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SOME CONSIDERATIONS INVOLVED IN THE ANALYSIS OF MAJOR MEDICAL EXPENSE INSURANCE EXPERIENCE

CHARLES A. SIEGFRIED

THE purpose of this paper is to outline certain questions involved in the analysis of the experience emerging from the operation of Major Medical Expense insurance plans. This type of insurance is of interest not only because of its relative newness, but because it possesses so many attractive possibilities for meeting successfully the intricate problems inherent in financing the costs of medical care. Because Major Medical Expense insurance plans deal with so many different types of medical care and cover a wide variety of persons in many different situations, the problems involved in a statistical analysis of the experience are complex and challenging.

There are many variations in the provisions of Major Medical Expense insurance plans. This of itself presents a basic problem of a kind appreciably different from that customarily found in the analysis of mortality experience or even the experience under some of the simpler forms of Medical Expense insurance, such as those providing hospital coverage alone or surgical expense coverage alone. In order to facilitate discussion and make it more specific, the outline of a particular Major Medical Expense plan is set forth in Appendix A.

OBJECTIVES OF ANALYSIS

There may be many reasons for analyzing the experience under a Major Medical plan. The nature and scope of the analysis undertaken will be determined in large measure by these objectives. Generally speaking, the more important purposes will be the following:

1. Comparisons of actual results with the expected on which premiums were based—this for the purpose of studying the appropriateness of the basic premium rate schedule.
2. Comparisons of benefits with expenses incurred—this for the purpose of testing the design of the plan and of the possible need for modifications.
3. Development of sound knowledge of medical practice as reflected in the kinds of medical treatment employed and in the quantitative utilization of various medical services.

4. Development of knowledge of the incidence and severity of illness and accidents requiring medical service. The information acquired for this purpose as well as that under (3) has potential usefulness of many sorts, not only from the viewpoint of the insurance company in the administration of the insurance, but also from the viewpoint of the medical profession and all those directly interested in the problems of health and medical care as well as the public in general.

KINDS OF INFORMATION AVAILABLE

The following listing of the kinds of information that *may* be derived from the operation of a Major Medical plan illustrates the broad scope of the subject.

1. Aggregate benefits paid—if special benefits are paid for certain conditions, *e.g.*, normal maternity cases, mental illness cases, etc., these might be shown separately.
2. Expenses incurred—these might be classified in subdivisions as follows:
   a) Hospital Room and Board charges
   b) Hospital Special Services charges
   c) Surgeons' fees
   d) Physicians' fees other than for surgery or psychiatric care
   e) Psychiatric service charges
   f) Special nurses charges
   g) X-ray and laboratory fees and charges while not confined in a hospital
   h) Drugs and medicines
   i) Ambulance service charges
   j) Special equipment, prosthetic devices, etc.
3. Number of cases of hospital confinement.
4. Duration of hospital confinement.
5. Number of cases involving surgery.
6. Fees charged for selected surgical operations.
7. Cause of medical expense.

Information of the kind indicated to be useful should be obtained separately for men and women, and in the case of coverage for dependents, there might be a separation between dependent wives, dependent husbands, and dependent children. In the case of plans covering persons in different geographical locations, a segregation of the experience by at least the principal subdivisions may be obtained.

Age is an important factor affecting the incidence of illness and, consequently, medical costs, and hence the records may be maintained in such

a way that the experience may be classified by age or at least age groups. Likewise, since there is some tendency for medical expenses to vary with income, a still further subdivision may be made by salary or wages or by some grouping based on income.

The source of this information is the material submitted in filing a claim for benefits, although generally information as to salary or wages will have to be obtained from other records. The claim papers will also show the names of the hospital and physician, surgeon, or other practitioners on the case. Data regarding the total number of persons exposed to risk pertaining to the claims studied must be obtained from the basic insurance records. However, there may be practical difficulties in obtaining a breakdown of the exposure by sex, age, geographic area and income class.

CERTAIN BASIC QUESTIONS

Practical considerations require that answers be given to questions such as the following:

1. Should a statistical record either in the form of a data sheet or a punched card be prepared on each claim as it is processed?
2. Should any study undertaken cover all cases under a particular plan or only a sample? If the latter, how should the sample be taken? Should the study cover a whole year, or should it cover some shorter period and, if so, what steps should be taken to take account of seasonal variations in morbidity?

Attention may appropriately be directed at this point to a difficulty that is characteristic of Major Medical Expense insurance. This has to do with the fact that in many cases medical expenses are incurred over an extended period whether the plan is based on a calendar-year unit or on a per-disability unit. Because of this there is a need to bring together the data on claims that may be submitted on account of a particular individual either during the course of a calendar year or during a single period of disability or treatment. Otherwise, information pertaining to the number of different individuals requiring hospital confinement in a year, the amount of benefits or expenses per individual, etc., loses considerable significance.

Related to the foregoing is the fact that there may be a substantial lag in the submission of claims and there is a wide disparity between the claim liability incurred in a particular period of time and the claims paid in such period. Hence, it may take a year and possibly even longer before data based on paid claims can be taken as a reasonable equivalent to the liabilities actually incurred.

CERTAIN SPECIFIC PROBLEMS

1. *With Respect to Surgical Fees*

In the current stage of development, there is widespread interest in the subject of surgery and surgical fees. There is practical value in having knowledge of the incidence of surgery by type of operation and in the fee charged. However, except for a very few operations, it is difficult to classify operations by type so that the results will be meaningful. Even for such a common operation as an appendectomy there seem to be enough cases where other operations are involved as part of a multiple procedure to affect averages from which inferences might be drawn. On the other hand, if extensive subdivisions are used, there are difficulties because of the labor of dealing with a long list of different operations and because there will be wide normal fluctuations due to the low frequencies.

Information on fees charged for particular surgical operations must take account of not only the difficulties of classification referred to above, but also variation reflecting the severity of the operation, the presence or absence of complications, and variations in the standing and level of fees charged by different surgeons even in the same locality. Then also, there is evidence of change in the basis of setting fees. There seems to be an increase in the practice of making separate charges for the fees of an assistant surgeon and of separating the fee for preoperative and postoperative care. In a considerable number of cases where there is a protracted period of treatment, it is not readily ascertainable from the normal sources of information how much of the fee was for particular periods or types of service.

