

Study of Policies on Insured Lives With Elevated Blood Pressure Known at Time of Issue

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Background.—The mortality results of policies on insured lives with elevated blood pressure have been the subject of several studies since the early 20th century. This study, which began with issues of 1989, utilizes data from the Impairment Study Capture System (ISCS). Data are also compiled for impairments other than elevated blood pressure in the ISCS for the same study period. A comparison of these 2 sets of data shows the relative severity of elevated blood pressure compared to all other impairments combined. The determination of elevated blood pressure was made on the basis of risk classification due to lack of specific blood pressure readings.

Methods.—Mortality results are actual to expected ratios based on the SOA 1990–95 Select Basic Table. The companies participating in this study have completed 3 steps: (1) agreement to have individual reports to the MIB included in the ISCS file; (2) submission of additional policy information, not on the MIB report; and (3) update of in-force status annually. Reports do not include personal identifying information.

Results.—Based on the limited amount of data contributed by relatively few companies, there has been considerable improvement since earlier studies in mortality among insureds with elevated blood pressure. Some possible reasons for this include: (1) fewer smokers—there were fewer smokers in the population and hence applying for insurance during the period covered by this study as compared to earlier studies; (2) improved treatment, patient awareness and adherence to regimen—a wider variety of medications and current treatment practices compared to treatment in the 1970s and early 1980s may have influenced results. Compared to prior studies, it is likely that more insureds with elevated blood pressure first noted on the insurance examination subsequently have received treatment. In addition, those with elevated blood pressure have become more aware of the importance of adhering to their medication regimen and improving other adverse risk factors; (3) improvement in the treatment of related medical conditions.

Conclusion.—The results of this study must be interpreted with caution. The volume of data is not substantial, and the results may not be representative of non-contributing companies. Going forward, it is hoped that more companies will agree to participate such that future studies will produce data and results of greater utility.

From the Mortality and Morbidity Liaison Committee (MMLC) of the Society of Actuaries (SOA), the American Academy of Insurance Medicine (AAIM), and the Association of Home Office Underwriters (AHOU) with data and analysis supplied by the Center for Medico-Actuarial Statistics (CMAS) of the Medical Information Bureau (MIB)

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Elevated blood pressure is the most frequent medical impairment that crosses the individual life insurance underwriter's desk. It may be disclosed by the reading taken during required paramedical or full medical examination for larger insurance amounts, particularly at older ages, or by disclosure of medication for hypertension. History of elevated blood pressure is also disclosed in attending physicians' statements obtained with these larger amount applications. The underwriter then must make a judgment regarding the significance of 1 or more current or historical elevated blood pressure readings, together with evaluation of other coronary risk factors, to determine the risk classification of the proposed insured.

In addition to data for elevated blood pressure, data are also compiled for other impairments in the Impairment Study Capture System (ISCS) for the same study period. A comparison of these 2 sets of data shows the relative severity of elevated blood pressure compared to all other impairments combined.

BACKGROUND

Mortality results among policies on insured lives with elevated blood pressure have been the subject of several studies since the early 20th century. The most recent study focusing on blood pressure was the 1979 Blood Pressure Study that presented data on insured lives with normal as well as elevated blood pressure. The study evaluated elevated blood pressure, irrespective of whether a diagnosis of hypertension had been made, and with no additional impairment or impairments that would have required classification as a substandard risk if found alone. In addition, the Multiple Medical Impairment Study, published in 1998, presented data where elevated blood pressure was found in combination with 1 or more "other" impairments (of both minor and major significance). These earlier studies were more specific than this study in that levels of blood pressure elevation were available.

Prior studies have demonstrated that elevated blood pressure, which is usually asymptomatic, has great significance on both short-term and long-term mortality. The earlier studies were largely based on experience among policies issued prior to the 1980s. This was a time when the importance of hypertension was not as widely recognized and acknowledged. This period also preceded the availability of a greater variety of medications to treat and manage elevated blood pressure with the ability to reduce the risk of associated coronary artery and cerebral vascular diseases. Relatively little mortality data has been available on insured lives in recent years when medication has been more widely used.

Despite advances in medicine and public awareness, many applicants for insurance without prior knowledge of any history of blood pressure elevation continue to show elevated blood pressure readings on examination. It is unknown whether they subsequently receive medication after they have been examined for insurance purposes.

