

CONTINUANCE STUDY OF HOSPITAL CLAIMS ON
INDIVIDUALLY UNDERWRITTEN LIVES
AGE 65 AND OVER

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IN RECENT years substantial progress has been made in providing hospital and medical care coverage for "senior citizens." Many companies have entered the field either by offering individually underwritten policies or through mass enrolment plans devised either by the individual company or in conjunction with others through special state legislation. In addition, there has been a considerable volume of this insurance made available without evidence of insurability under the conversion privilege of group insurance policies.

Most of the statistical data available has been based on population data rather than on insured lives, or else on insurance statistics relating to the somewhat limited coverage made available on an experimental basis during the early days of "senior-citizen" insurance. Recently, the trend has been to expand the benefits on these lives, and it would be helpful to actuaries to have available statistical data which would indicate the additional cost for these more liberal benefits. In addition, it would be helpful to have data from which could be estimated the savings which might be expected by eliminating the first few days of hospitalization or a fixed amount per confinement. In cases where legislation has required making a variety of plans available on conversion from group coverage, as in the recent New York State Russo legislation, or in the evaluation of various federal compulsory health care proposals, the lack of actuarially reliable data at the higher ages has been a matter of great concern. It is the purpose of this paper to provide data derived from actual claim experience on lives age 65 and over in a form that will facilitate actuarial calculations involving modification of durations of hospital stay and variations in the allowances provided for miscellaneous services billed by the hospital.

Description of Plan Benefits

The data for this study are based on the experience of the senior hospital and professional services policies which were first offered by the Metropolitan Life Insurance Company during 1961. The benefits are as follows:

Hospital Expense Benefits	Plan I	Plan II
Hospital room and board—maximum per day . . .	\$15	\$25
Hospital—maximum benefit period	180 days	240 days
Special hospital services	80% of charges above \$50 de- ductible	80% of charges above \$50 de- ductible
Nursing home—maximum per day	\$7.50	\$12.50
Nursing home—maximum benefit period	30 days	30 days
Maximum indemnity per claim (aggregate of above benefits)	\$3,500	\$7,000

Professional Services Benefit in Hospital

Surgical fees—schedule maximum	\$250	\$500
Services of physicians and private nurses	80% of charges above \$50 de- ductible	80% of charges above \$50 de- ductible
Maximum indemnity per claim	\$1,500	\$3,000

Description of Claim Data

Lives covered by this policy form are individually underwritten. The standards are liberal and are defined as average normal health for the attained age. The exclusion period for pre-existing conditions is six months. The study covers claims incurred in 1962 traced through May, 1963. The lives in the study are, therefore, in the select period, and the pre-existing exclusion clause applies to many of the lives in the group exposed.

This policy is intended for people aged 65 and over, with no upper age limit. In the case of family policies, when the insured is over age 65, the spouse can be covered if her/his age is 56 or over. Most of the policies have been issued on an individual basis, and many of the family policies cover a spouse who is over age 65. There were relatively few claims on people between ages 56 and 64, and these were excluded from the study. The claim experience in this study is divided into four basic groups: male, ages 65-74; male, ages 75 and over; female, ages 65-74; female, ages 75 and over.

Since this study does not take into consideration lives exposed, it does not develop claim costs. The tables are based solely on claim information from which it is possible to derive relative claim costs of various benefits, average duration of hospital stay, and average miscellaneous service charges. In making any interpretation concerning this study it should be borne in mind that this experience is very immature, and the relationships which exist at early durations may change as the experience matures.

It is felt, however, that an analysis of claims by incidence of cost would be less likely to be affected by the early duration of the experience than would claim costs.

In spite of the limitations, it is believed that the study involving approximately six thousand claims would prove to be of significant value, since there are few published statistical data available for the individually underwritten older lives.

The study contains the following tables and an Appendix which illustrates the use of the tables in deriving relative claim costs.

Table 1. Hospitalization Continuance Tables—Male

Table 2. Hospitalization Continuance Tables—Female

Table 3. Hospitalization Continuance Tables—Male and Female

Table 4. Ratio of Patient Days during First t Days to Patient Days during First 31 Days

Table 5. Average Duration of Confinement for t -Day Maximum

Table 6. Miscellaneous Services Continuance Table—Male

Table 7. Miscellaneous Services Continuance Table—Female

Table 8. Miscellaneous Services Continuance Table—Male and Female

Table 9. Average Cost of Miscellaneous Services for Various Reimbursable Maximums

Table 10. Cost of Miscellaneous Services for a $\$m$ Maximum Benefit as a Percentage of a $\$100$ Maximum Benefit

Hospitalization Continuance Tables

Tables 1, 2, and 3 were constructed by listing the number of claims which terminate on the t th day with t running from 1 to 180. These values were then summed successively from 180 up to t for all values of t and the resulting sums designated as l_t . The value of l_t , therefore, is the number of people confined t or more days. The l_t column was then summed successively from 1 to t for all values of t , and this second sum designated as C_t . The value of C_t , therefore, is the number of patient days during the first t days of confinement. Tables 1, 2, and 3 show values of l_t and C_t for t equal to 1, 2, 3, . . . , 31 and each multiple of 10 thereafter.

Table 4 expresses the cost of the first t days of confinement as a ratio of the cost of the first 31 days of confinement, where t is shown for multiples of 10 ranging from 10 to 180. Table 5 shows the average duration of confinement which would have resulted if the claims had been truncated at various points.

The data in this study were compared with the British Columbia Study for the year 1960. It will be noted that the hospital confinements for the British Columbia population are of longer duration. The explanation for this difference, very probably, is the "select" nature of the Metropolitan

TABLE 1
HOSPITALIZATION CONTINUANCE TABLES
MALE

DAYS OF CONFINEMENT (t)	AGES 65-74		AGES 75 AND OVER		AGES 65 AND OVER		DAYS OF CONFINEMENT (t)
	l_t	C_t	l_t	C_t	l_t	C_t	
1.....	1,010	1,010	1,020	1,020	2,030	2,030	..... 1
2.....	964	1,974	980	2,000	1,944	3,974	..... 2
3.....	910	2,884	935	2,935	1,845	5,819	..... 3
4.....	855	3,739	884	3,819	1,739	7,558	..... 4
5.....	789	4,528	839	4,658	1,628	9,186	..... 5
6.....	723	5,251	793	5,451	1,516	10,702	..... 6
7.....	670	5,921	736	6,187	1,406	12,108	..... 7
8.....	617	6,538	686	6,873	1,303	13,411	..... 8
9.....	560	7,098	644	7,517	1,204	14,615	..... 9
10.....	523	7,621	594	8,111	1,117	15,732	..... 10
11.....	469	8,090	543	8,654	1,012	16,744	..... 11
12.....	438	8,528	498	9,152	936	17,680	..... 12
13.....	401	8,929	454	9,606	855	18,535	..... 13
14.....	367	9,296	429	10,035	796	19,331	..... 14
15.....	346	9,642	395	10,430	741	20,072	..... 15
16.....	320	9,962	365	10,795	685	20,757	..... 16
17.....	296	10,258	342	11,137	638	21,395	..... 17
18.....	276	10,534	315	11,452	591	21,986	..... 18
19.....	254	10,788	288	11,740	542	22,528	..... 19
20.....	236	11,024	270	12,010	506	23,034	..... 20
21.....	208	11,232	257	12,267	465	23,499	..... 21
22.....	187	11,419	244	12,511	431	23,930	..... 22
23.....	175	11,594	236	12,747	411	24,341	..... 23
24.....	164	11,758	222	12,969	386	24,727	..... 24
25.....	149	11,907	210	13,179	359	25,086	..... 25
26.....	132	12,039	198	13,377	330	25,416	..... 26
27.....	125	12,164	190	13,567	315	25,731	..... 27
28.....	114	12,278	179	13,746	293	26,024	..... 28
29.....	103	12,381	164	13,910	267	26,291	..... 29
30.....	98	12,479	156	14,066	254	26,545	..... 30
31.....	88	12,567	146	14,212	234	26,779	..... 31
40.....	52	13,150	88	15,213	140	28,363	..... 40
50.....	31	13,549	52	15,838	83	29,387	..... 50
60.....	21	13,806	34	16,234	55	30,040	..... 60
70.....	17	13,989	30	16,557	47	30,546	..... 70
80.....	15	14,153	23	16,818	38	30,971	..... 80
90.....	13	14,290	17	17,018	30	31,308	..... 90
100.....	10	14,395	14	17,161	24	31,556	..... 100
110.....	10	14,495	13	17,293	23	31,788	..... 110
120.....	8	14,583	10	17,411	18	31,994	..... 120
130.....	5	14,654	5	17,474	10	32,128	..... 130
140.....	4	14,695	5	17,524	9	32,219	..... 140
150.....	2	14,718	4	17,570	6	32,288	..... 150
160.....	2	14,738	4	17,610	6	32,348	..... 160
170.....	1	14,753	4	17,650	5	32,403	..... 170
180.....	1	14,763	4	17,690	5	32,453	..... 180

l_t = number of persons confined t or more days.
 C_t = number of patient days during first t days of confinement.

