COMPREHENSIVE MEDICAL INSURANCE — STATISTICAL ANALYSIS FOR RATEMAKING

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INTRODUCTION

In their original form, Accident and Health policies typically extended coverage on the basis of stipulated benefits for hospital, surgical and medical expenses. About 15 years ago, however, the concept of Major Medical coverage began to emerge, which concept tended to cut across benefit maximums by type of medical expense and imposed only maximums of $5,000 or $10,000 for all expenses combined arising out of one disability. Such policies usually carried a relatively high deductible of $300 or $500 and provided that the policyholder, in addition to the deductible, would share in the loss at a fixed coinsurance percentage above the deductible.

Under such Major Medical policies, the typical pattern was to build this coverage upon a foundation of basic hospital and surgical coverages, the benefits under which helped to satisfy the Major Medical deductible. As time went on, however, the product designers developed policies of the Major Medical type which contained low deductibles and high maximums and eliminated the necessity of basic coverages. They came to be known as Comprehensive Medical policies and this is the general definition used in this paper.

In developing this new coverage concept, actuaries and company management tended to adopt and sell inadequate rate levels. Inflationary tendencies, broad contracts and unknown medical expense areas produced unprofitable experience. Only recently have solid data started to emerge as to costs of this coverage. This paper is an attempt to outline the type of statistical data required and an approach to ratemaking for this type of insurance on the basis of such data.

BASIS OF STATISTICAL ANALYSIS

Source and Scope of Data: Ideally, it would be desirable to study intensively all our Comprehensive Medical business. However, non-standard contracts and the lack of detailed exposure on a current basis made such an approach impossible. Rather, it was decided for our own preliminary analysis and for purposes of this paper to concentrate on one large policyholder and to maintain detailed data on claims originating in the two and one-half year period from July 1, 1957 through December 31, 1959. Such an approach, it was felt, would provide meaningful relativity data and a point of departure from which rate patterns could be designed for coverage variations more frequently requested. A total of 9,304 claims reported during this period were tabulated and analyzed.

The policyholder in question has had about 8,500 employees insured over the two and one-half year experience period of which about 59 percent were females. Approximately 3,000 of the 3,500 male employees were also cov-

ered for their dependents. Although most of this paper is devoted to claim analysis, it is to be emphasized that the exposure information cited above is equally vital. Our approach was to secure from our premium records the total number of employees and dependents insured at quarterly intervals and to derive "exposure years" therefrom. In addition, the employer cooperated in providing periodic data on age breakdowns from its personnel records. Since self-administration is the rule in Group insurance wherein the employer simply multiplies the number of employees and dependents by a flat rate and submits the resulting total premium to the company, it is virtually impossible, as indicated above, to maintain detailed exposures (by age, income, and area) on total business.

A loss card with columnar headings as shown below was first designed to produce on closed cases the types of detailed data considered necessary.

Emp. or Dep.	Age	Diag.	Yr. Mo. of Disa.	No. Mos. of Pay	No. Mos. Open	81 Days	81 Am't.	82	83	84	85	86	87	88	89 (Other Ins.)	Total Chgs.	Am't. Check

Code numbers 81 through 88 refer to the type of medical expense incurred as follows:

81 Hospital Room and Board
82 Hospital Extras (Other than Room and Board—In Patient)
83 Hospital Extras (Out Patient)
84 Doctors' Charges—Surgery
85 Doctors' Charges—Other than Surgery
86 Nurses
87 Drugs
88 All Other

It will be noted that the significant data in such a study are not the claims paid, but the expenses incurred before imposition of deductibles and coinsurance percentages. Only on this basis can the material be arranged in such a way that frequency and severity indications are produced by various deductibles and coinsurance provisions. As respects frequency and severity indications, it was decided to use the number of claims incurred during the period from July 1, 1957 to December 31, 1959 for frequency indications and the expenses on claims incurred during the period July 1, 1957 to December 31, 1958 for severity indications. As of the time of the last experience review at July 1, 1961, it was found that many claims with disability dates in 1959 were sufficiently indeterminate so as to make it advisable to discard them for severity purposes. However, at that time, knowledge of the number of claims incurred in 1959 was a virtual certainty so that reliability for frequency purposes was assured. Frequency indications, therefore, are based on a two and one-half

year period and severity results are based on all medical expenses paid through July 1, 1961 on claims with disability dates in the period from July 1, 1957 through December 31, 1958.