METHODS

All companies were invited to participate in this study. Initial participation began in 1989. There are 3 steps involved in participation:

1. Agreement to have individual reports to the MIB included in the ISCS file. These reports to the ISCS file do not include any personal identifying information (ie, name, social security number).
2. Submission of additional information not on the MIB report such as risk classification, tobacco use and policy size at issue, along with the latest in-force status.
3. An update of in-force status annually. Companies that have data in this study have completed the 3 steps.

The methods of this study are the same as those used for past studies. However, the exposure period is relatively short. Maximum exposure is 8 years, and the average is about 2.5 to 3 years. Actual deaths were compared

to the expected deaths derived from the sex-distinct 1990–95 Select Basic Tables that are based on standard insured lives experience by amounts of insurance on both medical and non-medical issues. Results are reported separately for males and females, for standard and substandard issues, and for risks with and without elevated blood pressure.

There are 11 companies that have contributed data for the exposure period (ie, issues of 1989–1996 exposed to 1997 anniversaries). Three companies have 80% of the total study data. The volume of data included in this study, although sufficient to produce results that are generally statistically significant, is only a fraction of that in earlier studies. In addition, the credibility of the data, as representative of total industry experience, is more limited than in prior studies due to the fewer number of companies participating.

CATEGORIES

The number of categories or cells that were studied in addition to male, female, standard and substandard, include:

1. Single vs multiple impairments
2. Elevated blood pressure treatment (at issue and/or in recent history)
3. Smoking status
4. Three amount of insurance bands
5. Four issue-age groups
6. Three policy-year groups
7. Four degree of substandard categories

The degrees of substandard categories are defined as: Slightly = less than 175%; Moderately = 175% to 250%; and Highly = over 250%. The "Other" category includes policies with a flat extra premium rating with or without a percentage rating. Multi-variable subdivisions (eg, subdivision of smokers by age) are not shown in this report due to data limitations.

STUDY AND DATA LIMITATIONS

Detailed results from this study should be evaluated with the following caveats in mind.

The definition of the data for some of the categories varied to some extent. Some policy records tabulated as having multiple impairments include 2 or more reports pertaining to a single impairment (eg, impairment and symptom, impairment and test result, etc.). Also, the definition of "smoker" may vary among companies. Some companies use a definition of cigarette smoking only, while others use any tobacco use to distinguish the smoking or tobacco use status of the applicant. There may also be situations whereby the definition by a specific company may have changed during the study period.

The definition of blood pressure treatment may also have varied among companies, including whether the treatment was current or in the past. For this study, it was presumed that the MIB reporting rules were followed. However, there may have been variances from underwriter to underwriter. Minor impairments may have been recorded by some companies and omitted by others.

Specific levels of blood pressure are not available from ISCS data. When blood pressure was the only impairment, the degree of risk was measured by the risk classification. When other impairments in addition to blood pressure were involved, the risk class is assumed to represent all impairments and not blood pressure alone, and in some cases, elevated blood pressure may have been the impairment of lesser significance.

The number and combination of cells studied were limited by the extent of the data. The Committee was hopeful that various combinations of risk, such as blood pressure and build, or blood pressure and diabetes or coronary disease, could be evaluated using ISCS data. However, due to the limited number of current contributors to ISCS, the mortality analysis is reported on a more general level. Companies contributing data for this study have fulfilled all 3 steps outlined in the Methods section of this report. Other companies have completed the first or first 2 steps. Full participation by all companies in the ISCS is needed to produce data and results of greater utility.

Results that distinguish mortality between treated and untreated hypertension are based on the treatment status of the insured at time of issue. Therefore, a determination of the effect of treatment on mortality is limited since treatment status of the insured may change over time. The effect of changes in treatment status over time is beyond the scope of this study.

The effect of elevated blood pressure on mortality results of small amount policies may be overstated because a study by number of policy years of exposure gives small and large amount policies equal weight. In addition, only those with more serious elevations of blood pressure may have been identified. Smaller amount policies also include a heavier concentration of smokers than larger amount policies. With larger amounts of insurance, a greater number of underwriting requirements are obtained and more evaluation time is needed. These factors should be considered when interpreting results by policy amount.

