play much of a role in all-cause mortality if he is anticipated to progress to liver failure long before CAD would normally be problematic?

A further consideration is to evaluate whether applicants may be double- or even triple-credited for essentially the same factors. For instance, if someone is credited for a favorable BMI, should this same person also receive credits for favorable BP, lipids, and EKG? These are all measures of CAD risk. The obese population has a higher incidence of hypertension and hyperlipidemia than the non-obese population. Giving a credit for a normal BMI may already be recognizing lower rates of hypertension and lipid elevations within this group. As such, it may be debatable whether multiple credits should apply.

Another consideration in crediting programs is determining the total credits that could be applied to a case. For example, if an individual's basic risk profile for a particular impairment is in the mild-moderate range, is it reasonable to use credits to reduce the eventual offer to standard or even preferred rates? If that life is consigned to an inappropriate class of risks, then mortality results in that class may be worse than anticipated, or the other members of the class may be required to unknowingly subsidize that risk. This would, of course, be compounded if credits are used excessively or in an illogical fashion.

Assuming that crediting programs are applied in a fair and reasonable fashion, it still remains necessary to determine how crediting certain individuals within a specific risk class will affect the expected mortality outcome in that class. Consider condition 'X', as outlined in the graph on the right. Assuming that the mortality of people with this condition is well known and accurately described by the curve shown in the graph, then the act of applying appropriate credits should create a class 'A'. This sub-class would show better mortality results than the original class. The important question to consider, however, is what happens with the rest of the original class. This residual class 'B' can be expected to experience a worse outcome than the original group. This would, however, only occur if debits are applied for less-than-favorable factors. Otherwise the mortality of the overall



group would diverge from original expectations.

In conclusion, consider these key questions when using or considering the use of a crediting program:

1. Does the underwriting manual in use already assume in the ratings guidelines that the people within each risk group for a particular impairment are the best of that group? For instance, in CAD, are the rates already taking into account that the applicant is under good medical care, with well-controlled BP and lipids? If so, applying credits for normal lipids or BP is an example of double-crediting.
2. Do the parameters being used for credit assignment really correlate well with better-than-average risk, or are they merely indicative of normality, common to the majority of the population?
3. If one CAD risk factor measurement is deserving of a credit, but other CAD factors are less favorable, is it still reasonable to apply a credit for the first factor? For instance, if a person's total cholesterol is favorable, but the total cholesterol to cholesterol/HDL cholesterol ratio is less favorable, is it still reasonable to apply credits? Or, if the total cholesterol is favorable, but the BP is less so, should the cholesterol credits be given at all?

4. Regarding credits for family history, if the applicant is substandard for any reason, but has parents and/or siblings with extremely good health and longevity, can one assume that the individual inherited the 'good' genes that the other members of the family have? Perhaps he/she was unlucky in inheriting the 'bad' genes present in even the healthiest parents.
5. Is there experience-based justification for the magnitude of credits given?
6. Are the credits being given to reduce a clearly substandard risk and put that risk into the standard risk pool? If so, is this program essentially another form of table shaving? Is this with the knowledge and understanding of the pricing actuaries at the direct and reinsurance companies?
7. Are the credits applied for similar and/or dissimilar conditions? If so, does that make sense?

## HOW MUCH LAND DOES A MAN NEED?

by J. Carl Holowaty, M.D.

The title of this article comes from a well-known story written by Leo Tolstoy, circa 1886. While Tolstoy obviously was not referring to medical underwriting when he wrote his story, his message echoes a topic that is pertinent to underwriters today: How much medical information do underwriters really need to make a reasonably accurate assessment of expected mortality in any individual case?

When assigning risk, the key questions to ask are:

1. Is this individual a standard (or preferred) risk?
2. If the risk is substandard due to a single impairment or combination of impairments, is it mildly, moderately or severely substandard?
3. Is the risk so high or unpredictable that no offer can reasonably be made?

In order to determine the answers to these questions, certain information needs to be obtained from the applicant's own statement of health, as well as the results of routine screening tests such as blood and urine samples, electrocardiograms, blood pressure measurements and build figures. Certain factors may also trigger the need for attending physician statements (APS) to provide more details.