TABLE 2
HOSPITALIZATION CONTINUANCE TABLES
FEMALE

DAYS OF CON- FINEMENT (t)	AGES 65-74		AGES 75 AND OVER		AGES 65 AND OVER		DAYS OF CON- FINEMENT (t)
	l_t	C_t	l_t	C_t	l_t	C_t	
1.....	2,082	2,082	1,746	1,746	3,828	3,828	..... 1
2.....	2,012	4,094	1,672	3,418	3,684	7,512	..... 2
3.....	1,889	5,983	1,598	5,016	3,487	10,999	..... 3
4.....	1,754	7,737	1,512	6,528	3,266	14,265	..... 4
5.....	1,621	9,358	1,412	7,940	3,033	17,298	..... 5
6.....	1,501	10,859	1,326	9,266	2,827	20,125	..... 6
7.....	1,371	12,230	1,247	10,513	2,618	22,743	..... 7
8.....	1,235	13,465	1,152	11,665	2,387	25,130	..... 8
9.....	1,130	14,595	1,078	12,743	2,208	27,338	..... 9
10.....	994	15,589	994	13,737	1,988	29,326	..... 10
11.....	895	16,484	912	14,649	1,807	31,133	..... 11
12.....	823	17,307	854	15,503	1,677	32,810	..... 12
13.....	747	18,054	791	16,294	1,538	34,348	..... 13
14.....	681	18,735	754	17,048	1,435	35,783	..... 14
15.....	607	19,342	700	17,748	1,307	37,090	..... 15
16.....	555	19,897	652	18,400	1,207	38,297	..... 16
17.....	517	20,414	605	19,005	1,122	39,419	..... 17
18.....	473	20,887	577	19,582	1,050	40,469	..... 18
19.....	429	21,316	546	20,128	975	41,444	..... 19
20.....	400	21,716	519	20,647	919	42,363	..... 20
21.....	360	22,076	497	21,144	857	43,220	..... 21
22.....	335	22,411	474	21,618	809	44,029	..... 22
23.....	305	22,716	441	22,059	746	44,775	..... 23
24.....	286	23,002	423	22,482	709	45,484	..... 24
25.....	269	23,271	402	22,884	671	46,155	..... 25
26.....	251	23,522	377	23,261	628	46,783	..... 26
27.....	232	23,754	362	23,623	594	47,377	..... 27
28.....	223	23,977	347	23,970	570	47,947	..... 28
29.....	210	24,187	325	24,295	535	48,482	..... 29
30.....	194	24,381	313	24,608	507	48,989	..... 30
31.....	189	24,570	299	24,907	488	49,477	..... 31
40.....	120	25,910	207	27,126	327	53,036	..... 40
50.....	77	26,829	147	28,824	224	55,653	..... 50
60.....	50	27,441	116	30,117	166	57,558	..... 60
70.....	29	27,830	92	31,140	121	58,970	..... 70
80.....	21	28,071	78	31,952	99	60,023	..... 80
90.....	15	28,251	55	32,620	70	60,871	..... 90
100.....	10	28,377	44	33,105	54	61,482	..... 100
110.....	9	28,473	38	33,509	47	61,982	..... 110
120.....	9	28,563	33	33,858	42	62,421	..... 120
130.....	5	28,622	26	34,150	31	62,772	..... 130
140.....	4	28,664	21	34,388	25	63,052	..... 140
150.....	4	28,704	16	34,572	20	63,276	..... 150
160.....	3	28,737	11	34,695	14	63,432	..... 160
170.....	2	28,760	10	34,803	12	63,563	..... 170
180.....	2	28,780	7	34,895	9	63,675	..... 180

l_t = number of persons confined t or more days.
 C_t = number of patient days during first t days of confinement.

TABLE 3
HOSPITALIZATION CONTINUANCE TABLES
MALE AND FEMALE

DAYS OF CON- FINEMENT (<i>t</i>)	AGES 65-74		AGES 75 AND OVER		AGES 65 AND OVER		DAYS OF CON- FINEMENT (<i>t</i>)
	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>	
1.....	3,092	3,092	2,766	2,766	5,858	5,858	..... 1
2.....	2,976	6,068	2,652	5,418	5,628	11,486	..... 2
3.....	2,799	8,867	2,533	7,951	5,332	16,818	..... 3
4.....	2,609	11,476	2,396	10,347	5,005	21,823	..... 4
5.....	2,410	13,886	2,251	12,598	4,661	26,484	..... 5
6.....	2,224	16,110	2,119	14,717	4,343	30,827	..... 6
7.....	2,041	18,151	1,983	16,700	4,024	34,851	..... 7
8.....	1,852	20,003	1,838	18,538	3,690	38,541	..... 8
9.....	1,690	21,693	1,722	20,260	3,412	41,953	..... 9
10.....	1,517	23,210	1,588	21,848	3,105	45,058	..... 10
11.....	1,364	24,574	1,455	23,303	2,819	47,877	..... 11
12.....	1,261	25,835	1,352	24,655	2,613	50,490	..... 12
13.....	1,148	26,983	1,245	25,900	2,393	52,883	..... 13
14.....	1,048	28,031	1,183	27,083	2,231	55,114	..... 14
15.....	953	28,984	1,095	28,178	2,048	57,162	..... 15
16.....	875	29,859	1,017	29,195	1,892	59,054	..... 16
17.....	813	30,672	947	30,142	1,760	60,814	..... 17
18.....	749	31,421	892	31,034	1,641	62,455	..... 18
19.....	683	32,104	834	31,868	1,517	63,972	..... 19
20.....	636	32,740	789	32,657	1,425	65,397	..... 20
21.....	568	33,308	754	33,411	1,322	66,719	..... 21
22.....	522	33,830	718	34,129	1,240	67,959	..... 22
23.....	480	34,310	677	34,806	1,157	69,116	..... 23
24.....	450	34,760	645	35,451	1,095	70,211	..... 24
25.....	418	35,178	612	36,063	1,030	71,241	..... 25
26.....	383	35,561	575	36,638	958	72,199	..... 26
27.....	357	35,918	552	37,190	909	73,108	..... 27
28.....	337	36,255	526	37,716	863	73,971	..... 28
29.....	313	36,568	489	38,205	802	74,773	..... 29
30.....	292	36,860	469	38,674	761	75,534	..... 30
31.....	277	37,137	445	39,119	722	76,256	..... 31
40.....	172	39,060	295	42,339	467	81,399	..... 40
50.....	108	40,378	199	44,662	307	85,040	..... 50
60.....	71	41,247	150	46,351	221	87,598	..... 60
70.....	46	41,819	122	47,697	168	89,516	..... 70
80.....	36	42,224	101	48,770	137	90,994	..... 80
90.....	28	42,541	72	49,638	100	92,179	..... 90
100.....	20	42,772	58	50,266	78	93,038	..... 100
110.....	19	42,968	51	50,802	70	93,770	..... 110
120.....	17	43,146	43	51,269	60	94,415	..... 120
130.....	10	43,276	31	51,624	41	94,900	..... 130
140.....	8	43,359	26	51,912	34	95,271	..... 140
150.....	6	43,422	20	52,142	26	95,564	..... 150
160.....	5	43,475	15	52,305	20	95,780	..... 160
170.....	3	43,513	14	52,453	17	95,966	..... 170
180.....	3	43,543	11	52,585	14	96,128	..... 180

l_t = number of persons confined *t* or more days.

C_t = number of patient days during first *t* days of confinement.

TABLE 4
RATIO OF PATIENT DAYS DURING FIRST 4 DAYS
TO PATIENT DAYS DURING FIRST 31 DAYS

	MALE			FEMALE			MALE AND FEMALE			
	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	
10.....	0.606	0.571	0.587	0.634	0.552	0.593	0.625	0.559	0.591	.....10
20.....	0.877	0.845	0.860	0.884	0.829	0.856	0.882	0.835	0.858	.....20
30.....	0.993	0.990	0.991	0.992	0.988	0.990	0.993	0.989	0.991	.....30
31.....	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.....31
40.....	1.046	1.070	1.059	1.055	1.089	1.072	1.052	1.082	1.067	.....40
50.....	1.078	1.114	1.097	1.092	1.157	1.125	1.087	1.142	1.115	.....50
60.....	1.099	1.142	1.122	1.117	1.209	1.163	1.111	1.185	1.149	.....60
70.....	1.113	1.165	1.141	1.133	1.250	1.192	1.126	1.219	1.174	.....70
80.....	1.126	1.183	1.157	1.142	1.283	1.213	1.137	1.247	1.193	.....80
90.....	1.137	1.197	1.169	1.150	1.310	1.230	1.146	1.269	1.209	.....90
100.....	1.145	1.208	1.178	1.155	1.329	1.243	1.152	1.285	1.220	.....100
110.....	1.153	1.217	1.187	1.159	1.345	1.253	1.157	1.299	1.230	.....110
120.....	1.160	1.225	1.195	1.163	1.359	1.262	1.162	1.311	1.238	.....120
130.....	1.166	1.230	1.200	1.165	1.371	1.269	1.165	1.320	1.244	.....130
140.....	1.169	1.233	1.203	1.167	1.381	1.274	1.168	1.327	1.249	.....140
150.....	1.171	1.236	1.206	1.168	1.388	1.279	1.169	1.333	1.253	.....150
160.....	1.173	1.239	1.208	1.170	1.393	1.282	1.171	1.337	1.256	.....160
170.....	1.174	1.242	1.210	1.171	1.397	1.285	1.172	1.341	1.258	.....170
180.....	1.175	1.245	1.212	1.171	1.401	1.287	1.172	1.344	1.261	.....180

TABLE 5
AVERAGE DURATION OF CONFINEMENT FOR 4-DAY MAXIMUM
(In Days)

	MALE			FEMALE			MALE AND FEMALE			
	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	
30.....	12.4	13.8	13.1	11.7	14.1	12.8	11.9	14.0	12.9	.....30
60.....	13.7	15.9	14.8	13.2	17.2	15.0	13.3	16.8	15.0	.....60
90.....	14.1	16.7	15.4	13.6	18.7	15.9	13.8	17.9	15.7	.....90
120.....	14.4	17.1	15.8	13.7	19.4	16.3	14.0	18.5	16.1	.....120
150.....	14.6	17.2	15.9	13.8	19.8	16.5	14.0	18.9	16.3	.....150
180.....	14.6	17.3	16.0	13.8	20.0	16.6	14.1	19.0	16.4	.....180

experience. As the effects of selection wear off, this difference may diminish.