Notwithstanding the above limitations, the data appear to reflect a reasonably accurate representation of the differences among categories.

DETAILED RESULTS

For the interested reader, the results of the study are presented in greater detail in the Appendices posted at www.mmlc.org. Appendices A through C each have tables showing data tabulated by number of policies for the following:

- (1) Male—Substandard
- (2) Female—Substandard
- (3) Male—Standard
- (4) Female—Standard

Appendix A shows actual policy deaths and mortality ratios for policies where elevated blood pressure was reported at issue.

Appendix B compares the elevated blood pressure data in Appendix A with actual deaths and mortality ratios for policies with medical impairments other than elevated

blood pressure with the same issue and exposure periods.

Appendix C shows exposures, actual and expected deaths, mortality ratios and extra deaths for data in the elevated blood pressure experience. The data for smoking status unknown at issue are not shown separately, but are included in the totals.

All tables show data for all policies on insureds with elevated blood pressure known at issue except as indicated in the column headings.

The following abbreviations are used in the tables:

- ACT = Actual number of policy deaths
- MR = Mortality Ratio of actual to expected policy deaths.
- Parentheses () indicate that the mortality ratio was based on fewer than 25 policy deaths.

SUMMARY OF RESULTS

Single vs Multiple Impairments

As expected, mortality ratios were lower for those with elevated blood pressure as the only known impairment (Single) compared to those who had 1 or more other impairments in addition to elevated blood pressure (Multiple). The latter (Multiple) results reflect the effect of both elevated blood pressure and another 1 or more impairments.

The overall mortality ratios for policies on insureds with elevated blood pressure reported at issue were somewhat lower for substandard males than for substandard females. The reverse was true for standard males compared to standard females, largely due to the low mortality ratio for standard female non-smokers. (Table 1)

Treatment

Table 2 compares data for policies where treatment was reported at issue, with policies where there was no treatment, or where information about treatment was unknown. Most of the data in the latter group originates

Table 1. Mortality of Single vs Multiple Impairments

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Single	82	130%	50	141%	460	106%	284	92%
Multiple	260	153%	211	155%	233	118%	104	90%
Total	342	147%	261	152%	693	110%	388	92%

Table 2. Mortality of Treatment vs No Treatment Reported

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Untreated	151	158%	70	120%	224	110%	122	87%
Treated	191	140%	191	169%	469	109%	266	94%
Total	342	147%	261	152%	693	110%	388	92%

from policies where treatment was reported as unknown. The volume of data in this category and the similarity of results to those where treatment was reported, suggest that virtually all of the “unknowns” were untreated.

For substandard males, the mortality ratio for treated elevated blood pressure is lower than for untreated hypertension. For standard males, the mortality ratios for treated and untreated are about the same. For substandard females, the reverse is true (ie, the mortality ratio for treated elevated blood pressure is much higher than that for untreated). A similar result is found for standard females. The low ratio for untreated substandard females may be due to a lesser significance of moderate levels of elevated blood pressure on females than on males.

Smoking Habits

The mortality ratios for smokers were even higher than may have been expected relative to those for nonsmokers. The high mortality ratios for smokers may also suggest that the ratings for the combination of elevated blood

pressure and smoking applied could have been greater.

It is particularly noteworthy that this is the first intercompany study tabulating data for all impairments that has separated data for substandard lives by smoking habits. These results reemphasize the importance of smoking habits on mortality risk. (Table 3)

Policy Amount Group

Mortality ratios generally decreased as the size of policies increased. There is more extensive underwriting and scrutiny of larger cases. There is a higher percentage of smokers among those with smaller amount policies than among those with larger policies.