2. *With Respect to the Incidence and Duration of Hospital Confinement*

There appears to be a substantial variation in views as to the need for hospital confinement for treatment of many types of illness and accidents. Whether patients are confined or not seems to be influenced by such factors as (*a*) availability of hospital facilities; (*b*) availability of suitable alternative facilities for home care; (*c*) the availability of nurses for home care; (*d*) the terms of insurance or prepayment plans which may make hospital confinement more acceptable or desirable than out-of-hospital care; (*e*) the attitude of the attending physician—who may prefer to deal with patients in a hospital because of its greater convenience.

Hence, it is of interest in the administration of a Major Medical plan to be aware of marked deviations in the incidence of hospital confinements and in the durations of confinement. Perhaps the most useful information is that which shows incidence by duration—*i.e.*, the

number of cases of one day duration, of two days duration, etc. Otherwise it may be difficult to ascertain whether the average duration is above or below a satisfactory level because of the absence or presence of an unusual number of short duration cases which might not normally require hospital confinement, or whether there are factors, other than considerations directly related to the condition of the patients, substantially influencing the period of confinement.

These considerations point out a difficulty in the way of producing useful statistics if nonhomogeneous data are combined.

3. *With Respect to Cause of Medical Expense*

Analysis of major medical experience beyond certain broad and fairly general areas may require some attention to the cause of the illness giving rise to the expense. There are, however, a number of obstacles in the way of developing satisfactory or reliable information on causes of illness. The source of such information must be the answer given by the attending physician on the claim form. In a broad way, the information so furnished is fairly descriptive. However, there are enough cases where there are ambiguities or variations in terminology so that there may be room for considerable differences in the cause code selected by the person responsible for translating the physician's statement into a mark on a punched card record. If the work can be performed by persons of competency and can be adequately checked, reasonably satisfactory basic information can be obtained. If these conditions are not present, allowance must be made for the effect of an appreciable amount of inaccurate classification by cause.

Perhaps a more troublesome aspect is that many major medical cases extend over considerable periods of time or for other reasons involve medical expenses for more than one cause. Generally, it is impracticable or confusing from other viewpoints to deal separately with each such cause. This makes necessary some decision as to the basis for determining the dominant cause.

It is difficult to work with a lengthy and detailed cause code. Hence, an abridged code is desirable. There is an element of judgment of how detailed a code is practicable. Also, in the interpretation of results, due allowance must be made for the effects of grouping cases that may be rather widely different.

4. *With Respect to Cost*

To develop and extract all the statistical information that is inherent in a Major Medical plan involves a substantial amount of administrative work and expense apart from clerical and other help that may be needed but not readily available. There is need, therefore, to

appraise carefully the value that may be derived from a particular line of statistical inquiry as well as the consequences of making either no such studies or studies of a fairly limited sort.

OUTLINE OF ONE STUDY PROGRAM

Appendix B shows the information contained on the punched card used for a study of the experience under a Major Medical Expense group insurance plan of the type shown in Appendix A.

The punched card is prepared by an operation using the worksheet shown in Appendix C. The worksheet is completed on the basis of information obtained from the basic claim papers. This procedure is followed as a means of facilitating the cards and also to improve accuracy.

Generally speaking, a card is punched for each separate claim. However, where there is an extended period of medical treatment, several claims may be made for the same cause. Hence, if an objective is to measure the experience for a full year for each claimant, it is necessary to bring together the data for these separate claims.

Experience thus far indicates that, per 1,000 employees insured for family coverage, a program of the kind outlined will involve, for a year's experience, about 260 basic cards for employee coverage, and about 620 cards on account of coverage for dependents. Taking account of the preparation of the worksheets and the punching and processing of the cards, the work and expense involved in so complete a study is substantial.

CONCERNING STUDIES BASED ON SAMPLING

Normally, in insurance practice satisfactory statistical studies can be based on a sample of the aggregate experience. The reasons for so doing need no comment. In dealing with Major Medical Expense insurance, there are some unusual factors present that affect the reliability of results based on a sampling approach.

One obvious method for selecting a sample is to take the claims for a period of less than one year. For example, the claims for one month might be considered. However, there are considerable variations in medical expense by months during a year. Therefore, where data applicable to a full year are desired, account must be taken of such variations by selecting a satisfactory period for the sample and by making appropriate adjustments in the extrapolation—steps that are highly subjective and make for difficulties in comparisons between different studies. A factor which is particularly difficult to deal with is the fact that the relation between expenses and benefits is affected by the deductible feature. Generally speaking, a calendar year deductible will have a diminished influence in the latter part of a year.

Many elements of interest in the experience relate to items that do not occur in large numbers. For example, if information is sought on variations in surgical fees by geographical areas, a large sample is required in order to get a satisfactory number of claims of a particular kind for which comparisons can be made. Even so, only the most common operations will appear with sufficient frequency to give a clue as to the underlying situation. When we consider how the aggregate experience might desirably be analyzed by age and earnings classes, it is clear that any but a very large sample may not be sufficient to produce a sufficient volume of data in the various cells under study.

The foregoing suggests that thought be carefully given at the outset as to the ultimate objectives of a particular study. If considerable detail is likely to be required, use of all the data, or at least a large proportion, should be considered. Otherwise, only highlights can be extracted with reasonable confidence as to their significance.

INFORMATION THAT CAN BE DERIVED FROM A STUDY

The following is illustrative of the experience that can be derived from a study of this kind with respect to a group plan of Major Medical Expense insurance of the kind described in Appendix A. It is indicative of the type of basic information which is most urgently desired.

TABLE 1

COMPOSITION OF MEDICAL EXPENSES

Hospital Room and Board Charges	25.1%
Hospital Special Services	22.8
Surgical Fees	22.9
Other Physicians' Charges	17.7
Nursing Fees	1.5
Drugs and Medicines	6.7
Other Charges Covered by Plan	3.3

Tables 1–6 are based on all claims paid exclusive of maternity and, unless otherwise noted, relate to claims on both employees and dependents.