COMPARISON OF BRITISH COLUMBIA*
AND METROPOLITAN EXPERIENCE

	RATIO OF PATIENT DAYS DURING FIRST 1 DAYS TO PATIENT DAYS DURING FIRST 30 DAYS			
	British Columbia		Metropolitan	
	Ages 65-74	Ages 75 and over	Ages 65-74	Ages 75 and over
10 . . . . .	.566	.542	.630	.565
20 . . . . .	.852	.837	.888	.844
30	1.000	1.000	1.000	1.000
60	1.162	1.199	1.119	1.199
	Average Duration of Hospital Confinement in Days (60-Day Maximum)			
.....	16.3	18.0	13.3	16.8

* Annual Statistics, 1960.

Cases discharged from British Columbia hospitals—Table 1.

A comparison was also made with one of Gingery's tables. This table was used by Bartleson and Olsen as Table B in their paper "Reserves for Individual Hospital and Surgical Expense Insurance."¹ This comparison indicates that the additional cost for a higher maximum benefit is considerably greater for the older lives which made up the Metropolitan experience than would be necessary for the typical distribution of lives insured under a group contract.

In the report by the New York State Insurance Department in connection with the development of gross premiums for group conversion policies to be offered to employees terminating at age 60 and over, the basic room-and-board information was derived principally from experience on policies which provided a 31-day benefit. In that report the claim cost for an optional 21-day benefit was determined as .875 of the claim cost for a 30-day benefit. Table 4 of this study indicates that the cost of a 30-day maximum would be reduced by 13 per cent if the maximum duration were restricted to 21 days, agreeing with the results of the New York study. In the New York State Insurance Department Report the cost of a 70-day benefit was determined as 1.275 of the cost of a 30-day maximum

¹ TSA, IX, 344.

benefit. This additional cost of a 70-day benefit over a 30-day benefit takes into consideration the anti-selection likely to occur when an applicant in poor health exercises a choice between a 30-day and a 70-day benefit. Where anti-selection of this nature is possible, the frequency of claims under a 70-day policy probably would exceed the frequency of claims under a 30-day policy. In addition, the average duration for those selecting the 70-day policy would probably be higher than the average duration

COMPARISON OF GINGERY'S TABLE*
AND
METROPOLITAN EXPERIENCE

	RATIO OF PATIENT DAYS DURING FIRST 4 DAYS TO PATIENT DAYS DURING FIRST 31 DAYS			
	Gingery		Metropolitan	
	Males	Females	Males	Females
31	1.000	1.000	1.000	1.000
40	1.037	1.024	1.059	1.072
50	1.070	1.045	1.097	1.125
60	1.096	1.063	1.122	1.163
70	1.115	1.076	1.141	1.192
90	1.141	1.096	1.169	1.230
120	1.166	1.117	1.195	1.262
180	1.198	1.144	1.212	1.287
	Average Duration of Hospital Confinement in Days (70-Day Maximum)			
.....	8.7	7.5	15.0	15.4

* Stanley W. Gingery, "Special Investigation of Group Hospital Expense Insurance" (author's review of discussion), *TSA*, IV, 686.

of those selecting the 30-day policy even if their claims were truncated at 30 days. The additional cost of a 70-day benefit over a 30-day benefit for the homogeneous group of individually underwritten Metropolitan policyholders is about .18 of a 30-day benefit. This differential indicates that the additional cost stipulated by the New York study may be something of a minimum.

Miscellaneous Services Continuance Tables

The miscellaneous services benefit for the policy on which this study was based was payable only for inpatient claims. Therefore, the claims involved in this continuance study are exactly the same claims which were used in the hospitalization continuance study.

The individual claim card indicated the amount that was actually paid for this benefit. Since the benefit formula calls for 80 per cent of the hospital charges in excess of \$50.00, it was possible to convert the amount payable which was recorded on the claim card to the amount actually charged by the hospital. This was done by multiplying the amount paid by 1.25 and adding \$50.00. For the claims where there was no amount paid, it was necessary to examine the actual claim file to determine the hospital charges. This was done for a sample of 150 cases where no payment was made. The average charge was \$30.14. In developing the continuance tables, a charge of \$30.00 was used for claims which were less than \$50.00. The tables were truncated at a maximum charge of \$1,000.00, since there were relatively few claims which exceeded this amount, and it was felt that the data would not be reliable beyond this point.

Tables 6, 7, and 8 were constructed by listing for each interval the number of claims which had miscellaneous charges terminating in that interval. The intervals were designated by the lowest value in the interval with the first interval being designated zero. The number of claims were then summed successively from the last interval up to m for all values of m and the resulting sums designated as l_m .

The value of l_m , therefore, is the number of claims with miscellaneous services of m or greater. The amount of miscellaneous services on the claims terminating in each interval was totaled. The resulting values were summed successively from zero to the interval immediately preceding m for all values of m and this sum was designated as D_m . The value of D_m , therefore, represents the amount of miscellaneous services charges on claims that were less than m .

The value of $D_m + m \cdot l_m$ was calculated for each value of m and was designated C_m . The value of C_m , therefore, represents the amount of miscellaneous services on all claims where claims greater than m are truncated at m . Tables 6, 7, and 8 show values of l_m , D_m , and C_m for values of m ranging from 0 to 1,000.

Table 9 shows the average cost for miscellaneous services for various reimbursable maximums. These values are obtained from Tables 6, 7, and 8 by dividing C_m by l_0 . Table 10 shows the cost of a m dollar maximum as a percentage of a \$100 maximum benefit.

The miscellaneous services allowance of the plan on which this study was based paid 80 per cent of the excess of the charges over a deductible amount of \$50, which was approximately the same amount in the aggregate as would have been paid by a \$225 maximum allowance without deductible or coinsurance. This amount paid was about 65 per cent of the charges actually made by the hospital. The distribution of payments to claimants was considerably different, however, than if the miscellaneous

TABLE 6

MISCELLANEOUS SERVICES CONTINUANCE TABLE
MALE

m	AGES 65-74			AGES 75 AND OVER			AGES 65 AND OVER			m
	l_m	D_m	C_m	l_m	D_m	C_m	l_m	D_m	C_m	
0	1,010			1,020			2,030			0
50	892	\$ 3,540	\$ 48,140	905	\$ 3,450	\$ 48,700	1,797	\$ 6,990	\$ 96,840	50
75	803	9,242	69,467	810	9,483	70,233	1,613	18,725	139,700	75
100	705	17,916	88,416	708	18,323	89,123	1,413	36,239	177,539	100
125	616	27,886	104,886	621	28,109	105,734	1,237	55,995	210,620	125
150	525	40,431	119,181	538	39,671	120,371	1,063	80,102	239,552	150
200	401	62,000	142,200	417	60,495	143,895	818	122,495	286,095	200
250	312	81,936	159,936	349	75,967	163,217	661	157,903	323,153	250
300	253	98,068	173,968	283	94,063	178,963	536	192,131	352,931	300
350	211	111,657	185,507	232	110,576	191,776	443	222,233	377,283	350
400	162	129,892	194,692	194	124,624	202,224	356	254,516	396,916	400
450	126	145,278	201,978	155	141,248	210,998	281	286,526	412,976	450
500	105	155,260	207,760	126	155,024	218,024	231	310,284	425,784	500
600	77	170,473	216,673	86	176,418	228,018	163	346,891	444,691	600
700	59	181,946	223,246	63	191,479	235,579	122	373,425	458,825	700
800	40	195,982	227,982	46	204,018	240,818	86	400,000	468,800	800
900	32	202,768	231,568	32	215,952	244,752	64	418,720	476,320	900
1,000	28	206,572	234,572	24	223,471	247,471	52	430,043	482,043	1,000

l_m = number of claims m or greater.
 D_m = amount charged on claims which are less than m .

C_m = amount charged on all claims where claims greater than m are truncated at m .

TABLE 7

MISCELLANEOUS SERVICES CONTINUANCE TABLE
FEMALE

<i>m</i>	AGES 65-74			AGES 75 AND OVER			AGES 65 AND OVER			<i>m</i>
	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	
0.....	2,082			1,746			3,828			0
50.....	1,818	\$ 7,920	\$ 98,820	1,466	\$ 8,400	\$ 81,700	3,284	\$ 16,320	\$180,520	.50
75.....	1,606	21,267	141,717	1,250	21,869	115,619	2,856	43,136	257,336	.75
100.....	1,329	45,431	178,331	1,078	36,901	144,701	2,407	82,332	323,032	1.00
125.....	1,120	68,741	208,741	919	54,674	169,549	2,039	123,415	378,290	1.25
150.....	942	92,987	234,287	803	70,503	190,953	1,745	163,490	425,240	1.50
200.....	677	139,020	274,420	615	103,156	226,156	1,292	242,176	500,576	2.00
250.....	506	177,102	303,602	476	134,366	253,366	982	311,468	556,968	2.50
300.....	394	207,611	325,811	384	159,389	274,589	778	367,000	600,400	3.00
350.....	315	233,138	343,388	302	185,878	291,578	617	419,016	634,966	3.50
400.....	249	257,619	357,219	242	208,614	305,414	491	466,233	662,633	4.00
450.....	205	276,278	368,528	201	225,918	316,368	406	502,196	684,896	4.50
500.....	173	291,390	377,890	165	243,021	325,521	338	534,411	703,411	5.00
600.....	122	319,008	392,208	130	261,904	339,904	252	580,912	732,112	6.00
700.....	84	343,442	402,242	93	285,747	350,847	177	629,189	753,089	7.00
800.....	62	359,906	409,506	66	305,753	358,553	128	665,659	768,059	8.00
900.....	41	377,572	414,472	59	311,629	364,729	100	689,201	779,201	9.00
1,000.....	33	384,990	417,990	45	324,816	369,816	78	709,806	787,806	1,000

l_m = number of claims *m* or greater.

D_m = amount charged on claims which are less than *m*.

C_m = amount charged on all claims where claims greater than *m* are truncated at *m*.