Another explanation for the lower mortality experience in policy face amounts of \$100,000 or more may be the “preferred risk” underwriting criteria used for premium credits or reductions on larger amount policies. Also, the basis of expected mortality (ie, the 1990–95 Basic Tables) includes experience on both medical and nonmedically underwritten policies. It’s doubtful that the concentration of nonmedical business in this study is as low

Table 3. Smoking Habits and Mortality

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Smoker	100	292%	64	312%	152	233%	108	232%
Unknown	66	207%	65	238%	191	150%	82	113%
Nonsmoker	176	106%	132	107%	350	80%	198	65%
Total	342	147%	261	152%	693	110%	388	92%

as is reflected in the expected mortality. However, the results indicate decreasing mortality ratios with an increase in policy amount, reflecting the heavier concentration of examined business at larger policy amounts. (Table 4)

Issue Age

The poorest results both for standard and substandard males were at issue ages 40–49, with decreasing mortality ratios at issue ages 50–59 and 60–69. The mortality ratios at issue ages 20–39 were unfavorable for females. Substandard females had both a higher mortality ratio (160%) and a higher proportion of actual deaths at ages 60–69 than males. The higher prevalence of elevated blood pressure among females than males at higher ages may have resulted in a higher percentage of policies being issued to substandard females than to substandard males at ages 60–69. (Table 5)

Policy Year

The highest mortality ratios were for policy years 1–2 with a decrease at policy years 3–5. There was a further substantial decrease at policy years 6–8. This trend was evident for both males and females.

The higher mortality in the early policy years may suggest that the effect of selection is not as great for elevated blood pressure as for other conditions. Perhaps this is because elevated blood pressure can trigger a stroke or other vascular incidents at any time.

The favorable results in policy years 6–8

may reflect better and more widespread treatment, reflect under-recognition of lapses resulting in over-statement of exposures, and/or reflect a significant percentage of substandard policies with reduction of risk classification that were not recognized in this study. In any event, these results are an anomaly to keep in mind. (Table 6)

Degree of Substandard

The mortality ratios generally followed an increasing pattern as the rating increased and were generally more favorable than expected for each degree of substandard category at issue. The relatively high ratings applied to the policies in this study relative to actual mortality experience reflect higher mortality ratios in prior studies of elevated blood pressure mortality. However, the ratings were accurate in classifying the relative mortality of these substandard risks. (Table 7) Results by degree of substandard are given separately for smokers and nonsmokers in the next section.

Comparison of Results—With and Without Elevated Blood Pressure

Data for impairments other than elevated blood pressure have also been tabulated. The larger volume for other impairments and the general similarity of the patterns of mortality ratios to those for elevated blood pressure increase the credibility of the results (see Appendix B tables at www.mmlc.org). The data also demonstrate similar trends by smoking habits, amount of policy, issue age, policy

Table 4. Policy Amounts and Mortality

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Pol. Amt. (\$1,000)								
Under \$50	205	161%	212	155%	353	120%	306	98%
\$50-\$99	75	137%	37	174%	173	114%	56	86%
\$100 & over	62	123%	12	89%	167	89%	26	55%
Total	342	147%	261	152%	693	110%	388	92%

Table 5. Issue Age and Mortality

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Issue Age								
20-39	28	123%	18	(320%)	52	102%	26	190%
40-49	81	174%	35	160%	153	116%	64	107%
50-59	108	158%	58	114%	232	111%	108	82%
60-69	125	132%	150	160%	256	106%	190	87%
Total	324	147%	261	152%	693	110%	388	92%

Table 6. Policy Year and Mortality

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Policy Year								
1-2	131	165%	100	177%	206	123%	138	114%
3-5	139	144%	112	151%	314	114%	182	95%
6-8	72	127%	49	120%	173	92%	68	61%
Total	342	147%	261	152%	693	110%	388	92%

year and degree of substandard. Results for impairments other than elevated blood pressure, especially those where hypertension is a complicating factor and where the greatest volume may be obtained, could be more useful with additional data.

Although the trends of mortality ratios for all impairments combined, other than elevated blood pressure, compared to those for elevated blood pressure are similar, the total

mortality ratios are generally lower than those for elevated blood pressure. One notable exception is that the mortality ratio for male substandards with a single impairment, other than elevated blood pressure, (136%) is slightly greater than that for male substandards with elevated blood pressure as the single impairment (130%). This is largely due to a higher mortality ratio (152%) for the degree of substandard "Other" (ie, with a flat extra

Table 7. Degree of Substandard and Mortality

	Male Substandard		Female Substandard	
	ACT	MR	ACT	MR
Degree Substandard:				
Slightly	76	125%	55	110%
Moderately	101	146%	74	141%
Highly	39	163%	29	182%
Other	126	160%	103	192%
Total	342	147%	261	152%