Those readers who are familiar with Accident and Health rating techniques will note that although area and income differentials are typically used in developing rates for this coverage, such data are not listed on the tabulating card. Their absence is traceable not to the fact that they were considered insignificant in their affect on losses, but to the facts that income data were not available and other published data on area cost differentials from such organizations as the American Hospital Association and the Health Insurance Association were deemed more reliable. Further, and in order to provide a meaningful point of departure for appraising the data, the nature of the exposure was such that for all practical purposes, the male and female income distribution could be considered to fall in the "to $10,000" and "to $5,000" brackets, respectively. Areawise, the exposure was weighted in the direction of high cost medical areas but it is impossible to relate the weighted exposure to some accepted standard of country-wide medical costs since no such yardstick exists.

However, it seemed advisable for evaluation purposes to at least rate the exposure on the company's area schedule used in rating Major Medical coverages which schedule of premium differentials reflects broad averages of published hospital and surgical cost differentials by area. The results together with the area classifications and the differentials are given below: (The area classifications are shown in Appendix A.)

AREA	DIFFERENTIAL	PERCENT OF EXPOSURE
1	.80	1.6
2	.90	9.2
3	1.00	17.0
4	1.10	43.3
5	1.20	28.9
Average Weighted Differential		1.09

Even if income and area data were available on exposures and losses, the ever-present actuarial problem of data fragmentation into small non-credible groups presents itself. Without pressing the point further, it is felt that in such a study the isolation of variables which influence losses while holding others constant is almost impossible without virtually unlimited data. That is, loss cost differentials by income would be valid only if age homogeneity were maintained in the group to be studied. If exposure dilution by area was also imposed the experience cells to be examined would expand to the point where resulting data would become almost meaningless.

Coverage: The tabulated losses are those arising from a policy which contained the following provisions and limitations:

> "This insurance pays for the reasonable expense, incurred while the insurance is in effect, of medical care and treatment of accidental bodily injury and sickness.
>
> The injury or sickness must have been due to non-occupational causes.
>
> The injury or sickness must have been treated by a licensed physician.
>
> The care or treatment must have been prescribed as necessary by a licensed physican. Physician includes a chiropracter when licensed by state authorities and a Christian Science Practitioner.
>
> When these conditions are met the insurance will pay the excess over deductible amounts, hereinafter stated, up to $7,500 of expenses incurred for each separate injury or sickness.
>
> The deductible amounts are as follows:
>
> > In the case of employees, 15% of the expenses, or $25.00, whichever is greater incurred for each separate injury or sickness in each successive 90 day period starting with the date of the first expense incurred for such injury or sickness.
> >
> > In the case of dependents, 25% of the expenses, or $25.00, whichever is greater incurred for each separate injury or sickness in each successive 90 day period starting with the date of the first expense incurred for such injury or sickness.
>
> Complications of sickness, related conditions and recurrences of the original sickness or of any complication or related condition are not considered a separate sickness. Injury includes sickness which results directly from the accident.
>
> Hospital expense for room and board will be limited to the usual charge made by the hospital for two bed semi-private accommodations.
>
> Benefits are not payable for:
>
> 1. dentistry, unless required:
>   (a) by accidental injury externally caused
>   (b) bacterial infection other than tooth decay
>   (c) for removal of impacted teeth
> 2. eye examinations and eyeglasses
> 3. hearing aids or fitting thereof
>
> Benefits are not payable for care in an institution whose services are primarily custodial rather than curative."

Thus, it is seen that we are dealing generally with claims which exceed $25.00 of reasonable medical expense in successive 90-day periods, which are limited to the usual charge for semi-private hospital accommodations, and which may continue without a time limit subject only to a maximum of $7,500.

EXPERIENCE ANALYSIS

Basic Data: The underlying data on which further calculations are based is set forth in Table I.

The frequency indications for spouses are not as reliable by age as those for employees since the figures were grouped by age of the insured husband not of the spouse. If it is reasonable to assume that the wife's age averages

two or three years less than the husband's, the exposures shown for higher ages are probably understated and result, therefore, in producing somewhat lower frequencies than if the results could be determined on a more refined exposure base. Exposures for maternity experience were based on those assignable to the "to 39" age bracket for both female employees and dependent spouses.

Claim Expenses by Size of Claim: Of vital importance in Major Medical ratemaking is the availability of loss distributions by size. Only with such data can rates be determined for varying deductibles and maximums. Although unlimited data by age would be helpful in determining differing deductible and maximum rates by age, such refinement leads to non-credible results and it was therefore decided to group the size data generally by type of person covered, i.e., male employee, female employee, spouse, and children. One exception was made in the case of male employees, however, wherein the distribution for males up to age 39 is shown as well as the totals for all males. In this way, the data for male and female employees becomes more comparable, as about 85% of all females were less than 39. Refer to Table IIA for this data.