TABLE 8

MISCELLANEOUS SERVICES CONTINUANCE TABLE
MALE AND FEMALE

<i>m</i>	AGES 65-74			AGES 75 AND OVER			AGES 65 AND OVER			<i>m</i>
	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	<i>l_m</i>	<i>D_m</i>	<i>C_m</i>	
0	3,092			2,766			5,858			0
50	2,710	\$ 11,460	\$146,960	2,371	\$ 11,850	\$130,400	5,081	\$ 23,310	\$ 277,360	50
75	2,409	30,509	211,184	2,060	31,352	185,852	4,469	61,861	397,036	75
100	2,034	63,347	266,747	1,786	55,224	233,824	3,820	118,571	500,571	100
125	1,736	96,627	313,627	1,540	82,783	275,283	3,276	179,410	588,910	125
150	1,467	133,418	353,468	1,341	110,174	311,324	2,808	243,592	664,792	150
200	1,078	201,020	416,620	1,032	163,651	370,051	2,110	364,671	786,671	200
250	818	259,038	463,538	825	210,333	416,583	1,643	469,371	880,121	250
300	647	305,679	499,779	667	253,452	453,552	1,314	559,131	953,331	300
350	526	344,795	528,895	534	296,454	483,354	1,060	641,249	1,012,249	350
400	411	387,511	551,911	436	333,238	507,638	847	720,749	1,059,549	400
450	331	421,556	570,506	356	367,166	527,366	687	788,722	1,097,872	450
500	278	446,650	585,650	291	398,045	543,545	569	844,695	1,129,195	500
600	199	489,481	608,881	216	438,322	567,922	415	927,803	1,176,803	600
700	143	525,388	625,488	156	477,226	586,426	299	1,002,614	1,211,914	700
800	102	555,888	637,488	112	509,771	599,371	214	1,065,659	1,236,859	800
900	73	580,340	646,040	91	527,581	609,481	164	1,107,921	1,255,521	900
1,000	61	591,562	652,562	69	548,287	617,287	130	1,139,849	1,269,849	1,000

l_m = number of claims *m* or greater.*D_m* = amount charged on claims which are less than *m*.*C_m* = amount charged on all claims where claims greater than *m* are truncated at *m*.

TABLE 9

AVERAGE COST OF MISCELLANEOUS SERVICES FOR VARIOUS REIMBURSABLE MAXIMUMS

#	MALE			FEMALE			MALE AND FEMALE			#
	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	
50.....	\$ 47.66	\$ 47.75	\$ 47.70	\$ 47.46	\$ 46.79	\$47.16	\$ 47.53	\$ 47.14	\$ 47.35	.....50
75.....	68.78	68.86	68.82	68.07	66.22	67.22	68.30	67.19	67.78	.....75
100.....	87.54	87.38	87.46	85.65	82.88	84.39	86.27	84.54	85.45	.....100
125.....	103.85	103.66	103.75	100.26	97.11	98.82	101.43	99.52	100.53	.....125
150.....	118.00	118.01	118.01	112.53	109.37	111.09	114.32	112.55	113.48	.....150
200.....	140.79	141.07	140.93	131.81	129.53	130.77	134.74	133.79	134.29	.....200
250.....	158.35	160.02	159.19	145.82	145.11	145.50	149.92	150.61	150.24	.....250
300.....	172.25	175.45	173.86	156.49	157.27	156.84	161.64	163.97	162.74	.....300
350.....	183.67	188.02	185.85	164.93	167.00	165.87	171.05	174.75	172.80	.....350
400.....	192.76	198.26	195.53	171.57	174.92	173.10	178.50	183.53	180.87	.....400
450.....	199.98	206.86	203.44	177.01	181.20	178.92	184.51	190.66	187.41	.....450
500.....	205.70	213.75	209.75	181.50	186.44	183.75	189.41	196.51	192.76	.....500
600.....	214.53	223.55	219.06	188.38	194.68	191.25	196.92	205.32	200.89	.....600
700.....	221.04	230.96	226.02	193.20	200.94	196.73	202.29	212.01	206.88	.....700
800.....	225.72	236.10	230.94	196.69	205.36	200.64	206.17	216.69	211.14	.....800
900.....	229.28	239.95	234.64	199.07	208.89	203.55	208.94	220.35	214.33	.....900
1,000.....	232.25	242.62	237.46	200.76	211.81	205.80	211.05	223.17	216.77	.....1,000

services benefit had been a \$225 maximum. A greater percentage of the hospital charges were reimbursed on the very substantial claims and a lesser percentage on smaller claims. This was felt to be a desirable feature and in accordance with sound insurance principles.

Actuaries have been aware for many years of the upward trend in the cost of medical care. It is an interesting application of the miscellaneous

TABLE 10
COST OF MISCELLANEOUS SERVICES FOR A \$*m* MAXIMUM BENEFIT
AS A PERCENTAGE OF A \$100 MAXIMUM BENEFIT

<i>m</i>	MALE			FEMALE			MALE AND FEMALE			<i>m</i>
	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	Ages 65-74	Ages 75 and Over	Ages 65 and Over	
50...	54%	55%	55%	55%	56%	56%	55%	56%	55%	50
75...	79	79	79	79	80	80	79	79	79	75
100...	100	100	100	100	100	100	100	100	100	100
125...	119	119	119	117	117	117	118	118	118	125
150...	135	135	135	131	132	132	133	133	133	150
200...	161	161	161	154	156	155	156	158	157	200
250...	181	183	182	170	175	172	174	178	176	250
300...	197	201	199	183	190	186	187	194	190	300
350...	210	215	213	193	202	197	198	207	202	350
400...	220	227	224	200	211	205	207	217	212	400
450...	228	237	233	207	219	212	214	226	219	450
500...	235	245	240	212	225	218	220	232	226	500
600...	245	256	250	220	235	227	228	243	235	600
700...	252	264	258	226	242	233	234	251	242	700
800...	258	270	264	230	248	238	239	256	247	800
900...	262	275	268	232	252	241	242	261	251	900
1,000...	265	278	272	234	256	244	245	264	254	1,000

services tables to analyze how the increase in miscellaneous services charges by the hospital will affect the cost of different benefit provisions having a comparable current cost. This has been illustrated in problem 4 of the Appendix.

As mentioned above, this study included only inpatient claims, since the policy provisions did not provide miscellaneous services benefits for outpatients. If outpatient claims had been included, the average cost would be somewhat lower, but at the higher ages, outpatient claims are relatively infrequent.

Conclusion

The form and scope of personal health insurance are in a very active state of evolution, and nowhere is this more true than in the area of pro-

viding medical expense protection for the older lives in our population. For this reason, it is highly desirable to obtain current, ultimate experience for the various benefits in a format suitable for actuarial calculations and analysis. This study represents relatively current hospital charges; however, all the lives covered are still within the select period. It would be of great interest if companies which have mature experience in this field, even if the experience were in a different format, would offer their experience in discussing this study.

APPENDIX

DEFINITION OF SYMBOLS AND FORMULAS FOR DATA
WHICH CAN BE DERIVED FROM THE TABLES*Hospitalization Continuance Table*

l_t = number of persons confined t or more days

C_t = number of patient days during first t days of confinement

Number of people who are confined exactly t days = $l_t - l_{t+1}$

Percentage of confinements which last t or more days = $100 l_t/l_1$

Cost of r th day as a percentage of a t -day maximum = $100 l_r/C_t$

Miscellaneous Services Continuance Table

l_m = number of claims m or greater

D_m = amount charged on claims which are less than m

C_m = amount charged on all claims where claims greater than m are truncated at $m = D_m + l_m m$

A_m = average size claim with maximum of $m = C_m \div l_0$

Number of claims less than $m = l_0 - l_m$

Percentage of claims which are less than $m = 100(l_0 - l_m)/l_0$

Average size of claims which are less than $m = D_m/(l_0 - l_m)$

Average size of claims which are equal to or greater than $m = (C_\omega - D_m)/l_m$
(ω = highest possible miscellaneous services charge)

Average size of claims which are equal to or greater than r but less than $m = (D_m - D_r)/(l_r - l_m)$

Illustrative Calculations Using Tables

The following set of problems and solutions is intended to indicate how the tables can be used to convert actual claims costs for a specified benefit to claim costs for other benefits and to analyze situations where the incidence of cost is important. For each problem assume the data are required for males and females at ages over 65.

1. *Problem:* The net annual claim cost for a 90-day hospital room and board benefit providing \$20 per day is \$60. By what amount would the net annual claim cost be reduced if a deductible of \$10 per day were applied to benefits for the first 9 days?

Solution: Reduction in net annual claim cost = $\$60 \cdot 10C_9 / 20C_{90}$.

From Table 3:

- a) Cost of first 9 days at \$10 per day = $41,953 \times \$10 = \$419,530$
 b) Cost of first 90 days at \$20 per day = $92,179 \times \$20 = \$1,843,580$
 c) Reduction in net annual claim cost = $\$60 \cdot a/b = \13.65 .
2. *Problem:* The net annual claim cost for a room and board benefit providing \$20 per day for a maximum of 40 days is \$44. Find the net annual claim cost for a room and board benefit providing \$20 per day for the first 70 days and \$10 per day for the next 110 days.

Solution: Net annual claim cost = $\$44 \cdot (10C_{70} + 10C_{180}) / 20C_{40}$.

Table 4 may be used rather than Table 3, since the values in Table 4 are directly proportional to the C_t columns of the respective basic tables.

- a) Cost of 40-day maximum at \$20 per day = $1.067 \text{ units} \times \$20 = \$21.34$ units
 b) Cost of 70-day maximum at \$10 per day = $1.174 \text{ units} \times \$10 = \$11.74$ units
 c) Cost of 180-day maximum at \$10 per day = $1.261 \text{ units} \times \$10 = \$12.61$ units
 d) Cost \$20 per day for 70 days + \$10 per day for next 110 days = (b) + (c) = \$24.35 units
 e) Net annual claim cost = $\$44 \cdot (d)/(a) = \50.21 .
3. *Problem:* The net annual claim cost of a \$150 special service maximum is \$20. Determine the net annual claim cost of a special service benefit which will pay 80 per cent of all special services over \$50. The maximum payment is \$600.