The group from which these figures were derived is a large national concern engaging in manufacturing. Thirty-one percent of the employees are females; sixty-one percent of the employees have dependents insured.

In conclusion, it is hoped that increasing thought and discussion will be given to the new and interesting statistical questions involved in Medical Expense insurance plans. The development of these plans will be affected by thinking on the significance of the experience realized under plans now in operation. There is a need for a more widespread understanding of the criteria that should be developed for judging the results under the various types of plans that are in operation.

TABLE 2

SURGICAL FEES FOR CERTAIN FREQUENTLY OCCURRING OPERATIONS

Type of Operation	Average Fee Charged
Tonsillectomy and Adenoidectomy	$ 61
Appendectomy	164
Dilation and Curettage	69
Thyroidectomy	238
Cholecystectomy	252
Hysterectomy (abdominal approach)	253
Gastrectomy	343

TABLE 3

INCIDENCE AND DURATION OF HOSPITAL CONFINEMENTS

	Male Employees	Female Employees	Dependent Wives
Number of Admissions per Year*	78	122	92
Average Duration of Confinement (Days)	8.9	7.6	8.7
Number of Days Confinement per Year*	694	927	800

* Per 1,000 employees or employees with dependents.

TABLE 4

DISTRIBUTION OF BENEFITS BY AMOUNT PAID PER CLAIMANT FOR PERSONAL COVERAGE

Size of Benefit Paid per Claimant	Employee	
	Number of Claimants	Percentage of Total
$ 0– 99	11,109	40.4%
100– 499	13,113	47.7
500– 999	2,495	9.1
1,000– 1,499	495	1.8
1,500– 1,999	168	.6
2,000– 2,499	62	.2
2,500– 2,999	31	.1
3,000– 3,499	18	.1
3,500– 3,999	7	.0
4,000– 4,499	10	.0
4,500– 4,999	1	.0
5,000– 5,499	0	.0
5,500– 5,999	2	.0
6,000– 6,499	1	.0
Total	27,512	100.0%

TABLE 5

DISTRIBUTION OF CLAIMS BY CAUSE—
CASES NOT INVOLVING SURGERY

(Sickness Claims Last Six Months 1956)

Condition	Percentage of Total Benefits Paid
Diseases of respiratory system	5.89%
Ulcers*	2.70
Other diseases of digestive system	3.72
Heart diseases	3.70
Hypertensive disease	.59
Other diseases of circulatory system	.89
Diseases of genital organs	1.28
Other diseases of genito-urinary system	1.60
Arthritis, rheumatism, or other diseases of bones or organs of movement	2.64
Psychoses, psychoneuroses, or other mental or personality disorders	3.82
Diseases of nervous system	1.84
Malignant neoplasms or leukemia	1.26
Diabetes mellitus	.78
Congenital malformations and birth injuries	.95
Accidents	1.58
All other conditions	5.41
Total	38.64%

* Includes unknown number of claims for "gastritis" and other nonulcerative diseases of the stomach or duodenum.

TABLE 6

COMPARISON OF BENEFITS WITH
EXPENSES INCURRED

	Distribution of Expenses between Type A and Type B	Percentage Benefits Were of Expenses Incurred
Type A	73%	83%
Type B	27	50
Total	100%	74.2%

APPENDIX A

OUTLINE OF ILLUSTRATIVE MAJOR MEDICAL EXPENSE INSURANCE GROUP PLAN (FOR EMPLOYEES AND DEPENDENTS)

I. *Expenses Covered*			
Type A Expenses	Hospital Room and Board, Special Hospital Services, Anesthetics, Surgical Fees, Diagnostic X-Rays.		
Type B Expenses	Physicians' fees other than surgery, X-Ray and Radium Therapy, drugs and medicines, rental of iron lung and other durable equipment for therapeutic use, registered graduate nurses, artificial limbs and other prosthetic appliances.		
	For Type A Expenses	For Type B Expenses	
II. *Benefits*			
For each individual covered during calendar year	Employee pays first $25, Plan pays next $225 in full, Plan pays 85% of excess.	Employee pays first $50, Plan pays 75% of excess.	
	For Maternity—Type A and Type B Expenses		
	Normal Delivery $150, Caesarean Section $225, Miscarriage $75. Where there are severe complications, Plan pays 75% of expenses for such complications in excess of $150.		
Maximum Benefits	$7,500 in any calendar year; $15,000 aggregate.		
III. *Expenses Not Covered*	Dental care (except due to accidents), eyeglasses, health check-ups, expenses paid by Government or other employer plan.		

COMPREHENSIVE MEDICAL EXPENSE CLAIM CARD

Card columns	Field
1	DATE OF PAYMENT
2	YR OF PAYMENT
3–8	CLAIM NUMBER
9	INCOME CLASS
10–11	AGE LAST BIRTHDAY
12	SEX & TYPE
13–15	DAYS OF HOSPITALIZATION
16	TYPE OF HOSPITAL ROOM
17–18	HOSPITAL RATE FOR SEMI-PRIVATE
19–21	HOSPITAL ROOM AND BOARD EXPENSE
22–24	SPECIAL HOSPITAL SERVICES
25–27	OPERATING ROOM
28–30	ANESTHESIA
31–33	DIOGNOSTIC X-RAY
34–36	SURGICAL EXPENSES
37–40	TOTAL TYPE A EXPENSES
41–44	X TOTAL TYPE A BENEFITS
45–47	PHYSICIAN'S CHARGES
48–50	REGISTERED NURSES
51–53	LABORATORY EXAMINATIONS - NOT TYPE A
54–56	X-RAY AND RADIUM TREATMENTS - NOT TYPE A
57–59	DRUGS AND MEDICINES - NOT TYPE A
60–62	BLOOD TRANSFUSIONS, ARTIFICIAL LIMBS & RENTAL OF THERAPEUTIC EQUIPMENT
63	CODE
64–67	TOTAL TYPE B EXPENSES
68–71	TOTAL TYPE B BENEFITS
72–75	PENSION UNIT OF EMPLOYEE
76–77	NEW CONDITION CODE
78–80	CAUSE OF ILLNESS