In general, two characteristics of the distribution are worth noting but might have been forecast without inspection: (a) The many small claims account for only a small proportion of total charges. About 60% of all claims (excluding children's) are less than $200, but such charges represent only about 15% of the total charges; (b) The claims for children form a different distributional pattern than do those for adults. That is, the experience for children understandably indicates that the incidence of smaller size claims is sharply greater than the incidence for adults. It need not be emphasized to the actuary that some smoothing or graduation techniques should be applied to these crude data prior to their ratemaking application.

It is always illuminating to compare the results of any research study with those independently determined by others. Fortunately, a similar type study has been completed in the Major Medical field authored by Messrs. Gingery and Mellman and appearing in Volume XIII of the *Transactions of the Society of Actuaries*. Although coverage differentials and varying incurred loss definitions limit the possible areas of direct comparison, it is of interest to show the following frequency and severity comparisons by size of total charges. It will be noted that frequency indices follow the same general pattern but that the severity data tend to be higher in the subject study as compared to that of the Society of Actuaries.

This phenomenon is generally traceable to the fact that our definition of loss runs to all expenses incurred arising out of a disability until either all expenses have been paid or the $7,500 maximum has been reached, whichever first occurs. Under our definition, for example, payments on a chronic disability may have been accumulated over a two or three year period, as indicated above under Scope of Data, while the definition used in the Society

of Actuaries' Study was: "* . . . all of the reported charges, including those used to satisfy the deductible, incurred in 1957 for an individual claimant once he had satisfied the deductible." Thus, in the latter case, major medical expenses were limited to those expenses generated by one calendar year's medical bills while in our case the time dimension imposed no restriction on the total expenses accumulated. Obviously, this difference in loss definition should produce marked severity differences, but minor frequency differences.

It should also be mentioned that the mid-point of our experience study can be considered to be in 1959 as compared to the 1957 period in the other aforementioned study. The inflationary trend between these periods may well account for about 10% of the severity difference.

Comparison is set forth in Table IIB.

Claim Charges by Type of Medical Expense: In the merchandising of Comprehensive Medical Insurance, it is often necessary to develop variations in the coverage pattern such that, for example, hospital expenses are covered in full up to $300 or $500 before application of coinsurance while all other medical expenses are subject to an initial deductible and then coinsurance. Consequently, it is vital to have a segregation of medical expenses by general category to assess cost differentials for the variations desired. Table III sets forth medical costs by type as a percentage of total and shows such percentages by age for the four exposure classes used heretofore. As a by-product of our tabulations for this study, we accumulated additional data on hospital claims and show average room and board benefits and average lengths of stay.

Some characteristics of the tabulated data are immediately apparent:

1. Hospital expenses comprise a smaller percentage of total expenses for male employees than for female employees and spouse. Note that the male category accounts for only 33% of the total while comparable figures for female employees and spouses were 45%.
2. There is a general increase in the average length of hospital stay as age increases.
3. Hospital extras or therapeutic expenses tend to be about the same as room and board expenses at the lower ages where the average stay is close to the norm but as age increases, the room and board charges tend to be more costly than the extras.
4. Doctors' charges for surgery show a downward trend with increasing age. Although the dollar amounts spent for this category remain about the same by age, the fact that hospital confinements and thus expenses increase with age tends to depress surgical percentages to total.
5. Indications for exposure groups over 60 in age should be discounted because of the thinness of data.

* Page 517, Volume XIII, "An Investigation of Group Major Medical Expense Insurance Experience."

APPLICATION OF STATISTICS TO RATEMAKING

In the construction of a manual table from statistical data, there are almost unlimited variations in the form that such tables may take. No industry uniformity has emerged and there are about as many approaches to this problem as there are companies merchandising this coverage. Regardless of the form of the rate table, however, actuaries have found it necessary to compromise between overly-refined rate tables and those which weave differing coverage provisions and exposure mixes into the rates on an averaging basis.

The purpose of this paper is not to produce manual rates or rate tables which purport to be proper for use by any company or for any one risk but to demonstrate the type of statistical data necessary for and its use in producing rates. This section will attempt to demonstrate how statistical data *could* be used in the fundamental processes of rate preparation for this line.

In our company we have chosen to relate our comprehensive medical rating to basic rates for males segregated by age and by deductible. Such base rates contemplate:

a. A coinsurance percentage of 75%.
b. The payment of a maximum benefit of $5,000 per disability after the deductible has been satisfied.
c. Average area classification (i.e., Area 3 from our 5 area classes of 1 through 5).
d. Employees earning less than $6,000 per annum.