Solution: Net annual claim cost = $\$20 \times .8(C_{800} - C_{50}) / C_{150}$.

Table 10 may be used, since the ratios to the \$100 maximum are directly proportional to the C_m columns of the respective basic tables.

- a) Maximum hospital charges covered ($\$600 \div .80$) + \$50 = \$800
 b) Cost of \$800 maximum = 247 units
 c) Cost of \$50 maximum = 55 units
 d) Cost of \$150 maximum = 133 units
 e) Cost .80 of charges from \$50-\$800 = $(247 - 55) \cdot (.8) = 153.6$ units
 f) Net annual claim cost = $\$20 \cdot (e)/(d) = \23.10 .

4. *Problem:* To what extent will an increase of 6 per cent in miscellaneous services charges by the hospital affect the cost of (i) a benefit providing a maximum of \$200 miscellaneous services, (ii) a benefit providing a maximum of \$750 of miscellaneous services charges in excess of a \$50 deductible?

Solution: (i) Ratio of increased cost to present cost = $(1.06D_{200} + 200 l_{200})/C_{200} = 1.028$.

From Table 8:

The numerator of the fraction equals the increased cost of a \$200 maximum benefit. The first term, $1.06 D_{200}$, represents the increased cost of the claims which were originally less than \$200. The second term, $200 l_{200}$, represents the cost of claims which were originally \$200 or greater. Since the benefit provision limits reimbursement to \$200, any increase in the charges above this amount will not affect the cost of the benefit. We can designate a symbol $C_m^{1+k} = (1 + K)D_m + l_m \cdot m$ which represents the approximate increased value of C_m after an increase in hospital charges of K . Therefore, the formula for the ratio of the increased cost to the present cost could be expressed as

$$\frac{C_{200}^{1.06}}{C_{200}} = 1.028.$$

The formula overstates the increase that results from allowing all claims under \$200 to increase by 6 per cent. The claims between \$189 and \$200 will have increases which are restricted by the \$200 maximum. An adjustment for these claims could be made if a more refined answer were needed.

(ii) Ratio of increased cost to present cost =

$$\frac{C_{800}^{1.06} - C_{50}^{1.06}}{C_{800} - C_{50}} = \frac{(1.06D_{800} + 800 l_{800}) - (1.06D_{50} + 50 l_{50})}{C_{800} - C_{50}} = 1.065.$$

This formula is similar to the formula above and the same reasoning applies. It will be noticed that an increase in medical charges will have a much greater effect on benefit (ii) than on benefit (i). Generally, it will be found that a deductible accelerates increases in cost which result from increases in medical charges; the larger the deductible, the larger the acceleration. The presence of a maximum on the miscellaneous services benefit, however, decelerates the increase in cost which results from increases in medical charges by the hospital; the lower the maximum, the greater the deceleration.

DISCUSSION OF PRECEDING PAPER

ROBERT J. MYERS:

Mr. Houghton has presented a very interesting and useful paper, giving data and analysis in the field of hospitalization benefits for persons aged 65 and over. Those of us who work in this particular area are all too well aware of the sparsity of published experience data in a form that is usable, so his paper is greatly welcomed. One of the major difficulties in dealing with hospitalization data for persons aged 65 and over is the frequent failure to have sufficient subdivision by age and sex, since these are such important factors. In this respect, it is hoped that Mr. Houghton will, in some later paper, present hospitalization incidence rates for this particular experience.

The actual plan is a very interesting one and certainly is attempting to fulfill a very real need. I note that a relatively high limit for the aggregate indemnity is provided. In fact, it would seem that only under very unusual circumstances would this cut off the benefits for the policyholder. Accordingly, it could have only a small cost effect, and thus the question is raised in my mind—as has also occurred in connection with other major medical policies—as to why there should be such an upper limit when the few rare catastrophic cases are the very ones that need the insurance the most.

As Mr. Houghton's paper shows—and as other experiences also have indicated—the variations in the average duration of hospitalization with age and sex for persons aged 65 and over are not so large as those in mortality rates. For example, for his four age-sex groups, there is a spread from the lowest average duration to the highest one in the 60-day maximum case of only 30 per cent. This perhaps justifies Mr. Houghton's procedure of merely adding together all the experiences to obtain a hospitalization continuance table for ages 65 and over, although it should be recognized that with different distributions of the exposure by age and sex, even though the continuance tables for each age-sex group remain the same, there would be a different total continuance table.

Several years ago, in connection with preparing cost estimates for legislative proposals for hospitalization benefits for OASDI beneficiaries aged 65 and over, I sought a hospitalization continuance table for this age group but could not find one. Accordingly, I constructed one from some very limited data from the National Health Survey. All that was available

were the proportions of hospital discharges for persons aged 65 and over for a few length-of-stay intervals (namely, 1 day, 7 days or less, 14 days or less, and 30 days or less). Using these data, plus some interpolation and extrapolation, I prepared a hospitalization continuance table, which is shown in both *Actuarial Study No. 52* and *Actuarial Study No. 57*.

A comparison of my hospitalization continuance table with Mr. Houghton's for total persons aged 65 and over for the proportions hospitalized for various periods is shown in Table 1.

TABLE 1

DAYS OF CONFINEMENT (t)	PERCENTAGE HOSPITALIZED FOR EXACTLY t DAYS		PERCENTAGE HOSPITALIZED FOR t DAYS OR LESS	
	Houghton	Myers	Houghton	Myers
5.....	5.4	6.0	25.9	29.8
10.....	4.9	4.5	51.9	56.0
20.....	1.8	1.2	77.4	81.5
30.....	0.7	0.6	87.7	89.6
60.....	0.1	0.1	96.3	95.0

TABLE 2

DAYS OF CONFINEMENT (t)	AVERAGE DURATION OF CONFINEMENT FOR t-DAY MAXIMUM	
	Houghton	Myers
30.....	12.9	11.8
60.....	15.0	13.9
90.....	15.7	15.1
120.....	16.1	15.3
180.....	16.4	15.6

Similarly, Table 2 shows the comparison of the average duration of hospitalization for various maximum limits.

In general, there is reasonably good correspondence between the two sets of material. My tables show somewhat lower average durations of hospitalization—about 7 per cent for a 60-day maximum—although the differential decreases for longer maximum periods.

Somewhat along these lines, it is interesting to note that Mr. Houghton compares his experience with that in British Columbia. He concludes that the probable explanation for the longer durations in the latter experience

is the "select" nature of his experience and that possibly, as selection wears off, his experience will more closely approach that of British Columbia. In my opinion, that may not necessarily be the case. As the selection of his experience wears off, the incidence rates may well increase, but the average duration might decrease because many of the additional claims may be for short durations. Furthermore, the British Columbia experience is probably relatively high, since this is true of all Canadian experience as to length of hospital confinement. The reasons for this tendency, which has been the case for many years and has not arisen solely under the recently enacted governmental plans, are probably the more rural nature of the country (thus requiring more extended hospitalization for the convenience of both the doctor and the patient) and the relative absence of nursing homes (which in many cases can substitute for hospital care).

Mr. Houghton gives several interesting problems that can be solved by his continuance tables. In the fourth problem he recognizes that the formula in his solution overstates the increases. The correct formula would, of course, involve subscripts of 189 in the two terms in the numerator (rather than 200). The miscellaneous-service continuance table gives only selected values, and accordingly it is necessary to interpolate for m equal to 189. Assuming constant third differences, I have obtained an increase in cost of 2.65 per cent, in comparison with Mr. Houghton's figure of 2.78 per cent. Accordingly, it is clear that no such refinement is necessary, but rather the overstatement in Mr. Houghton's formula produces only a slight margin of safety.

Finally, I have used Mr. Houghton's hospitalization continuance table for total persons aged 65 and over to compare the three hospitalization options available in the pending King-Anderson Bill, which are intended to be equivalent in value. The automatic provision is for a maximum 90 days of hospitalization with a deductible of \$10 per day for the first 9 days (minimum deductible of \$20). The beneficiary can elect irrevocably to have either a 45-day maximum with no deductible or a 180-day maximum with a flat deductible of two and a half times the average daily hospital cost under the program (except that such deductible cannot exceed the customary charges for the particular case).

In our cost estimates for the proposal—which are made on the basis of 1961 conditions (*Actuarial Study No. 57*)—it is hypothesized that the average daily hospital cost (for room, board, and special services) is \$31.30.

The per capita cost for persons hospitalized is \$493 if there is a 90-day maximum with no deductible. The automatic provision of a 90-day maximum with a \$10 daily deductible for the first 9 days (\$20 minimum) has a cost of \$421 (i.e., a \$72, or 15 per cent, reduction because of the

deductible provision). Correspondingly, the calculations for the two alternatives to the automatic provision yield per capita figures of \$446 for the 45-day maximum with no deductible and of \$435 for the 180-day maximum with a 2½-day deductible.

Accordingly, based on Mr. Houghton's table, it would seem that the "180-day maximum" alternative is about 4 per cent more costly than the automatic "90-day maximum" provision, and that the "45-day maximum" provision is about 6 per cent more costly. On the other hand, my continuance table indicates close equivalence. In fact, according to Mr. Houghton's table, the "no-deductible" provision would have to have a maximum of about 35 days to be equivalent to the automatic "90-day maximum" provision, and the "180-day maximum" alternative would correspondingly have to have a 3-day deductible.

TABLE 3

CONTINUANCE TABLE	PER CENT	
	45-Day Maximum	180-Day Maximum
Males, 65-74.....	11.1	1.9
Males, 75 and over.....	6.6	3.7
Females, 65-74.....	12.1	.0
Females, 75 and over.....	- 1.7	7.0
Total, 65 and over.....	6.1	3.5

It is important to note that the foregoing results would be significantly different if the various hospitalization continuance tables prepared by Mr. Houghton for age-sex groups were used. Under these circumstances, the increases for the two alternatives over the "90-day maximum" provision are as shown in Table 3.