INCOME CLASS
1 HOURLY
2 SALARIED – UNDER 5000
3 SALARIED – 5000 - 9999
4 SALARIED – 10000 - OVER

SEX & TYPE OF EMPLOYEE
1 MALE-SINGLE
2 MALE-MARRIED, WIDOWED, DIVORCED
3 MALE-SPOUSE
4 MALE-CHILD
5 FEMALE-SINGLE
6 FEMALE-MARRIED, WIDOWED, DIVORCED
7 FEMALE-SPOUSE
8 FEMALE-CHILD

TYPE OF HOSPITAL ROOM
1 P
2 SP
3 W

CODE FOR ITEM 60-62
1 BLOOD TRANSFUSION ONLY
2 OXYGEN ONLY
3 BLOOD TRANSFUSION & OXYGEN
4 ARTIFICIAL LIMBS ONLY
5 RENTAL OF THERAPEUTIC EQUIPMENT ONLY
9 OTHER COMBINATION

CAUSE OF ILLNESS
WITH SICKNESS, USE X
WITH SURGICAL, OMIT X

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APPENDIX C

CLAIM NUMBER

Payment Date	
Month	Year

COMPREHENSIVE MEDICAL EXPENSE WORK SHEET NO. _____

Employee's Name

Patient's Name — Age

Patient's Status (Check One) — Male — Female

1. Employee ☐ 2. Spouse ☐ 3. Child ☐ | 4. Employee ☐ 5. Spouse ☐ 6. Child ☐

Employee's Classification (Check One) — Hourly ☐ Salaried Exempt ☐ Salaried Non Exempt ☐

LINE	DESCRIPTION OF EXPENSES	Days in Hospital W	SP	P	Total	Semi-Private Rate	TOTAL EXPENSES	COVERED MEDICAL EXPENSE (ASSIGNMENT OF ALLOWABLE CHARGES) Hospital	Doctor (Surgeon)	Insured (Employee)	Other	EXPENSE NOT COVERED
1	Hospital Room and Board											
2	Hospital Special Services (other than those listed below)											
TYPE A 3	Charges for Local Ambulance Service					Sum 2-3						
4	Operating Room											
5	Anesthesia											
6	Diagnostic X-Rays											
7	Surgical Operations											
8	Total Type A Expenses (Sum of Lines 1-7)											
9	Deductible (and other Group benefits)											
10	Line 8 Less Line 9											
11	Amount subject to 100% payment											
12	Line 10 Less Line 11											
13	85% of Line 12											
14	Enter Line 11											
15	Total Type A Expense benefits payable (line 13 plus line 14)											
16	Physicians' Charges											
17	Registered Nurses											
TYPE B 18	Laboratory Examinations (not Type A)											
19	X-Ray & Radium Treatment (not Type A)											
20	Prescribed Medicines (not Type A)											
21	Blood Transfusions (not Type A)											
22	Oxygen (not Type A)											
23	Artificial Limbs and other Prosthetic Appliances											
24	Rental-Therapeutic Equipment					Sum 21-24						
25	Total Type B Expenses (Sum of Lines 16-24)											
26	Deductible (and other Group Benefits)											
27	Line 25 Less Line 26											
28	Total Type B Expense benefits payable (75% of line 27)											
29	Total Type A & B Expense benefits payable (line 15 plus line 28)											

30	Memo-For Future Claims: Initial Expense Incurred Last Quarter of this Calendar Year	For Insurance Company Use	New Condition Code / Cause of Illness Code
31	Total Previously Paid		
32	Insurance Co. Payment		
33	Total Payments To Date		
34	Pension Unit No.	35. Calculated By / Date	

DISCUSSION OF PRECEDING PAPER

RICHARD H. HOFFMAN:

Mr. Siegfried is to be congratulated for presenting this fine paper which furnishes a method of accumulating and presenting the experience of Major Medical Expense insurance plans. It is certainly true that information concerning Major Medical Expense insurance experience is direly needed at this time—a time when rising costs of medical care together with inadequate rate structures have produced many difficult problems in providing this coverage without loss to the insurer. Any addition to the knowledge in this field may prove to be of help in meeting this situation and it would appear that individual case studies of large groups are one of the most fruitful sources of experience data.

Presented below is some experience from a study of one large group's medical care plan consisting of basic Hospital, Surgical, and Medical Expense insurance supplemented by Major Medical Expense insurance. Although this is not the same form of plan as presented by Mr. Siegfried, the coverage is similar, being somewhat more comprehensive in some respects and less comprehensive in others.

The plan for nonmaternity benefits consists of the following:

a) *Hospital Expense Benefits*—Room and board reimbursed up to $15 per day for a maximum of 70 days, with additional charges up to $250.

b) *Surgical Expense Benefits*—A schedule providing a maximum reimbursement of $300 for the most serious operations.

c) *In-Hospital Medical Expense Benefits*—Reimbursement equal to $4 times the number of days of hospital confinement, subject to a maximum of $280.

d) *X-Ray and Laboratory Expense Benefits*—75% of covered charges in excess of a deductible amount of $10, but limited to a maximum of $50 in any twelve consecutive months.

e) *Major Medical Expense Benefits*—The Major Medical Expense plan is a calendar year type with a corridor deductible of $150 or 2% of annual earnings, if greater, which must be satisfied within a three month period and is applied to each unrelated disability. The maximum benefit is $5,000 for each cause and the coinsurance is 75–25. Major Medical Expense insurance is not provided for retired employees.

The group is comprised of the employees and their dependents of a large industrial organization located entirely in one northeastern state. Of the total number of active employees, 12% are females, while 81%

have one or more dependents. Retired employees equal 13% of the number of active employees and of these 70% have dependents. The experience is based on claims closed in the calendar year 1956. Maternity and obstetrical claims have been excluded throughout.