Nearly every year, additional laboratory tests and diagnostic studies are made available to help elucidate the risk for certain conditions as well as to delineate the severity of those conditions. While certainly serving this purpose, it remains to be seen how this additional information will affect the outcomes of specific case adjudication. In order to illustrate this point, consider how tests such as electron beam computerized tomography (EBCT), C-reactive protein, and routine HgbA1c may affect decision-making. While these specific tests will be discussed, understand that they are merely illustrative of a larger issue, and that any of the newer laboratory tests or diagnostic procedures could be similarly considered.

EBCT is a test that can be used to determine the degree and location of calcification in the coronary arteries. Generally the results are expressed either in raw numbers, or as a percentile within a specific age range. Often a brief description is given of the anatomical location of the calcium depositions. Generally, the higher the calcium number, or more importantly the higher the percentile, the greater is the risk that an individual may have coronary artery disease (CAD). While this information is certainly useful, it is less apparent how this information should be used for risk assignment. For instance, in an otherwise healthy individual with no other ratable condition and relatively few coronary risk factors or symptoms, at what EBCT percentile is it reasonable to expect worse-than-standard mortality?

A person in the 75th percentile has more calcium deposits than 75% of the population, but 25% of the population (at that specific age) has more calcium deposition. If ratings are given for percentiles higher than 75, then presumably 25% of the individuals with EBCT scores will require a rating. Applying debits to one-quarter of the routinely tested insurance population is not only unreasonable for business purposes, but is also incompatible with actuarial estimations of substandard risks in the insurance-buying population. On the other hand, not rating for any degree of measured calcium deposits, or only for those at the highest levels, may result in placing some individuals into the standard risk pool with excessive CAD risk. If ratings for EBCT scores are being considered, should the ratings for otherwise healthy people with high scores or percentiles be as high as ratings for people with documented CAD, including those with stable angina and a history of stent or by-pass procedures? Conversely, in the case of applicants with documented CAD, would a high (or low) EBCT score change the baseline CAD rating enough to justify transferring that person into another risk class?

The use of hsC-reactive protein (hsCRP) as a marker for coronary inflammation can be similarly problematic. Studies suggest that the highest quartile of hsCRP correlates to greater risk for significant CAD. It is easy to conclude that the best risks for CAD are in the lowest quartile, and the worst risks are in the highest quartile. How should this be incorporated into an underwriting decision? Once again, does it make sense to take adverse action on everyone in the top quartile? Likewise, is it fair to assume that the lowest quartile's overall risk is so good that they should derive a benefit from this information?

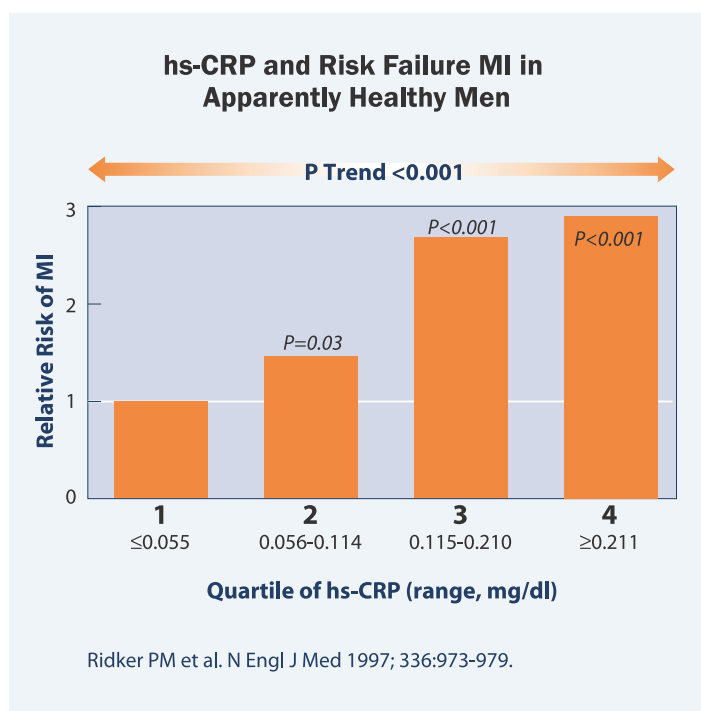
Total coronary risk is derived from the panoply of risk factors, some of which, like hsCRP, are new, and some of which are more established. How should hsCRP results be weighted against all the other favorable or unfavorable factors? As with EBCT scores, should an unfavorable hsCRP result in an otherwise healthy person being assigned a rating that is as high as that given to a person with a documented CAD lesion or event? Further, if a person with documented CAD has a measured hsCRP level, will that knowledge change the risk assignment given before the hsCRP level was recorded? If the answer is 'no', then is there really much value in this test from an underwriting perspective, or in considering the result if the test has already been done? A further consideration is that the hsCRP levels can change with time and appropriate therapy aimed at reducing coronary artery inflammation. Thus the additional risk of a high score can be transitory rather than permanent. While there may be value in hsCRP

measurement done by clinicians to assist in the modification of disease progression, the true value of hsCRP within the life insurance industry remains to be proven.