With these rates as a point of departure, final policy rates are produced by the application of factors or rate increments depending on differing coverage conditions or characteristics of the exposure. From our raw statistical data described above, it is now possible to construct a basic rate table. Although most of the frequency and severity data are based on foregoing tables, it will be noted that a basic-excess severity approach has been adopted based on the familiar casualty concept that excess claims are erratic and largely happenstance. In deriving basic rates, we have chosen to limit average claim costs used in the severity ingredient to the first $1,000 of charges. Increments are added thereto based on a judgment "excess limits" table to build the rate to contemplate $5,000 maximum benefit. Although attempts were made to test the application of a mathematical model to the excess data, they proved abortive. It was finally felt that a judgment determination based on a blend of indications, judgment and other related experience data would produce reasonable results. Infinitely more excess experience is necessary before the confidence limits surrounding the use of the subject table may be significantly increased.

See Table IV which is in three parts and Table V.

One of the most frequent variations of Comprehensive Plans involved the grant of first dollar, no coinsurance coverage for hospital expenses with all other medical expenses subject to the normal deductible and coinsurance pro-

visions. Typically, this coverage is offered only in conjunction with low $25 or $50 deductible plans and accurate ratemaking for such variation would require a distribution of hospital only charges by size. However, reasonable approximations to the additional cost can be derived as shown in Table VI. Although our example demonstrates the method used for the determination of the additional charges for males under age 40 at a $25 deductible, in practice one factor by deductible for employees (all ages) and for two classes of dependents (spouses and children) would suffice because of the small charges involved and since at best the techniques used are rather crude.

Other variations in coverage may involve first dollar surgical coverage, the imposition of higher or lower maximums, the application of the deductible each calendar year on prolonged disabilities, and many others. Rate differentials for such variations depend upon the compilation of the type of data recorded under our statistical plan but in far greater quantities. It is hoped that emerging statistics will lead to the development of the credible ratemaking material needed.

CONCLUSION

The scope of this paper has been intentionally limited to a discussion of the type of statistics needed for Comprehensive Medical ratemaking and a few examples as to how such derived data may be processed into rates. In the absence of bureau-promulgated statistical plans as we know them in other casualty lines, companies writing this relatively new type of Accident and Health insurance must develop their own record-keeping techniques. This paper attempts to outline Liberty Mutual's approach.

Table I

Male Employees	Age Group To 39	40-49	50-59	60 & Over	Total (All Ages)
1. Number of Claims	967	287	229	(77)	1560
2. Exposure (Life Years)	6161	1517	893	(357)	8928
3. Frequency Per 100 Lives	15.7	18.9	25.6	(21.6)	17.5
4. Severity (Average Claim)	$284	$462	$755	($850)	$419
Female Employees (Excl. Maternity)					
1. Number of Claims	1796	259	128	(23)	2206
2. Exposure (Life Years)	10696	1258	504	(126)	12584
3. Frequency Per 100 Lives	16.8	20.6	25.4	(18.3)	17.5
4. Severity (Average Claim)	$270	$420	$455	($221)	$298
Dependent Spouse (Excl. Maternity)					
1. Number of Claims	941	342	157	(58)	1498
2. Exposure (Life Years)	5051	1365	805	(223)	7444
3. Frequency Per 100 Lives	18.6	25.1	19.5	(26.0)	20.1
4. Severity (Average Claim)	$274	$414	$630	($578)	$357

Children		Maternity Female Employees	Dependent Spouse
1. Number of Claims	1553	644	1241
2. Exposure (Life Years)	8459	10696	5051
3. Frequency	18.4	6.0	24.6
4. Severity (Average Claim)	$243	$299	$299

NOTE

As to Table I, it will be noted that frequency and severity trends are significantly upward as ages increase and that aging affects severity to a greater extent than frequency. The fact that data for the 60 and over age range does not round out the rising trend is largely attributable to meagre experience in which the presence or lack of a serious claim can distort the results.

Table IIA

DISTRIBUTION OF CLAIM CHARGES BY SIZE OF CHARGE (EXCLUDING MATERNITY)