Table A shows the composition of medical expense charges and a comparison of these charges with the benefits paid. As compared with the composition of medical expenses shown in Table 1 of Mr. Siegfried's paper, this experience, not unexpectedly, has produced a greater proportion of hospital and surgical expenses and a lesser proportion of other expenses because of the difference in benefit formulas. This plan has no initial deductible for hospital and surgical expense charges, while Mr. Siegfried's plan has a $25 deductible for these expenses. In addition, a

TABLE A

COMPOSITION OF MEDICAL EXPENSE CHARGES AND COMPARISON OF BENEFITS WITH CHARGES

	Composition of Charges	Benefits Paid as a Percentage of Charges
Hospital Room and Board	34.5%	92.5%
Hospital Additionals	26.4	93.9
Surgical	24.8	83.0
Doctor Visits In-Hospital	6.1	79.2
X-Ray and Laboratory	3.3	52.4
All Other	4.9	57.9
All	100.0%	86.7%

smaller proportion of charges for drugs and home and office doctor visits and a greater proportion of out-of-hospital X-Ray and Laboratory expense charges has appeared in this experience than that shown in the paper. A further result is that Table A shows a higher ratio of benefits paid to charges than does Table 6 of the paper.

Table B presents the incidence and duration of hospital confinement of bed patients by 10-year age groups for active and retired employees combined. For dependents, similar figures are shown separately for adult dependents of active and retired employees and children, but without any age breakdown. The results correspond to those shown in Table 3 of the paper.

In Table C, the distribution of total charges by size of claim may be seen to be materially different from that shown in Table 4 of the paper in that Table C shows a greater proportion of small claims. This is the result of the previously mentioned difference in deductible features of the

two plans plus the effect of a significant number of purely X-Ray and Laboratory expense claims. In determining the number of claims and amount of charges, all claims arising from the same individual for the same or related causes are combined. Claims on retired employees have been excluded from Tables C and D because major medical coverage is not provided for them.

Table D provides claim costs based on the total charges appearing in the experience without application of deductibles or coinsurance. The figures were computed by dividing such total charges by the number of lives exposed. For employees the variation by 10-year age groups is shown, while dependent claim costs were not shown by age since no reliable age distribution was available. It might be suggested in this connection that inasmuch as age distributions of dependents are generally not available

TABLE B

INCIDENCE AND DURATION OF HOSPITAL CONFINEMENT—IN-PATIENTS ONLY

Age	Frequency per 100	Average Duration of Confinement (Days)	Days Confined per Year per 100
	Employees		
Less than 30	7.5	5.2	39
30–39	6.6	6.8	45
40–49	10.0	8.0	80
50–59	10.4	9.6	100
60–69	14.8	12.1	179
70 and over	12.6	11.4	144
All	9.9	9.0	89
	Dependent Adults		
Active	11.2*	8.4	94*
Retired	15.1*	14.8	223*
All	11.6*	9.2	107*
	Dependent Children		
All	11.7*	4.5	53*

* Per 100 employees with dependents.

and premium rates for dependent adults are usually based on the age distribution of employees, in studies of this kind dependents experience could be tabulated in accordance with the employee's age instead of the spouse's age. Table D indicates a claim cost for employees which increased with age but not as sharply as the age increase in hospital utilization indicates in Table B, probably because the experience on retired employees has not been included in Table D. The figures also indicate that the claim cost for adult dependents is 126% of that for employees.

TABLE C

DISTRIBUTION OF TOTAL CHARGES BY SIZE OF CLAIM
ACTIVE EMPLOYEES AND DEPENDENTS

TOTAL CHARGES	EMPLOYEES		DEPENDENT ADULTS		DEPENDENT CHILDREN	
	Number of Claims	% of Total	Number of Claims	% of Total	Number of Claims	% of Total
$ 0–$ 25	758	38.2%	481	31.1%	633	38.7%
26– 50	335	16.7	183	11.8	164	10.1
51– 100	211	10.5	165	10.6	299	18.3
101– 200	266	13.3	282	18.2	346	21.2
201– 500	313	15.6	292	18.8	172	10.6
501– 1,000	77	3.8	111	7.2	13	.8
1,001– 1,500	21	1.0	19	1.2	1	.1
1,501– 2,000	10	.5	10	.6	0	.0
2,001– 2,500	4	.2	2	.1	1	.1
2,501– 5,000	5	.2	4	.3	0	.0
5,001– 7,500	0	.0	2	.1	0	.0
7,501– 10,000	1	.0	0	.0	1	.1
Total	2,001	100.0%	1,551	100.0%	1,630	100.0%

TABLE D

ANNUAL CLAIM COST BASED ON TOTAL CHARGES
ACTIVE EMPLOYEES AND DEPENDENTS

Age	Employees	Dependent Adults*	Dependent Children*
Less than 30	$21.82		
30–39	21.48		
40–49	35.35		
50–59	46.36		
60–69	55.18		
All	$34.92	$44.14	$21.91

* Charges per employee with dependents.

DANIEL W. PETTENGILL:

The marked differences that exist in the Comprehensive Medical Expense premium rate structures of the various insurance companies is mute testimony to the lack of accurate cost statistics. Mr. Siegfried's paper is, therefore, a timely reminder that the actuary's goal is to substitute facts for impressions. He has properly warned us, however, that statistical research in the field of Comprehensive Medical Expense insurance is difficult, expensive, and time consuming.

My company's statistical program is somewhat similar to that outlined by Mr. Siegfried. Under our program, the claim adjuster prepares a worksheet each time he pays a Comprehensive Medical Expense benefit. This worksheet (reproduced on the next page) is designed to be used for all types of Comprehensive plans. Consequently, items that are inapplicable to any particular plan are to be left blank. The completed worksheets are transcribed onto IBM cards at the home office, two cards being required for each worksheet.

This statistical program has been in operation for four years now. It has not answered all of our questions, but it has enabled us to base the premium rates for our standard Comprehensive plans on statistical averages rather than on educated guesses. In addition to this regular program, we have made a few sample claim studies to obtain special information.

Medical practices and medical care costs are constantly changing, so that this task of substituting facts for impressions is a never ending one. Those of us who are actively engaged in Accident and Health insurance work have a moral obligation to see that our companies spend adequate amounts on statistical research. We also have an obligation to see to it that this research is conducted as accurately as possible. I mention this latter obligation for two reasons. First, as regards Group plans, it is often difficult to get the policyholder to furnish accurate exposure data with respect to such important cost factors as age, sex, salary, and location. Thus, there is a temptation to use obsolete exposure data. Another temptation is to base the first year's exposure on the data used in connection with the sale of the plan—data that all too often are quite different from the data applicable to the group of employees who were finally insured. Accurate exposure data must be obtained both on the effective date of the plan and periodically thereafter.