HgbA1C is a test that provides a measure of a person's average serum glucose over a 2-3 month period. The National Institutes of Health estimates that 11% of all American adults have impaired glucose metabolism and that 45% of adults older than age 65 have this condition. Using current definition guidelines, 8.7% of all adults are considered diabetic, and 18.3% of adults aged greater than 60 are diabetic. Since this condition is associated with excess mortality, particularly from cardiovascular complications, it is important to consider the effects of routine testing of applicants to evaluate whether they have this condition. Since it is often present in an occult fashion for a number of years prior to definitive diagnosis, the need for testing is imperative.

In the insurance industry, routine testing traditionally consists of serum glucose measurements and urine testing for glucosuria. These tests are admittedly crude, but probably detect many non-disclosing diabetics as well as those diabetics that are unaware of their condition. Additional testing for serum fructosamine detects some of the diabetic population that may be missed on routine spot testing for serum glucose. While these tests provide some protective value, they undoubtedly do not detect all those who are at risk for diabetes, and especially those who may be termed pre-diabetic or glucose-impaired.

Labs have established a normal range for HgbA1c. Levels above this range are associated with extra mortality. In reality, this excess mortality does not begin abruptly at the upper limit of the normal range, but exists in a continuum from some point in the mid-range of normal values and gradually increases with corresponding increases in the HgbA1c levels. This is probably very similar to the additional risk associated with increasing levels of blood pressure, where the mortality risk increases even within the normal range from low-normal to high-normal. While this increasing risk is easy to conceptualize, it is not customary to start considering the application of correspondingly incremental debits within this range. It is far more practical to establish a relatively rigid 'cut-off', beyond which a person is considered diabetic. This definition is ultimately arbitrary, even though it can have a profound influence on disease incidence and health care expenses. It also will play a role in deciding on assignment of additional debits for insurance purposes.





**EPIC-Norfolk All Cause Mortality—relative risk**

	<b>A1C</b>	5 – 5.4%	5.5 – 5.9%	6 – 6.4%	6.5 – 6.9%	>6.9%
<b>MEN</b>	<b>RR Death</b>	1.25	1.57	1.8	3.49	3.38
<b>WOMEN</b>	<b>RR Death</b>	1.02	1.28	1.61	1.7	6.91

Ann Int Med. 2004;141:413-420

Routine screening for HgbA1c is likely to much more accurately identify those with impaired glucose intolerance than other commonly used insurance tests. The next question is, what to do with this additional information? Presumably the ‘hit rate’ for older adults undergoing this test will be quite high, since glucose intolerance incidence is high in older adults, and increases with age. Within a population that is otherwise standard, what should be done with those who are glucose-intolerant but not necessarily ratably so? Those who pass this testing hurdle are likely to represent a better risk than those that are glucose-impaired. Presumably, the individual might even be a preferred risk, at least in terms of diabetic considerations. If this additional test information is used to take an applicant out of the standard risk pool, what will happen to the mortality of that residual group after the better risks have been removed, leaving a much greater percentage with impaired glucose tolerance than existed prior to routine HgbA1c testing? While only experience can tell, it is reasonable to postulate that the mortality of the residual standard group would suffer, necessitating pricing adjustments.

Although some specific tests have been discussed in this article, it is worth reiterating that the same considerations should be given to any new test or requirement that is proposed to assist in underwriting. Regardless of the merit of the test procedure, the real question is not truly if the test has value, but what value does it provide beyond those screens that are already in place? Screening procedures are generally not meant to provide complete accuracy in diagnosis or risk assessment, but to be relatively blunt tools to identify many, but not all, of those at highest risk from a variety of common mortality-related diseases such as CAD, renal disease or diabetes. They are also meant to be cost-effective and as unobtrusive as possible, so that they do not significantly impede the sale of life products. While additional screens should always be reviewed, it is important to consider the full impact of any additional tests.

To paraphrase Tolstoy: How much information does an underwriter need?

**INFORMATION**

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