Table 8a. Comparison of Mortality With and Without Elevated Blood Pressure

	Substandard				Standard			
	Males		Females		Males		Females	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Single Impairment								
With Elev. BP	82	130%	50	141%	460	106%	284	92%
No Elev. BP	530	136%	308	124%	1460	84%	697	84%
Mult. Impairment								
With Elev. BP	260	153%	211	155%	233	118%	104	90%
No Elev. BP	302	133%	150	134%	198	95%	62	72%

Table 8b. Comparison of Mortality of Substandard Smokers and Nonsmokers by Elevated Blood Pressure Status

Degree of Substandard	With Elevated Blood Pressure					No Elevated Blood Pressure				
	Smoker		Nonsmoker		Ratio S/NS	Smoker		Nonsmoker		Ratio S/NS
	ACT	MR	ACT	MR		ACT	MR	ACT	MR	
	Substandard Males									
Slightly	37	389%	38	76%	5.12	55	237%	118	93%	2.55
Moderately	26	223%	74	130%	1.72	66	229%	156	111%	2.06
Highly	14	(261%)	25	134%	(1.95)	38	247%	59	117%	2.11
Other	23	(297%)	39	95%	(3.13)	72	212%	148	107%	1.98
Total	100	292%	176	106%	2.75	231	228%	481	105%	2.17
	Substandard Females									
Slightly	15	(241%)	39	91%	2.65	32	201%	69	74%	2.72
Moderately	24	(340%)	48	107%	3.18	52	275%	100	111%	2.48
Highly	11	(376%)	18	(138%)	2.72	17	(215%)	36	148%	1.45
Other	14	(322%)	27	117%	2.75	19	(149%)	80	131%	1.14
Total	64	312%	132	107%	2.92	120	216%	283	106%	2.04

premium rating only or with a combination of percentage rating and a flat extra premium), which is a more significant cell in terms

of exposure for impairments other than elevated blood pressure. (Table 8a)

Because the effect of smoking on mortality

Table 9. Comparison to 1979 Blood Pressure Study

	Substandard				Standard			
	Males		Females		Males		Females	
	ISCS	1979	ISCS	1979	ISCS	1979	ISCS	1979
Untreated	135%	192%	(127%)	168%	102%	—	92%	—
Treated	124%	181%	150%	164%	107%	—	92%	—
Total	130%	191%	141%	160%	106%	—	92%	—

merits further examination, the mortality ratios for substandard smokers and nonsmokers, and the ratios of smoker to nonsmoker mortality ratios are shown separately in Table 8b for the 4 degrees of rating classes. Although the data are small when subdivided, the smoker-nonsmoker ratios are generally higher for substandard risks with elevated blood pressure than for those without elevated blood pressure, and they are consistently high for most of the substandard subcategories.

COMPARISONS WITH OTHER STUDIES

1979 Blood Pressure Study

This study of very substantial proportions (11,230 male policy deaths and 1711 female policy deaths among substandard risks) covered issues of 1950–1971 exposed between 1954 and 1972 anniversaries. Expected deaths were based on standard lives mortality experience between 1954 and 1972 anniversaries. Studies were made of risks without known minor impairments and of those risks combined with those who had known minor impairments. Risks with elevated blood pressure that also had known major impairments (ie, an impairment that would have required a substandard classification if found alone) were not included in this study, nor were data subdivided by smoking habits or by amount group.

Only about 4% of the total substandard risk experience in the 1979 Study was on persons with known treatment. The mortality ratios were 181% for males (compared to 192% for the total male experience) and 164% for

females (compared to 168% for total females). (Table 9)

Data by issue age, policy year and degree of substandard are shown in Table 10a. The 1979 Study showed data for substandard risks separately, and standard and substandard combined, but not for standard risks separately.

Multiple Medical Impairment Study

This study was of substantial size with 6326 policy deaths among substandard males and 944 policy deaths among substandard females covering 1952–1976 issues. Policies were exposed between 1962 and 1977 anniversaries with expected deaths based on standard lives mortality experience during this exposure period. The study included risks with elevated blood pressure and 1 or more other impairments. Risks with elevated blood pressure but no other impairment were not included, nor were data subdivided by smoking habits.