The second reason for my statement is that the factors affecting Comprehensive costs are so complex that we can easily be misled by the loss experience of a few cases unless we make detailed claim studies to analyze what lies behind such loss experience. For example, at our Eastern Spring

Key No. .....
Policyholder
Name of Claimant

MAJOR MEDICAL EXPENSE WORKSHEET

Year ..... No. ....
Policy No.
Cert. No. Type Age

Salary Range
1 – 3 – 5 –
2 – 4 – 6 –

Nature of Disability

Type of Claim
Regular – (1) Maternity – (3)
Ext. Ins. – (2) Other – ( )

Basic Coverage
Yes ☐
No ☐

State

Maximum Amount

Deductible
Current Year.....
Carry Over .....
Net .....
Applicable This Worksheet .....

Room Limit

Date First Expense Incurred Against Deductible: Month Day Year
Date Last Expense Incurred Against Deductible:

1. Total Amount of Major Medical Expense Paid Prior to This Worksheet	a. All Causes	$
	b. This Cause	$

COVERED EXPENSE	AMOUNT
2. Hospital Room and Board	$
3. Hospital In-patient Miscellaneous Fees	$
4. Outside Anesthetist	$
5. Out-patient Miscellaneous Fees	$
6. Surgical Fees	$
7. Physicians Fees (Other Than Surgical)	$
8. Nurses Fees	$
9. Outside X-ray and Laboratory	$
10. Other Outside Services	$
11. Outside Drugs and Medicines	$
12. Other Outside Supplies	$
13. Total Covered Expense	$

14. Hospital Room and Board Charges

Accommodations	No. Days	Total Charges	Excess
Private		$	
Other		$	
Total		$	

15. Surgical Codes—All Procedures

BASIC BENEFITS PAID

	Type I Expense	Type II Expense	Total
16. Ætna	$		
17. Blue Cross Blue Shield	$		
18. Other	$		
19. Total	A $	B $	C $

	Type I Expense	Type II Expense	Total Expense
20. Total Covered Expense	$	$	$
	Item 19A	Item 19B	Item 19C
21. Basic Benefits Paid	$	$	$
22. Net Expense (Item 20 less 21)	$	$	$
23. Net Expense Less App. Ded.	$	$	$
24. Amount of Payment at 100% (or %)			$
25. Amount of Payment at %			$
26. Amount of Payment at % of Balance			$
27. Total to be Paid (Item 24 & Item 25 & Item 26)			$
28. Total Paid to Date		All Causes	$
		This Cause	$

Remarks:

Meeting this year, one of our members reported that the loss ratios for three Comprehensive plans with all-cause calendar year deductibles ranged from 120% to 186% while the loss ratios for three other plans which had per-cause deductibles ranged from 66% to 88%. To an inexperienced person, such loss ratios would seem to imply that a per-cause deductible plan would cost about 60% of an all-cause calendar year deductible plan; whereas the actual difference in cost between these two types of deductibles is very small for any given case. The marked difference in the loss ratios for the six cases reported must have been due either to erroneous data or, what is more likely, to inherent differences in the insured risks. A poor risk is a poor risk regardless of the type of deductible used.

My company's standard Comprehensive plan uses an all-cause calendar year deductible. In addition, it has what we call the "carry-over" provision. This provision allows the claimant to reduce next year's deductible by the amount of any expenses charged against this year's deductible which were incurred during the last three months of the year. We recently decided to offer an alternate plan which would still be on the all-cause calendar year basis but which would require the deductible to be accumulated in a period of sixty consecutive days rather than the whole year. In place of our standard three month carry-over provision, this alternate plan provides that when an individual is not entitled to benefits in the current year, he may count the expenses of the last few weeks of that year towards next year's deductible provided at least one day of the sixty day accumulation period falls in the next year.

To determine how much less than our standard plan this alternate plan would cost, we had claim files sent to the home office for review. These files represented a sample of claims paid with respect to 1957 expenses under our standard Comprehensive plans where the amount of the deductible was $50. Only cases that had become insured prior to July 1, 1956 were included, so that the sample would include individuals who had no deductible or a reduced deductible by reason of the carry-over provision.

We had 1,199 claims, of which 465 were on employees, 438 on dependent wives and 296 on dependent children. Since only 16% of the employee claims were on females, we did not attempt to study male and female employees separately.

For each of these three classes of claimants, we determined for the calendar year 1957 the amount of covered expenses, the amount of deductibles charged and the difference between these two amounts (see Table 1). This difference, or balance, represents the amount of covered expenses to be reimbursed by the plan, subject to whatever rate of co-

insurance may be applicable. While some Comprehensive plans waive the deductible for hospital expenses, in this study the deductible was applied to hospital expenses as well as to all other types of expense. This set of figures represented our standard plan and gave us our base from which we could determine the savings due to changes in the type of deductible.

By reapplying the deductible on the sixty day basis, we found that the new alternate plan would save 7.5% for employees, 8.6% for dependent wives and 10.1% for dependent children.

Two by-products of this study may be of interest. First, we determined the savings from our standard Comprehensive plan due just to the elimination of the three month carry-over feature. These were 2.2% for employees, 1.5% for dependent wives and 3.3% for dependent children.