Upper Limit of Claim Expense	Percentage of Total Charges Represented by Charges on Claims up to Limit Shown					Percentage of Total Number of Claims Represented by All Claims up to Limit Shown			
	Total Male Empl.	Male Empl. (To 39)	Female Empl.	Spouse	Child	Total Male Empl.	Female Empl.	Spouse	Child
($25) – $ 49	1.8	2.9	1.9	1.6	2.9	19.3	15.4	14.2	17.2
99	6.5	10.5	7.4	6.1	9.0	47.6	39.4	38.5	38.2
199	12.0	19.0	17.2	14.8	28.0	64.3	59.7	59.7	70.5
299	17.2	27.2	27.6	22.6	38.4	73.5	72.3	71.2	80.9
399	22.7	35.3	36.7	29.9	48.4	80.1	80.3	78.6	87.9
499	28.0	42.9	44.6	35.6	55.0	85.0	85.6	83.1	91.4
999	38.5	56.8	67.5	55.3	69.7	91.4	95.2	93.8	96.7
1,999	50.2	66.7	80.9	65.7	82.4	95.1	98.3	96.7	99.0
2,999	61.6	74.2	88.2	76.0	84.4	97.0	99.2	98.3	99.2
3,999	72.5	78.4	91.8	79.9	88.5	98.4	99.5	98.8	99.5
4,999	74.8	81.0	92.9	82.6	92.2	98.6	99.6	99.0	99.7
6,667	81.3	85.7	95.9	88.7	96.3	99.1	99.8	99.5	99.9
7,499	86.6	89.2	97.7	88.7	96.3	99.4	99.9	99.5	99.9
10,000	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Totals Used	$399,969	$165,278	$384,629	$326,753	$241,649	955	1,291	915	994

Table IIB

FREQUENCY AND SEVERITY COMPARISONS WITH DATA UNDERLYING TABLE 5A OF SOCIETY OF ACTUARIES' STUDY BY SIZE OF TOTAL CHARGE

	Age	Ded.	Frequency per 100 Exposed of Claims with Total Charges Exceeding Deductible Amount Shown: Society of Actuaries	Frequency per 100 Exposed of Claims with Total Charges Exceeding Deductible Amount Shown: Subject Study	Severity – Average Amount of Total Charges per Claim: Society of Actuaries	Severity – Average Amount of Total Charges per Claim: Subject Study Per Claim Limit on Total Charges $2,500	Severity – Average Amount of Total Charges per Claim: Subject Study Per Claim Limit on Total Charges $10,000
Employee	less than 40	$ 25	N.A.	15.9	$ N.A.	$ 244	$ 281
		50	11.7	12.7	292	294	340
		100	8.9	8.1	365	424	500
		300	3.6	3.5	634	741	914
		500	1.7	1.7	914	1,125	1,491
	40-49	25	N.A.	19.4	N.A.	365	454
		50	14.9	15.1	352	433	570
		100	11.0	9.6	434	641	851
		300	5.2	5.6	725	1,009	1,410
		500	2.8	3.1	1,007	1,533	2,281
	50-59	25	N.A.	25.6	N.A.	537	695
		50	19.3	21.7	399	622	806
		100	14.9	16.1	491	817	1,066
		300	7.2	10.4	816	1,167	1,554
		500	4.4	7.3	1,096	1,486	2,031
Dependents (Spouse and Children	(All Ages)	25	N.A.	38.3	N.A.	265	298
		50	31.5	32.2	287	308	347
		100	22.8	23.6	359	395	448
		300	8.1	9.1	691	705	893
		500	4.0	4.8	1,002	1,090	1,354

NOTES:

1. The employee data in our study were separately derived by males and females but were weighted 80% – 20%, respectively, in the above table for comparative purposes since the Society of Actuaries' data were not refined by age or by sex. However, the female content in the latter study was about 20% in the aggregate.
2. Dependent frequency data are related to the number of employees insured with respect to their dependents.
3. Because of the paucity of data on employees over age 60, no comparative data are shown for this age group.
4. In order to eliminate the impact of catastrophic claims on our severity data and to make the data slightly more comparable with the Society of Actuaries', average claims based on the first $2,500 of total charges on claims which exceed this amount are shown as well as those without the imposition of any limit. (Shown under $10,000 Limit Column, since no claim exceeds $10,000.)
5. Although the frequency comparison reveals a striking similarity and adds some reinforcement to the credibility of our study, the severity indications (even after the $2,500 limit) are dissimilar with the general exceptions of employees under age 40 and of dependents. Because the incidence of chronic cases generating longer term disabilities tends to increase with age, it is to be expected perhaps that our "per disability" loss definition would pick up relatively greater loss amounts than the Society of Actuaries' definition as age increases. This fact together with a more limited exposure base may account for the widening gap of average claim costs for age groups over age 40.