ALFRED L. BUCKMAN:

Mr. Houghton, in his paper, invited presentation of more mature experience in this field, even if in a different format. Taking Mr. Houghton at his word, I have prepared tables similar to his Tables 1, 2, 4, and 5 on the experience of Beneficial Standard Life Insurance Company on hospitalization claims incurred during the calendar years 1961 and 1962 and traced through September 30, 1963.

Beneficial Standard has been writing individually underwritten hospitalization policies since 1944. Our upper-age limit at issue was 69 until 1956, when we increased the upper-age limit to 79.

The total number of claims in this study is 38,927, of which 10,902 are

on persons age 65 and up. Thus for this age group our experience is based on nearly two times as many claims as that reported on by Mr. Houghton. While it is true that Mr. Houghton dealt only with claims on persons age 65 and over, we decided to analyze all our claims for each sex in three major age groupings: 0-18 inclusive, 19-64 inclusive, and 65 and over. We were also able to obtain separate experience for hospital confinements due to accident and due to sickness.

The detail of the claims in our study is shown in Table 1.

These claims are based on all hospitalization policies in force during 1961 and 1962 except those on certain forms which had a 30-day maximum for benefits on persons age 70 and over. Policies issued since January 1, 1960, provide hospitalization benefits for as long as 365 days. Some earlier policies studied had a maximum of 90 days' coverage. However, each

TABLE 1

AGES	MALE LIVES			FEMALE LIVES			TOTAL LIVES		
	Acci- dent	Sick- ness	Total	Acci- dent	Sick- ness	Total	Acci- dent	Sick- ness	Total
0-18	545	2,051	2,596	249	1,644	1,893	794	3,695	4,489
19-64	1,004	6,981	7,985	1,514	14,037	15,551	2,518	21,018	23,536
65 and over	385	3,857	4,242	973	5,687	6,660	1,358	9,544	10,902
Total	1,934	12,889	14,823	2,736	21,368	24,104	4,670	34,257	38,927

claim in the study was analyzed, and it was possible to determine the exact number of days of confinement in each case even in those instances where confinement continued beyond the period of coverage provided by the policy. There were exactly five claims which extended beyond 180 days and one to 414 days (a female accident claim), and these were curtailed to 180 days to keep within the confines of the study. All maternity claims were excluded from this study, as were all accidents covered by Workmen's Compensation.

Our policies provide specified amounts of daily hospital benefit on an indemnity basis. Daily benefits for confinement due to accident are double the benefits due to sickness. Amounts issued vary from \$5.00 per day for sickness (\$10.00 per day for accident) to \$30.00 per day for sickness (\$60.00 per day for accident). Premiums vary by amount of Daily Hospital Benefit and by age and sex at issue. The maximum age at issue is 79. All policies are individually underwritten.

Tables 2-7 are hospitalization continuance tables. Table 4 is based on

TABLE 2
BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
HOSPITALIZATION CONTINUANCE TABLES
MALE ACCIDENT AND SICKNESS

DAYS IN HOSPITAL (<i>t</i>)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	<i>l_t</i> *	<i>C_t</i> †	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>
1.....	2,596	2,596	7,985	7,985	4,242	4,242	14,823	14,823
2.....	1,843	4,439	7,302	15,287	3,968	8,210	13,113	27,936
3.....	1,253	5,692	6,402	21,689	3,625	11,835	11,280	39,216
4.....	956	6,648	5,559	27,248	3,267	15,102	9,782	48,998
5.....	705	7,353	4,739	31,987	2,912	18,014	8,356	57,354
6.....	524	7,877	3,954	35,941	2,560	20,574	7,038	64,392
7.....	397	8,274	3,341	39,282	2,235	22,809	5,973	70,365
8.....	308	8,582	2,843	42,125	1,933	24,742	5,084	75,449
9.....	241	8,823	2,399	44,524	1,691	26,433	4,331	79,780
10.....	194	9,017	2,051	46,575	1,469	27,902	3,714	83,494
11.....	159	9,176	1,743	48,318	1,271	29,173	3,173	86,667
12.....	147	9,323	1,514	49,832	1,109	30,282	2,770	89,437
13.....	125	9,448	1,341	51,173	1,012	31,294	2,478	91,915
14.....	102	9,550	1,187	52,360	904	32,198	2,193	94,108
15.....	88	9,638	995	53,355	764	32,962	1,847	95,955
16.....	75	9,713	878	54,233	686	33,648	1,639	97,594
17.....	69	9,782	780	55,013	613	34,261	1,462	99,056
18.....	64	9,846	694	55,707	546	34,807	1,304	100,360
19.....	57	9,903	604	56,311	486	35,293	1,147	101,507
20.....	49	9,952	530	56,841	438	35,731	1,017	102,524
21.....	43	9,995	472	57,313	398	36,129	913	103,437
22.....	40	10,035	400	57,713	355	36,484	795	104,232
23.....	34	10,069	366	58,079	330	36,814	730	104,962
24.....	32	10,101	328	58,407	302	37,116	662	105,624
25.....	27	10,128	292	58,699	271	37,387	590	106,214
26.....	24	10,152	265	58,964	244	37,631	533	106,747
27.....	20	10,172	237	59,201	222	37,853	479	107,226
28.....	20	10,192	223	59,424	209	38,062	452	107,678
29.....	18	10,210	206	59,630	181	38,243	405	108,083
30.....	17	10,227	190	59,820	167	38,410	374	108,457
31.....	15	10,242	174	59,994	153	38,563	342	108,799
40.....	11	10,355	110	61,204	72	39,497	193	111,056
50.....	5	10,415	62	62,025	43	40,028	110	112,468
60.....	4	10,459	36	62,506	27	40,369	67	113,334
70.....	2	10,487	26	62,795	18	40,586	46	113,868
80.....	2	10,507	21	63,028	10	40,714	33	114,249
90.....	2	10,527	15	63,186	6	40,786	23	114,499
100.....	1	10,544	12	63,325	5	40,845	18	114,714
110.....	1	10,554	9	63,434	3	40,885	13	114,873
120.....		10,558	7	63,512	1	40,907	8	114,977
130.....		10,558	6	63,576	1	40,917	7	115,051
140.....		10,558	4	63,626		40,921	4	115,105
150.....		10,558	3	63,662		40,921	3	115,141
160.....		10,558	2	63,688		40,921	2	115,167
170.....		10,558	2	63,708		40,921	2	115,187
180.....		10,558	2	63,728		40,921	2	115,207

* *l_t* = number of persons confined *t* or more days.

† *C_t* = number of patient days during first *t* days of confinement.

TABLE 3
 BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
 HOSPITALIZATION CONTINUANCE TABLES
 MALE ACCIDENT

DAYS IN HOSPITAL (<i>t</i>)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	<i>l_t</i> *	<i>C_t</i> †	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>	<i>l_t</i>	<i>C_t</i>
1.....	545	545	1,004	1,004	385	385	1,934	1,934
2.....	364	909	872	1,876	348	733	1,584	3,518
3.....	265	1,174	727	2,603	310	1,043	1,302	4,820
4.....	206	1,380	627	3,230	273	1,316	1,106	5,926
5.....	167	1,547	555	3,785	241	1,557	963	6,889
6.....	141	1,688	481	4,266	216	1,773	838	7,727
7.....	113	1,801	424	4,690	195	1,968	732	8,459
8.....	94	1,895	368	5,058	166	2,134	628	9,087
9.....	78	1,973	320	5,378	150	2,284	548	9,635
10.....	67	2,040	279	5,657	132	2,416	478	10,113
11.....	58	2,098	242	5,899	121	2,537	421	10,534
12.....	56	2,154	212	6,111	110	2,647	378	10,912
13.....	50	2,204	185	6,296	99	2,746	334	11,246
14.....	41	2,245	168	6,464	96	2,842	305	11,551
15.....	36	2,281	145	6,609	82	2,924	263	11,814
16.....	32	2,313	133	6,742	74	2,998	239	12,053
17.....	30	2,343	118	6,860	71	3,069	219	12,272
18.....	28	2,371	108	6,968	61	3,130	197	12,469
19.....	26	2,397	96	7,064	55	3,185	177	12,646
20.....	23	2,420	83	7,147	53	3,238	159	12,805
21.....	21	2,441	74	7,221	48	3,286	143	12,948
22.....	20	2,461	63	7,284	45	3,331	128	13,076
23.....	19	2,480	63	7,347	43	3,374	125	13,201
24.....	18	2,498	61	7,408	41	3,415	120	13,321
25.....	14	2,512	57	7,465	36	3,451	107	13,428
26.....	13	2,525	50	7,515	33	3,484	96	13,524
27.....	13	2,538	43	7,558	31	3,515	87	13,611
28.....	13	2,551	43	7,601	31	3,546	87	13,698
29.....	11	2,562	41	7,642	31	3,577	83	13,781
30.....	11	2,573	41	7,683	29	3,606	81	13,862
31.....	10	2,583	41	7,724	26	3,632	77	13,939
40.....	6	2,651	30	8,035	14	3,806	50	14,492
50.....	3	2,690	23	8,290	10	3,923	36	14,903
60.....	2	2,714	16	8,486	8	4,014	26	15,214
70.....		2,722	13	8,627	6	4,078	19	15,427
80.....		2,722	13	8,757	2	4,113	15	15,592
90.....		2,722	8	8,845	1	4,125	9	15,692
100.....		2,722	6	8,917		4,134	6	15,773
110.....		2,722	5	8,974		4,134	5	15,830
120.....		2,722	3	9,012		4,134	3	15,868
130.....		2,722	2	9,036		4,134	2	15,892
140.....		2,722	2	9,056		4,134	2	15,912
150.....		2,722	2	9,076		4,134	2	15,932
160.....		2,722	1	9,092		4,134	1	15,948
170.....		2,722	1	9,102		4,134	1	15,958
180.....		2,722	1	9,112		4,134	1	15,968

* *l_t* = number of persons confined *t* or more days.