TABLE 1

	Type of Comprehensive Plan*			
	Plan 1 All-Cause Calendar Year with Carry-over	Plan 2 Same as Plan 1 but without Carry-over	Plan 3 Same as Plan 2 but with 60 Day Accumulation Period	Plan 4 Per-Cause Deductible with 60 Day Accumulation Period
	Employee			
Total 1957 Expense	$133,344	$133,344	$133,344	$133,344
Deductibles Charged	21,014	23,454	29,436	31,162
Balance	112,330	109,890	103,908	102,182
Cost of Plan as a Percentage of Type 1	100%	97.8%	92.5%	91.0%
	Dependent Wife			
Total 1957 Expense	$133,777	$133,777	$133,777	$133,777
Deductibles Charged	20,560	22,287	30,258	31,429
Balance	113,217	111,490	103,519	102,348
Cost of Plan as a Percentage of Type 1	100%	98.5%	91.4%	90.4%
	Children			
Total 1957 Expense	$ 55,193	$ 55,193	$ 55,193	$ 55,193
Deductibles Charged	13,918	15,264	18,100	19,286
Balance	41,275	39,929	37,093	35,907
Cost of Plan as a Percentage of Type 1	100%	96.7%	89.9%	87.0%

* In all instances, it is assumed that the deductible applies to all types of expenses. Furthermore, the item entitled "Balance" is the amount of expense to be reimbursed before the application of whatever rate of reimbursement is to apply.

Then we determined as closely as possible the savings that would result if our standard plan were changed to a per-cause deductible plan with a sixty day accumulation requirement. These savings were 9.0% for employees, 9.6% for dependent wives and 13.0% for dependent children. Notice how close these savings are to those obtained by introducing the 60 day accumulation period into the all-cause calendar year plan. The per-cause savings are slightly overstated because, through lack of records, we were unable to include the cost of those few individuals who became disabled prior to October 1, 1956 and who had expenses for that disability in 1957 that amounted to less than $50.

TABLE 2

PERCENTAGE DISTRIBUTION OF NUMBER OF DISABILITIES PER YEAR AMONG CLAIMANTS UNDER A COMPREHENSIVE MEDICAL EXPENSE PLAN WITH A $50 ALL-CAUSE CALENDAR YEAR DEDUCTIBLE

Number of Disabilities	Type of Claimant		
	Employee	Dependent Wife	Children
1	64.0%	62.2%	67.9%
2	20.1	24.4	24.4
3	9.7	7.8	4.2
4	4.0	4.0	2.6
5 or more	2.2	1.6	.9

In actual practice, I would expect these per-cause savings to be reduced still further by reason of the fact that the attending physician would certify that some of the multiple disabilities to which we applied separate deductibles were actually related so that only one deductible should be applied. I should point out, however, that our actuarial staff did as realistic a job as possible in determining the number of different disabilities, and that all their decisions were reviewed by a doctor and a claim adjuster.

As a matter of curiosity, we tabulated the number of different disabilities by type of claimant (see Table 2). Of the employees, 64.0 % had only one disability, 20.1% had two, while 15.9% had three or more. The figures for dependent wives were very similar. The dependent children had slightly more single disabilities and slightly fewer multiple disabilities. It should be understood that it is not possible to obtain cost savings by multiplying the average number of disabilities per year by the dollar amount of the deductible because some of the disabilities involved total expenses of less than $50.

STANLEY W. GINGERY:

Mr. Siegfried very ably sets forth the objectives and some of the problems involved in analyzing the experience of Major Medical Expense insurance. The rapid expansion of this coverage makes this a very important topic. Mr. Siegfried's statistics do not directly illustrate the first objective listed, namely, "comparisons of actual results with the expected on which premiums were based." That type of information is of practical use to individual insurance companies in studying the appropriateness of their premium rate schedules. Your Committee on Accident and Sickness Experience in Plans Insured on the Group Basis, of which I am the present Chairman, has, of course, been grappling with the problems of studying Group M. M. E. insurance without much to show for its efforts to date, but I should like to take advantage of this opportunity to review our current plans very briefly.

Since the analysis of Group Major Medical claims is an expensive undertaking, your Group morbidity committee has, with the exception of one limited study of the expense involved in claims of large amount, waited for the emergence of sufficient data to make possible an attempt to derive annual claim costs in some usable form. In making such a study, we must use the information which insurance carriers can make available from their records without undue expense. The lack of standardization in Major Medical insurance has prevented the Committee from following the method used in deriving annual claim costs for the conventional types of Group Accident and Sickness insurance, namely, the study of the experience of a few popular plans on which a substantial amount of Group Weekly Indemnity and Group Employees and Dependents Hospital and Surgical Expense insurance coverages is written. Rather, we are finding it necessary to analyze expenses eligible for payment (rather than the claim payments themselves), which was the general approach used by Mr. A. M. Thaler in his paper on "Group Major Medical Expense Insurance" published in *TSA* III. We have completed plans for such a pilot study, which will bring together the small amount of data available on the 1957 eligible Major Medical expenses under calendar year plans, for a report next summer.

Our study is designed to produce the annual frequency of the incurral of expenses ranging upward from $100 (or from a lesser amount in some instances). The expenses incurred will be subdivided among those for hospitalization—room and board, and other—surgery, other charges by physicians (with psychiatric fees separately, where possible), laboratory and X-ray, private duty nursing, drugs and medicine, and other medical expense.

There will be some information on cause of disability but this will not

be as extensive as that illustrated in the paper under discussion because of the practical necessity of using data available from existing company records. This is not too serious a shortcoming, however, since only the subdivision of expenses among maternity, mental disorders and other causes appears to be of much importance to the purpose at hand.

To the extent that we are not able to assemble data adequate for the objectives listed by Mr. Siegfried, individual companies must, of course, rely on sample studies. Such studies are to be encouraged and it is hoped that all worth-while results will be made available to the Society in papers or actuarial notes. Your Group morbidity committee hopes that new methods or techniques may be developed in the conduct of such studies, which may be of assistance generally or on specific aspects of the problem. We are desirous of receiving any assistance which can be brought to bear on the statistical problems of this rapidly changing, highly complex field of Major Medical insurance.

I should also like to outline some improvements the Committee is attempting to make in its regular annual reports, since some of the data derived from conventional forms of Group Hospital and Surgical Expense insurance are also applicable to Group M. M. E. insurance. We shall make an experimental attempt this year to derive a grid-work of room and board and miscellaneous claim costs for ranges of daily hospital room and board and ancillary benefits and days of confinement. Separate claim costs for males and females and types of dependent would be available. This will make use of data recently secured for up-dating my paper on "Special Investigation of Group Hospital Expense Insurance Experience" published in *TSA* IV. Consideration will be given to the development of similar, but less extensive, grid-works for Weekly Indemnity and Surgical Expense coverages using Morton D. Miller's latest papers on these subjects, the one on Surgical Expense insurance having been presented here today. To the extent that we are able to complete some of these projects within the few weeks available between the time the contributing companies submit their data and the date of publication, our studies should be of greater value. However, I would point out that the collection of data for our studies is time consuming and expensive. Because of other priorities, including the difficulties encountered in the installation of new machine procedures, contributors are not always able to meet the deadlines established. This problem has become more acute recently while we have been expanding the scope of our studies.