Table III

CHARGES BY TYPE OF MEDICAL EXPENSE AS PERCENT OF TOTAL CHARGES

	Hospital Room & Board										
Male	Ave. Daily R & B Ben.	Ave. R & B Stay	% R & B Charges To Total	In & Out Patient Therapeutics	Hosp. Total	Doctor-Surgery	Doctor Excl. Surgery	Nurses	Drugs	All Other	Total Charges
To 29	$17.87	9 days	14%	15%	32%	15%	32%	5%	7%	9%	$ 89,990
30-39	18.84	7	16	15	34	14	40	3	7	2	75,288
40-49	18.55	15	20	17	37	11	31	1	16	4	80,896
50-59	19.79	20	23	19	42	12	19	9	10	8	115,556
60 & Over	20.31	21	26	19	45	9	19	21	4	2	38,239
Total	$19.08	13	16	17	33	13	29	7	9	9	$ 399,969
Female (Excl. Mat.)											
To 29	$18.26	7 days	23%	23%	46%	19%	21%	1%	4%	9%	$ 204,706
30-39	18.14	8	21	19	40	21	31	1	5	2	80,570
40-49	19.84	13	29	21	50	13	27	1	6	3	67,970
50-59	17.93	21	34	13	47	13	18	6	12	4	30,055
60 & Over	21.11	6	30	20	50	25	24	–	–	1	1,328
Total	$18.50	8	24	21	45	18	24	1	5	7	$ 384,629
Spouse (Excl. Mat.)											
To 29	$16.65	6 days	21%	22%	43%	25%	23%	1%	6%	2%	$ 65,734
30-39	20.37	10	29	23	52	16	20	2	6	4	89,814
40-49	22.45	10	24	17	41	17	29	2	8	3	87,435
50-59	17.66	16	23	21	44	13	18	6	15	4	62,941
60 & Over	19.86	20	31	20	51	5	27	1	14	2	20,753
Total	$19.58	10	25	20	46	17	24	2	8	3	$ 326,753
(Spouse and Children	$16.89	5 days	20%	27%	47%	21%	20%	1%	5%	6%	$ 241,649
Total (Excl. Mat.)	$18.61	9 days	22%	21%	43%	17%	24%	3%	7%	6%	$1,353,000
Maternity											
Spouse	$17.80	5 days	30%	20%	50%	46%	3%	–	–	1%	$ 226,114
Female Employee	$17.92	6 days	31%	20%	51%	46%	2%	–	–	1%	$ 116,143

Table IV

TABLE OF ANNUAL CLAIM COSTS
MALES

Deductible	$25			$50			$100			$300			$500		
Age	To 40	40-49	50-59	To 40	40-49	50-59	To 40	40-49	50-59	To 40	40-49	50-59	To 40	40-49	50-59
1. Frequency per 100 Lives Exposed	15.6	17.5	25.6	12.3	13.5	22.0	7.6	8.3	16.4	3.3	4.5	10.8	1.6	2.4	7.7
2. Average Charge less Ded. (Total Charge per Claim Limited to $1,000)	$162	215	354	176	250	384	223	345	461	212	370	459	144	407	400
3. Charge in (2) after 75% Coins. (.75) × (2)	$122	161	266	132	188	288	167	259	346	159	278	344	108	305	300
4. Annual Basic Claim Cost [(1) × (3)]	$19.00	28.20	68.10	16.20	25.40	63.40	12.70	21.50	56.70	5.20	12.50	37.20	1.70	7.30	23.10
5. *Excess Charge for $5,000 Maximum Benefit	$12.50	25.00	50.00	12.50	25.00	50.00	12.50	25.00	50.00	12.50	25.00	50.00	12.50	25.00	50.00
6. Total Annual Claim Cost Assumed to be Reflective of Costs 109% above Base Area Level and 110% above Base Income Level (4) ÷ (5)	$31.50	53.20	118.10	28.70	50.40	113.40	25.20	46.50	106.70	17.70	37.50	87.20	14.20	32.30	73.10
7. Total Annual Claim Cost Adjusted to Base Area and Income Levels (6) ÷ (1.09) × (1.10) = (6) ÷ 1.20	$26.25	44.33	98.42	23.92	42.00	94.50	21.00	38.75	88.92	14.75	31.25	72.67	11.83	26.92	60.92

*From Table of Charges for Increasing Maximum Benefits.

Table IV (Cont'd.)