† *C_t* = number of patient days during first *t* days of confinement.

TABLE 4
BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
HOSPITALIZATION CONTINUANCE TABLES

MALE SICKNESS

DAYS IN HOSPITAL (t)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	l_t^*	C_t^\dagger	l_t	C_t	l_t	C_t	l_t	C_t
1.....	2,051	2,051	6,981	6,981	3,857	3,857	12,889	12,889
2.....	1,479	3,530	6,430	13,411	3,620	7,477	11,529	24,418
3.....	988	4,518	5,675	19,086	3,315	10,792	9,978	34,396
4.....	750	5,268	4,932	24,018	2,994	13,786	8,676	43,072
5.....	538	5,806	4,184	28,202	2,671	16,457	7,393	50,465
6.....	383	6,189	3,473	31,675	2,344	18,801	6,200	56,665
7.....	284	6,473	2,917	34,592	2,040	20,841	5,241	61,906
8.....	214	6,687	2,475	37,067	1,767	22,608	4,456	66,362
9.....	163	6,850	2,079	39,146	1,541	24,149	3,783	70,145
10.....	127	6,977	1,772	40,918	1,337	25,486	3,236	73,381
11.....	101	7,078	1,501	42,419	1,150	26,636	2,752	76,133
12.....	91	7,169	1,302	43,721	999	27,635	2,392	78,525
13.....	75	7,244	1,156	44,877	913	28,548	2,144	80,669
14.....	61	7,305	1,019	45,896	808	29,356	1,888	82,557
15.....	52	7,357	850	46,746	682	30,038	1,584	84,141
16.....	43	7,400	745	47,491	612	30,650	1,400	85,541
17.....	39	7,439	662	48,153	542	31,192	1,243	86,784
18.....	36	7,475	586	48,739	485	31,677	1,107	87,891
19.....	31	7,506	508	49,247	431	32,108	970	88,861
20.....	26	7,532	447	49,694	385	32,493	858	89,719
21.....	22	7,554	398	50,092	350	32,843	770	90,489
22.....	20	7,574	337	50,429	310	33,153	667	91,156
23.....	15	7,589	303	50,732	287	33,440	605	91,761
24.....	14	7,603	267	50,999	261	33,701	542	92,303
25.....	13	7,616	235	51,234	235	33,936	483	92,786
26.....	11	7,627	215	51,449	211	34,147	437	93,223
27.....	7	7,634	194	51,643	191	34,338	392	93,615
28.....	7	7,641	180	51,823	178	34,516	365	93,980
29.....	7	7,648	165	51,988	150	34,666	322	94,302
30.....	6	7,654	149	52,137	138	34,804	293	94,595
31.....	5	7,659	133	52,270	127	34,931	265	94,860
40.....	5	7,704	80	53,169	58	35,691	143	96,564
50.....	2	7,725	39	53,735	33	36,105	74	97,565
60.....	2	7,745	20	54,020	19	36,355	41	98,120
70.....	2	7,765	13	54,168	12	36,508	27	98,441
80.....	2	7,785	8	54,271	8	36,601	18	98,657
90.....	2	7,805	7	54,341	5	36,661	14	98,807
100.....	1	7,822	6	54,408	5	36,711	12	98,941
110.....	1	7,832	4	54,460	3	36,751	8	99,043
120.....		7,836	4	54,500	1	36,773	5	99,109
130.....		7,836	4	54,540	1	36,783	5	99,159
140.....		7,836	2	54,570		36,787	2	99,193
150.....		7,836	1	54,586		36,787	1	99,209
160.....		7,836	1	54,596		36,787	1	99,219
170.....		7,836	1	54,606		36,787	1	99,229
180.....		7,836	1	54,616		36,787	1	99,239

* l_t = number of persons confined t or more days.

† C_t = number of patient days during first t days of confinement.

TABLE 5
BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
HOSPITALIZATION CONTINUANCE TABLES
FEMALE ACCIDENT AND SICKNESS

DAYS IN HOSPITAL (i)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	l_i^*	C_i^\dagger	l_i	C_i	l_i	C_i	l_i	C_i
1.....	1,893	1,893	15,551	15,551	6,660	6,660	24,104	24,104
2.....	1,359	3,252	14,324	29,875	6,266	12,926	21,949	46,053
3.....	866	4,118	12,440	42,315	5,696	18,622	19,002	65,055
4.....	677	4,795	10,645	52,960	5,103	23,725	16,425	81,480
5.....	463	5,258	9,180	62,140	4,525	28,250	14,168	95,648
6.....	347	5,605	7,783	69,923	4,002	32,252	12,132	107,780
7.....	250	5,855	6,524	76,447	3,515	35,767	10,289	118,069
8.....	196	6,051	5,395	81,842	3,069	38,836	8,660	126,729
9.....	160	6,211	4,412	86,254	2,682	41,518	7,254	133,983
10.....	132	6,343	3,694	89,948	2,341	43,859	6,167	140,150
11.....	105	6,448	2,742	92,690	1,924	45,783	4,771	144,921
12.....	93	6,541	2,339	95,029	1,692	47,475	4,124	149,045
13.....	83	6,624	1,982	97,011	1,514	48,989	3,579	152,624
14.....	75	6,699	1,707	98,718	1,384	50,373	3,166	155,790
15.....	66	6,765	1,439	100,157	1,235	51,608	2,740	158,530
16.....	61	6,826	1,263	101,420	1,093	52,701	2,417	160,947
17.....	50	6,876	1,113	102,533	996	53,697	2,159	163,106
18.....	42	6,918	985	103,518	910	54,607	1,937	165,043
19.....	39	6,957	888	104,406	823	55,430	1,750	166,793
20.....	34	6,991	796	105,202	743	56,173	1,573	168,366
21.....	33	7,024	713	105,915	688	56,861	1,434	169,800
22.....	31	7,055	633	106,548	618	57,479	1,282	171,082
23.....	29	7,084	575	107,123	570	58,049	1,174	172,256
24.....	28	7,112	527	107,650	530	58,579	1,085	173,341
25.....	26	7,138	479	108,129	481	59,060	986	174,327
26.....	23	7,161	445	108,574	453	59,513	921	175,248
27.....	21	7,182	406	108,980	417	59,930	844	176,092
28.....	21	7,203	373	109,353	396	60,326	790	176,882
29.....	20	7,223	345	109,698	366	60,692	731	177,613
30.....	18	7,241	320	110,018	345	61,037	683	178,296
31.....	16	7,257	290	110,308	327	61,364	633	178,929
40.....	5	7,343	180	112,318	175	63,469	360	183,130
50.....	4	7,388	88	113,521	98	64,753	190	185,662
60.....	2	7,414	55	114,205	67	65,528	124	187,147
70.....	2	7,434	39	114,639	44	66,075	85	188,148
80.....	1	7,447	24	114,950	38	66,474	63	188,871
90.....	1	7,457	17	115,144	28	66,817	46	189,418
100.....	1	7,467	14	115,296	23	67,068	38	189,831
110.....	1	7,477	11	115,429	17	67,273	29	190,179
120.....	1	7,487	9	115,527	9	67,394	19	190,408
130.....	1	7,497	7	115,601	4	67,455	12	190,553
140.....	1	7,507	7	115,671	4	67,495	12	190,673
150.....		7,512	5	115,726	3	67,525	8	190,763
160.....		7,512	3	115,766	2	67,554	5	190,832
170.....		7,512	2	115,795	1	67,566	3	190,873
180.....		7,512	1	115,810	1	67,576	2	190,898

* l_i = number of persons confined i or more days.

† C_i = number of patient days during first i days of confinement.

TABLE 6
BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
HOSPITALIZATION CONTINUANCE TABLES
FEMALE ACCIDENT

DAYS IN HOSPITAL (t)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	l_t^*	C_t^\dagger	l_t	C_t	l_t	C_t	l_t	C_t
1.....	249	249	1,514	1,514	973	973	2,736	2,736
2.....	169	418	1,336	2,850	864	1,837	2,369	5,105
3.....	118	536	1,189	4,039	790	2,627	2,097	7,202
4.....	95	631	1,027	5,066	716	3,343	1,838	9,040
5.....	72	703	887	5,953	647	3,990	1,606	10,646
6.....	63	766	759	6,712	589	4,579	1,411	12,057
7.....	51	817	667	7,379	541	5,120	1,259	13,316
8.....	44	861	580	7,959	483	5,603	1,107	14,423
9.....	39	900	511	8,470	435	6,038	985	15,408
10.....	33	933	453	8,923	406	6,444	892	16,300
11.....	26	959	404	9,327	366	6,810	796	17,096
12.....	24	983	356	9,683	334	7,144	714	17,810
13.....	23	1,006	311	9,994	316	7,460	650	18,460
14.....	21	1,027	290	10,284	296	7,756	607	19,067
15.....	20	1,047	257	10,541	267	8,023	544	19,611
16.....	19	1,066	235	10,776	239	8,262	493	20,104
17.....	14	1,080	218	10,994	225	8,487	457	20,561
18.....	12	1,092	191	11,185	212	8,699	415	20,976
19.....	12	1,104	179	11,364	194	8,893	385	21,361
20.....	11	1,116	163	11,527	182	9,075	356	21,717
21.....	11	1,126	149	11,676	173	9,248	333	22,050
22.....	11	1,137	139	11,815	164	9,412	314	22,364
23.....	11	1,148	130	11,945	158	9,570	299	22,663
24.....	10	1,158	119	12,064	145	9,715	274	22,937
25.....	8	1,166	112	12,176	135	9,850	255	23,192
26.....	6	1,172	107	12,283	130	9,980	243	23,435
27.....	6	1,178	101	12,384	121	10,101	228	23,663
28.....	6	1,184	94	12,478	115	10,216	215	23,878
29.....	6	1,190	89	12,567	105	10,321	200	24,078
30.....	5	1,195	84	12,651	102	10,423	191	24,269
31.....	4	1,199	79	12,730	95	10,518	178	24,447
40.....	2	1,224	56	13,305	59	11,162	117	25,691
50.....	1	1,239	29	13,686	42	11,647	72	26,572
60.....	1	1,249	18	13,917	28	11,985	47	27,151
70.....	1	1,259	15	14,085	19	12,222	35	27,566
80.....	1	1,269	10	14,197	18	12,410	29	27,876
90.....	1	1,279	8	14,280	13	12,574	22	28,133
100.....	1	1,289	7	14,356	11	12,689	19	28,334
110.....	1	1,299	5	14,421	9	12,784	15	28,504
120.....	1	1,309	5	14,471	3	12,836	9	28,616
130.....	1	1,319	4	14,515	.....	12,847	5	28,681
140.....	1	1,329	4	14,555	.....	12,847	5	28,731
150.....	.....	1,334	3	14,590	.....	12,847	3	28,771
160.....	.....	1,334	2	14,619	.....	12,847	2	28,800
170.....	.....	1,334	2	14,639	.....	12,847	2	28,820
180.....	.....	1,334	1	14,654	.....	12,847	1	28,835

* l_t = number of persons confined t or more days.
† C_t = number of patient days during first t days of confinement.