The mortality ratios for substandard males with elevated blood pressure were much higher in the Multiple Medical Impairment Study than in the ISCS Study. For all issue ages studied (15–69), the ratios were 220% for untreated risks and 234% for treated risks. The corresponding ratios for substandard females were 191% and 182%. The proportion of policy deaths on treated risks was about 2% for substandard males and 3% for substandard females. (Table 11)

Detailed data by issue age, policy year and degree of substandard are shown in Table 10b. Data by policy amount are not compa-

Tables 10a and 10b. Detailed Comparison of Elevated Blood Pressure Results With Prior Studies

	Table 10a Single Impairment				Table 10b Multiple Impairment			
	ISCS		1979 BP St.		ISCS		Mult Imp't St.	
	ACT	MR	ACT	MR	ACT	MR	ACT	MR
Substandard—Males								
Issue Age								
Under 39	10	(138%)	1038	222%	18	(116%)	685	230%
40–49	18	(127%)	{ 7711	{ 189%	63	195%	2115	238%
50–59	22	(114%)			86	176%	2415	218%
60–69	32	143%			93	128%	979	186%
Policy Year								
1–2	30	140%	1072	179%	101	175%	607	215%
3–5	34	128%	2266	191%	105	150%	1243	231%
6–10 (6–8 for mult imp)	18	(118%)	3142	193%	54	130%	2047	236%
11–15	—	—	1528	193%	—	—	1524	234%
16–25	—	—	741	209%	—	—	773	161%
Degree								
Slightly	28	120%	—	—	48	128%	1091	164%
Moderately	26	147%	—	—	75	145%	1618	198%
Highly	6	—	—	—	33	162%	2009	235%
Other	22	(119%)	—	—	104	173%	1739	306%
Treatment								
Untreated	43	135%	8749	192%	108	169%	6194	220%
Treated	39	124%	437	180%	152	144%	132	234%
Total	82	130%	9186	191%	260	153%	6326	221%
Substandard—Females								
Issue Age								
Under 39	5	—	54	307%	13	(260%)	41	228%
40–49	8	—	{ 1313	{ 165%	27	159%	222	217%
50–59	12	(110%)			46	115%	374	186%
60–69	25	135%			125	167%	275	176%
Policy Year								
1–2	21	(188%)	167	188%	79	174%	62	144%
3–5	17	(110%)	323	151%	95	162%	162	187%
6–10 (6–8)	12	(134%)	520	181%	37	116%	311	220%
11–15	—	—	246	158%	—	—	213	201%
16–25	—	—	111	161%	—	—	104	162%
Degree								
Slightly	17	(115%)	—	—	38	109%	363	159%
Moderately	13	(140%)	—	—	61	142%	265	203%
Highly	3	—	—	—	26	178%	161	270%
Other	17	(108%)	—	—	86	197%	123	208%
Treatment								
Untreated	19	(127%)	1367	168%	51	117%	912	191%
Treated	31	150%	77	164%	160	173%	37	182%
Total	50	141%	1367	168%	211	155%	944	191%

Table 11. Comparison to Multiple Medical Impairment Study

	Substandard				Standard			
	Males		Females		Males		Females	
	ISCS	Mult	ISCS	Mult	ISCS	Mult	ISCS	Mult
Untreated	169%	220%	117%	191%	127%	—	71%	—
Treated	144%	234%	173%	(182%)	114%	—	99%	—
Total	153%	221%	155%	191%	118%	130%	90%	124%

Table 12. Comparison of Mortality by Elevated Blood Pressure (EBP) Status in Study Database (ISCS) to SOA Intercompany Results

	Standard Males			Standard Females		
	Smoker	Nonsmoker	S/NS	Smoker	Nonsmoker	S/NS
With EBP-ISCS	233%	80%	2.91	232%	65%	3.57
No EBP-ISCS	168%	63%	2.67	151%	64%	2.36
SOA (By policy amt)	135%	60%	2.27	150%	67%	2.22

erable due to the sizable increases in policy amounts since the exposure period of the Multiple Medical Impairment Study.

Society of Actuaries Mortality Studies by Smoking Habits

The Society of Actuaries (SOA) conducts annual intercompany studies of data by amount of insurance on standard issues and includes subdivisions of data into smokers and nonsmokers. Table 12 is a summary presenting ratios of male smoker to nonsmoker mortality ratios for standard policies with elevated blood pressure at issue in this ISCS study, standard policies without elevated blood pressure in this ISCS study, and standard policies in the SOA Study by amounts of insurance exposed between 1994–95 policy anniversaries with expected deaths based on SOA 1990–95 Select Basic Tables.