TABLE OF ANNUAL CLAIM COSTS
FEMALES, SPOUSE AND CHILDREN

Deductible	$25				$50				$100			
	Females		Spouse	Child.	Females		Spouse	Child.	Females		Spouse	Child.
Age	To 40	40-49	(All Ages)		To 40	40-49	(All Ages)		To 40	40-49	(All Ages)	
[A]1. Frequency per 100 Lives Exposed	16.8	20.4	20.1	18.2	14.3	17.1	17.1	15.1	10.1	12.4	12.3	11.3
2. Average Charge less Ded. (Total Charge per Claim Limited to $1,000)	$211	285	232	178	222	312	245	186	254	371	283	192
3. Charge in (2) after 75% Coins. (.75) × (2)	$158	214	174	134	167	234	184	140	191	278	212	144
4. Annual Basic Claim Cost [(1) × (3)]	$26.50	43.70	35.00	24.40	23.90	40.00	31.50	21.10	19.30	34.50	26.10	16.30
5. *Excess Charge for $5,000 Maximum Benefit	$ 8.50	17.50	12.50	8.50	8.50	17.50	12.50	8.50	8.50	17.50	12.50	8.50
6. Total Annual Claim Cost Assumed to be Reflective of Costs 109% above Base Area Level and 110% above Base Income Level (4) + (5)	$35.00	61.20	47.50	32.90	32.40	57.50	44.00	29.60	27.80	52.00	38.60	24.80
7. Total Annual Claim Cost Adjusted to Base Area and Income Levels (6) ÷ (1.09) × (1.10) = (6) ÷ 1.20	$29.17	51.00	39.58	27.42	27.00	47.92	36.67	24.67	23.17	43.33	32.17	20.67

[A] For Spouses and Children, frequency base is the number of employees insuring dependent Spouses and Children.

* From Table of Charges for Increasing Maximum Benefits.

TABLE OF ANNUAL CLAIM COSTS
FEMALES, SPOUSE AND CHILDREN (Cont'd.)

	Deductible	$300				$500			
		Females		Spouse	Child.	Females		Spouse	Child.
	Age	To 40	40-49	(All Ages)		To 40	40-49	(All Ages)	
[A]1. Frequency per 100 Lives Exposed		4.4	8.2	5.6	3.5	2.2	4.7	3.2	1.6
2. Average Charge less Ded. (Total Charge per Claim Limited to $1,000)		$284	331	320	269	286	312	290	298
3. Charge in (2) after 75% Coins. (.75) × (2)		$213	248	240	202	215	234	218	224
4. Annual Basic Claim Cost [(1) × (3)]		$ 9.40	20.30	13.40	7.10	4.70	11.00	7.00	3.60
5.*Excess Charge for $5,000 Maximum Benefit		$ 8.50	17.50	12.50	8.50	8.50	17.50	12.50	8.50
6. Total Annual Claim Cost Assumed to be Reflective of Costs 109% above Base Area Level and 110% above Base Income Level (4) + (5)		$17.90	37.80	25.90	15.60	13.20	28.50	19.50	12.10
7. Total Annual Claim Cost Adjusted to Base Area and Income Levels (6) ÷ (1.09) × (1.10) = (6) ÷ 1.20		$14.92	31.50	21.58	13.00	11.00	23.75	16.25	10.08

[A] For Spouses and Children, frequency base is the number of employees insuring dependent Spouses and Children.

* From Table of Charges for Increasing Maximum Benefits.

Table V

TABLE OF INCREASED RATES FOR BENEFITS PAYABLE ON CHARGES IN EXCESS OF $1,000 PER CLAIM

(Maximum Benefit = $5,000)

		Indicated Additional Rates for:			Selected Additional Rates for:		
		$2,500 Max. Benefit (1)	$5,000 Max. Over $2,500 (2)	Total for $5,000 Max. (1) + (2)	$2,500 Max. Benefit (3)	$5,000 Max. Over $2,500 (4)	Total for $5,000 Max. (3) + (4)
Males	To 40	6.20	4.30	10.50	7.50	5.00	12.50
	40-49	14.63	15.00	29.63	15.00	10.00	25.00
	50-59	43.08	31.34	74.42	30.00	20.00	50.00
Females	To 40	3.20	1.50	4.70	5.00	3.33	*8.50
	40-49	9.80	7.80	17.60	10.00	7.50	17.50
Spouses (All Ages)		8.00	5.00	13.00	7.50	5.00	12.50
Children		3.30	2.30	5.60	5.00	3.33	*8.50

*Rounded

BASIS OF SELECTIONS:

1. Male "To Age 40" rate for $2,500 maximum benefit based on Indicated Charge rounded up to nearest $2.50.
2. Each successive age bracket = 2.0 preceding charge. This formula produces the following relative pattern selected excess costs by age group. For comparative purposes, ours and the latest industry consensus of age relativity for basic costs are also included. The latter is derived from a paper by Messrs. D. Pettengill and B. Burton written for the Society of Actuaries meeting in March 1963 and entitled "Development of Expected Claim Costs for Comprehensive Medical Expense Benefits and Ratios of 1959 and 1960 Actual Experience Thereto."