We shall continue our efforts to work out the statistical problems of Group M. M. E. insurance, within the practical limitations of time and expense which we must observe. We are indebted to Mr. Siegfried for bringing more attention to bear on this difficult area at this time.

C. H. WAIN:

Mr. Siegfried's paper should prove of great value to any actuary involved in any way with Major Medical Expense insurance. The excellent methods of analysis he describes should facilitate obtaining a rigorous picture of Major Medical experience periodically. Because of certain implications of Major Medical coverage, however, I believe supplementary analyses that are less rigorous but that can produce approximate results rapidly and economically also have considerable value. The aspects of Major Medical that make me believe such analyses are desirable are the following:

1. The risk for each individual insured is large and the corresponding risk in relation to premiums to be received is extremely large. Thus, a significant effect on earnings of a Group or Individual Accident and Health department could occur if for any reason significant antiselection were operating among a significant portion of those being insured.
2. There is considerable danger that significant antiselection could occur since this is one of the first coverages written providing large amounts of benefits in which there is not automatically a considerable interest on the part of the individual insured in avoiding a claim.
3. The large amounts of payments available may in specific areas induce adverse claim experience with or without antiselection being operative among those being insured, through the temptations imposed on persons or institutions providing medical care to render unnecessary services or to increase their normal charges.

Because of these conditions, we have found it desirable in our office—which handles primarily West Coast business—to institute a quarterly review of emerging claim experience. It is extremely simple, being a summation of premiums, and claims lagged four months. We break the over-all results into major types of Major Medical Expense plans being sold and also into results by area. We recognize that the experience for any individual case in as short a period as three months is not apt to be valid unless the case is extremely large. On the other hand, the results of a group of cases warrant careful consideration, particularly if adverse experience is split through a large proportion of the cases. The result also warrants greater weight if adverse experience is consistent among quarters or exhibits consistent trends after allowing for seasonal fluctuations. With this type of approach it is possible to satisfy oneself if over-all rate adjustment action is necessary much sooner than if reliance is placed only on indispensable periodic rigorous studies.

JAMES A. ATTWOOD:

I should like to make a few comments on Mr. Siegfried's excellent paper which relate the experiences of the firm of consultants and actuaries

with which I am affiliated. Increasing interest is being shown by our clients in the area of analysis of medical care experience. In the past few years we have been called upon in several instances to design data collection procedures and help in the analysis of the results.

I agree fully with Mr. Siegfried's conclusion that careful thought should be "given at the outset as to the ultimate objectives of a particular study."

The objectives of an individual employer in collecting and analyzing data are in some respects different from the objectives of an insurance company. The major objectives of an individual employer usually are to establish:

1. Measures of "benefit utilization."
2. Tests of "benefit effectiveness."
3. Tests of "financing effectiveness."

Ancillary objectives may exist in certain instances, such as:

1. Comparisons of premiums and claims with employee contributions. This is especially important where employees are told that their contributions are pegged at a certain percentage of cost or where employees are told that their contributions pay for certain types of medical expenses.
2. Determination of experience by employee group or by company location in order to allocate costs on the basis of experience.

The problems of individual companies in the collection of data and analysis of results are most difficult in situations where separate plans exist for different kinds of benefits, especially if the benefits are handled by different insurance carriers. To develop tests of over-all benefit effectiveness, there must be common coding and analysis.

The usual purpose of an individual employer's analysis is to determine areas of "overutilization" and "underprovision," which are inconsistent with the basic objectives of the company with respect to medical care benefits. This may lead to the readjustment of plan benefits to more effectively accomplish the plan's objectives.

The most popular measures of "benefit utilization" from the standpoint of being the most understandable and most useful to individual employers include:

1. Number of hospital confinements per thousand employees.
2. Number of surgical procedures per thousand employees.
3. Distribution of hospital confinements by days and average days of hospital confinements.
4. Total number of days of hospital confinement per year per thousand employees.

5. Average hospital bill per day (which includes all hospital charges).

In the area of "benefit effectiveness" the most useful tools seem to be:

1. Comparisons of average hospital bill per day and average claim paid per hospital day.
2. Comparison of total medical bills with total claims paid per person per illness or per calendar year. This is usually broken down by type of medical expense, if appropriate and possible.

In the area of "financial effectiveness" the individual company is interested in the breakdown of the premium dollar into its component parts.

Our experience with companies which have made experience studies shows the following results:

1. Benefit utilization statistics provide a good basis for projections of future costs of medical care benefits, especially when related from year to year. Companies with this type of analysis begin to appreciate the "why" of increasing costs. They can plan for increasing costs.
2. Effectiveness statistics test the objectives of the plan. In many instances, analysis of such statistics leads to the first real formulation of any real objectives.
3. Financial effectiveness statistics overcome much of the mystery in the minds of many company executives because they demonstrate the role of the insurance carrier in the plan and put before corporate officers items which are often misunderstood because they are not discussed.

In conclusion, I want to congratulate Mr. Siegfried on establishing a framework for consideration of a problem of increasing importance to the group policyholders of the insurance companies in the United States and Canada.

(AUTHOR'S REVIEW OF DISCUSSION)

CHARLES A. SIEGFRIED:

I should like to express my appreciation to those who contributed further thoughts in consideration of my paper. Each provided helpful insights which amplify the view of the problems and possibilities that the subject involves.

The information supplied by Mr. Pettengill and Mr. Hoffman is especially interesting and instructive and it is to be hoped that more such information will become available. Mr. Gingery's remarks further underscore the practical difficulties in the way of getting broadly based statistics, but the plans his committee have under way are very encouraging.