The ratios of smoker to nonsmoker mortality ratios are somewhat higher for the standard risks in this ISCS Study than in the SOA most recent study of standard issues. It is expected that at least part of this differential may result from the fact that the mortality tables for expected deaths in the SOA Study

are based on amount of insurance. This produces lower mortality ratios than those based on number of policies due to the more favorable mortality experience on larger amount risks.

ISCS Study by Amount of Insurance

Data were also tabulated for the ISCS elevated blood pressure experience by amount of insurance. However, this data is not shown, except as in Table 13, because the more favorable results among larger amount policies, which have a large proportion of the exposure, distort the overall results. This can mislead the reader to conclude that the overall experience is favorable. This is true only for policies of \$100,000 or more, where underwriting is much more extensive with more medical requirements and greater underwriting scrutiny.

OBSERVATIONS ON MORTALITY IMPROVEMENT

Based on the limited amount of data available to this study, the results show that there has been a considerable improvement in mor-

Table 13. Mortality by Policy Amounts (Males)

	Substandard		Standard	
	By Policy	By Amt	By Policy	By Amt
Policy Amt. (\$1,000)				
Under \$50	161%	163%	120%	116%
\$50–\$99	137%	141%	114%	114%
\$100 & over	123%	101%	89%	86%
Total	147%	119%	110%	94%

tality among insureds with elevated blood pressure at time of issue or in their history. These results are relative to all standard insureds and compared to earlier studies. Some possible reasons for this are:

- (1) Improved treatment: Treatment for elevated blood pressure has become more effective. Medications have improved and physicians have recognized the desirability of prescribing medication, thus starting treatment before blood pressures reach excessive levels.
- (2) Widespread detection: The opportunities for elevated blood pressure detection through screening have increased and resulted in earlier referrals to physicians.
- (3) Adherence to regimen: Those with elevated blood pressure have become more aware of the need to adhere to their medication regimen and to improve other risk factors.
- (4) Fewer smokers: Proportionately, there are fewer smokers in the population during the period of this study than during earlier studies.
- (5) Related medical conditions: Improvement in treatment of related medical conditions caused or accelerated by elevated blood pressure (such as coronary artery and cerebrovascular disease) has prolonged lives, and is partially responsible for the improving trend shown in this ISCS study.

Other reasons for mortality improvement relative to standard issues that has occurred since earlier studies are:

- (1) Prior studies: The relatively poor experience in earlier studies resulted in ratings that now appear to have been higher than needed.
- (2) Larger amounts: Compared to prior study periods, nonmedical underwriting is much more prevalent. Therefore, information about elevated blood pressure is routinely obtained only on larger-amount and higher-age applicants. These are given greater underwriting attention because of “preferred risk” considerations.

As previously stated, the results of this study must be interpreted with caution. It is emphasized that the volume of data is not substantial, and the relatively small number of contributing companies may not produce results representative of those of other companies. Nevertheless, the companies that did contribute made this initial step in presenting the ISCS experience possible. We thank them for their efforts.

OTHER DATA SOURCES

Blood Pressure Study 1979 (Single Impairment)

Published by SOA and ALIMDA, November 1980

Substandard experience regardless of treatment, without other impairments, by number of policies—

Pages 224–225—By issue age group—males

Pages 232–233—By issue age group—females

Page 242—By duration—males

Page 246—By duration—females

Substandard experience, after treatment, with and without minor impairments, by number of policies—

Pages 294–295—By issue age groups—males

Pages 298–299—By issue age groups—females

Page 304—By duration—males

Page 306—By duration—females

**Multiple Medical Impairment Study
(Multiple Impairment)**

Published by Center for Medico-Actuarial Statistics of MIB, Inc., 1998

Standard and substandard experience by number of policies

Page 74—Elevated blood pressure males

Page 76—Elevated blood pressure females

Page 78—Treated hypertension

Society of Actuaries Mortality Studies

Published by SOA

Standard mortality issues of 1980–94 studied between 1994 and 1995 anniversaries—by amount of insurance