	Relative Costs by Age Group Subject Paper		Society of Actuaries' Paper
Age	*Basic Costs	Selected Excess Costs	(Basic Costs)
Less Than 40	67%	50%	60%
40 - 49	100	100	100
50 - 59	240	200	153

3. *Female charges equal two-thirds male charges. Spouse charges equal average of female charges for two age groups. Children charges equal two-thirds spouse charges.*
4. Charges for $5,000 maximum over $2,500 maximum equal two-thirds of charge for $2,500 maximum.
5. Although it is not entirely accurate to use the same "excess" rate for each deductible from $25 through 500 under a $5,000 maximum benefit plan, it was decided to do so because of the minor indicated differences in such rates by deductible. It was determined that the maximum difference would be on the order of 3% or 4% and in view of the judgment approach used in the derivation of the charges, it was considered an over-refinement to reflect such nominal differences.

*$25 Deductible Plan

Table VI

DERIVATION OF BASIC CLAIM COST FOR HOSPITAL EXPENSES IN FULL – $25 DEDUCTIBLE, 75% CO-INSURANCE FOR ALL OTHER EXPENSES

Males Under Age 40

	Hospital	All Other Expenses	Total
1. No. of Claims per 1,000 of Employees	47	109	156
2. Total Charges before Deductible and Co-insurance – Assuming 1,000 Employees Covered	$9,750	$19,450	$29,200
3. Total Charges after Deductible [(2) – (1) × $25]	$8,575	$16,725	$25,300
4. Total Charges after 75% Co-insurance [.75 × (3)]	$6,431	$12,544	$18,975
5. Total Cost per 1,000 Covered [Hospital Line (2) $9,750 + A/O Line (4) $12,544]			$22,294
6. Cost per Person (Rounded) (5) ÷ 1,000			$ 22.30
7. Excess Charge for $5,000 Maximum Benefit			12.50
8. Total Annual Claim Cost (6) + (7)			34.80
9. Claim Cost Adjusted to Base Area and Income Level (8) ÷ 1.20			29.00
10. Annual Claim Cost – Co-Insurance and Deductible Applicable to all Expenses per Table of Annual Claim Costs (Table IV)			26.25

NOTES:

1. The frequency of 156 per 1,000 is equivalent to 15.6 per 100 shown for males up to age 40 in Table IV.
2. From Table III, Charges by Types of Medical Expense, it will be noted that Hospital Charges constitute about 33% of total charges. (Other studies show that the number of hospital claims is about 30% of total.) Thus, 30% × 156 = 47 hospital claims and $29,200 × 33% = $9,750 of Hospital Charges.
3. Total Charges after Deductible of $25,300 is equivalent to 156 claims times average claim for males under 40 of $162 as in Table IV.

Appendix A

AREA CODES

If 85% of the exposure is concentrated in any one area, the base rate for the entire group will be that shown for the area containing the 85% exposure. Otherwise, the base rate for each area times the percentage of exposure in each area will be applicable.

Location	Area Code
Alabama	
Birmingham	2
Remainder of State	1
Alaska	5
Arizona	4
Arkansas	2
California	5
Colorado	2
Connecticut	5
Delaware	3
Florida	
Miami	3
Remainder of State	2
Georgia	2
Hawaii	2
Idaho	3
Illinois	
Chicago	5
Remainder of State	4
Indiana	
Indianapolis	3
Remainder of State	2
Iowa	2
Kansas	2
Kentucky	
Louisville	3
Remainder of State	2
Louisiana	
New Orleans	3
Remainder of State	2
Maine	3
Maryland	3
Massachusetts	4
Michigan	
Detroit	5
Remainder of State	3
Minnesota	
Minneapolis-St. Paul	5
Remainder of State	3
Mississippi	1
Missouri	
St. Louis	4
Remainder of State	3
Montana	3
Nebraska	2
Nevada	4
New Hampshire	3
New Jersey	
Newark	5
Remainder of State	4
New Mexico	3
New York	
New York City	5
Buffalo	4
Rochester	4
Remainder of State	3
North Carolina	1
North Dakota	2
Ohio	
Cleveland	5
Akron	5
Toledo	4
Remainder of State	3
Oklahoma	2
Oregon	4
Pennsylvania	3
Rhode Island	4
South Carolina	1
South Dakota	2
Tennessee	2
Texas	
Houston	4
Dallas	4
Fort Worth	4
Remainder of State	3
Utah	3
Vermont	3
Virginia	2
West Virginia	2
Washington	4
Wisconsin	
Milwaukee	4
Remainder of State	2
Wyoming	2
District of Columbia	5