TABLE 7
 BENEFICIAL STANDARD LIFE—HOSPITAL CLAIMS, 1961-62
 HOSPITALIZATION CONTINUANCE TABLES
 FEMALE SICKNESS

DAYS IN HOSPITAL (t)	AGES 1-18		AGES 19-64		AGES 65 AND OVER		ALL AGES	
	l_t^*	C_t^\dagger	l_t	C_t	l_t	C_t	l_t	C_t
1.....	1,644	1,644	14,037	14,037	5,687	5,687	21,368	21,368
2.....	1,190	2,834	12,988	27,025	5,402	11,089	19,580	40,948
3.....	748	3,582	11,251	38,276	4,906	15,995	16,905	57,853
4.....	582	4,164	9,618	47,894	4,387	20,382	14,587	72,440
5.....	391	4,555	8,293	56,187	3,878	24,260	12,562	85,002
6.....	284	4,839	7,024	63,211	3,413	27,673	10,721	95,723
7.....	199	5,038	5,857	69,068	2,974	30,647	9,030	104,753
8.....	152	5,190	4,815	73,883	2,586	33,233	7,553	112,306
9.....	121	5,311	3,901	77,784	2,247	35,480	6,269	118,575
10.....	99	5,410	3,241	81,025	1,935	37,415	5,275	123,850
11.....	79	5,489	2,338	83,363	1,558	38,973	3,975	127,825
12.....	69	5,558	1,983	85,346	1,358	40,331	3,410	131,235
13.....	60	5,618	1,671	87,017	1,198	41,529	2,929	134,164
14.....	54	5,672	1,417	88,434	1,088	42,617	2,559	136,723
15.....	46	5,718	1,182	89,616	968	43,585	2,196	138,919
16.....	42	5,760	1,028	90,644	854	44,439	1,924	140,843
17.....	36	5,796	895	91,539	771	45,210	1,702	142,545
18.....	30	5,826	794	92,333	698	45,908	1,522	144,067
19.....	27	5,853	709	93,042	629	46,537	1,365	145,432
20.....	23	5,876	633	93,675	561	47,098	1,217	146,649
21.....	22	5,898	564	94,239	515	47,613	1,101	147,750
22.....	20	5,918	494	94,733	454	48,067	968	148,718
23.....	18	5,936	445	95,178	412	48,479	875	149,593
24.....	18	5,954	408	95,586	385	48,864	811	150,404
25.....	18	5,972	367	95,953	346	49,210	731	151,135
26.....	17	5,989	338	96,291	323	49,533	678	151,813
27.....	15	6,004	305	96,596	296	49,829	616	152,429
28.....	15	6,019	279	96,875	281	50,110	575	153,004
29.....	14	6,033	256	97,131	261	50,371	531	153,535
30.....	13	6,046	236	97,367	243	50,614	492	154,027
31.....	12	6,058	211	97,578	232	50,846	455	154,482
40.....	3	6,119	124	99,013	116	52,307	243	157,439
50.....	3	6,149	59	99,835	56	53,106	118	159,090
60.....	1	6,165	37	100,288	39	53,543	77	159,996
70.....	1	6,175	24	100,554	25	53,853	50	160,582
80.....		6,178	14	100,753	20	54,064	34	160,995
90.....		6,178	9	100,864	15	54,243	24	161,285
100.....		6,178	7	100,940	12	54,379	19	161,497
110.....		6,178	6	101,008	8	54,489	14	161,675
120.....		6,178	4	101,056	6	54,558	10	161,792
130.....		6,178	3	101,086	4	54,608	7	161,872
140.....		6,178	3	101,116	4	54,648	7	161,942
150.....		6,178	2	101,136	3	54,678	5	161,992
160.....		6,178	1	101,147	2	54,707	3	162,032
170.....		6,178		101,156	1	54,719	1	162,053
180.....		6,178		101,156	1	54,729	1	162,063

* l_t = number of persons confined t or more days.

† C_t = number of patient days during first t days of confinement.

male sickness confinements, Table 3 on male accident confinements, and Table 2 on male accident and sickness confinements. Tables 5-7 are corresponding experience on female lives. Each table shows data for each of the three age groupings referred to above.¹ These tables are prepared in the same manner as Tables 1 and 2 of Mr. Houghton's paper.

Table 8 shows ratio of patient-days during first t days to patient-days during first 31 days and is similar to Mr. Houghton's Table 4. Table 9 gives average duration of confinement for t -day maximum, similar to Mr. Houghton's Table 5.

All our policies provide scheduled benefits for miscellaneous hospital services. We are unable, therefore, to provide meaningful experience to compare with Mr. Houghton's tables on cost of miscellaneous hospital services.

On comparing our experience on persons age 65 and up with that reported by Mr. Houghton we find, as clearly shown in our Table 9 and Mr. Houghton's Table 5, that the average duration of confinement is lower in our experience for both males and females ages 65 and over. One explanation for this difference lies in the fact that all our policies exclude benefits for hospital confinements due to mental illness and that, according to Mr. Houghton, the Metropolitan policies do not. Another factor no doubt is the difference in area distribution of our respective blocks of business. Nearly 50 per cent of our business is done in the state of California, where hospital costs are very high but durations of confinement are low. One hospital in Los Angeles, the Cedars of Lebanon, with

¹ Tables 2-9 are based on 38,927 hospital claims incurred during 1961 and 1962 on policies in force in Beneficial Standard Life Insurance Company and include the following data:

1. Individual and family hospitalization policies have been issued since 1944.
2. All policies are individually underwritten.
3. Age limits at issue are 3 months to 79 years last birthday (69 years prior to 1956).
4. Claims are based on attained age last birthday on date claim incurred.
5. Maternity claims are excluded from the tables. (An independent study of maternity claims showed an average duration of hospital confinement of 3.96 days for all cases of confinement of 1 or more days.)
6. All policies in study exclude coverage on cases covered by Workmen's Compensation or Occupational Disease Law.
7. All policies exclude coverage for insanity or mental derangement.
8. Policies provide daily indemnity for hospital confinement on account of sickness for amounts varying from \$5.00 per day to \$30.00 per day and for accident for amounts varying from \$10.00 per day to \$60.00 per day. (Since 1956, accident indemnity benefits have been double-sickness indemnity benefits.)
9. Although policies provide world-wide coverage and are issued in forty-four states, nearly 50 per cent of policies in this study are on residents in California, where hospital costs are high and average duration of confinements is probably lower than average.

TABLE 8
RATIO OF PATIENT-DAYS DURING FIRST 4 DAYS TO PATIENT-DAYS
DURING FIRST 31 DAYS

	ACCIDENT			SICKNESS			ACCIDENT AND SICKNESS		
	Ages 0-18	Ages 19-64	Ages 65 and Over	Ages 0-18	Ages 19-64	Ages 65 and Over	Ages 0-18	Ages 19-64	Ages 65 and Over
Males									
10 . . .	0.790	0.732	0.665	0.911	0.783	0.730	0.880	0.776	0.724
20 . . .	0.937	0.925	0.892	0.983	0.951	0.930	0.972	0.947	0.917
30 . . .	0.996	0.995	0.993	1.000	0.997	0.996	0.999	0.997	0.996
31 . . .	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
40 . . .	1.026	1.040	1.048	1.006	1.017	1.022	1.011	1.020	1.024
50 . . .	1.041	1.073	1.080	1.009	1.028	1.034	1.017	1.034	1.038
60 . . .	1.051	1.099	1.105	1.011	1.033	1.041	1.021	1.042	1.047
70 . . .	1.054	1.117	1.123	1.014	1.036	1.045	1.024	1.047	1.052
80 . . .	1.054	1.134	1.132	1.016	1.038	1.048	1.026	1.051	1.056
90 . . .	1.054	1.145	1.136	1.019	1.040	1.050	1.028	1.053	1.058
100 . . .	1.054	1.154	1.136	1.021	1.041	1.051	1.029	1.056	1.059
110 . . .	1.054	1.162	1.136	1.023	1.042	1.052	1.030	1.057	1.060
120 . . .	1.054	1.167	1.136	1.023	1.043	1.053	1.031	1.059	1.061
130 . . .	1.054	1.170	1.136	1.023	1.043	1.053	1.031	1.060	1.061
140 . . .	1.054	1.172	1.136	1.023	1.044	1.053	1.031	1.061	1.061
150 . . .	1.054	1.175	1.136	1.023	1.044	1.053	1.031	1.061	1.061
160 . . .	1.054	1.177	1.136	1.023	1.044	1.053	1.031	1.062	1.061
170 . . .	1.054	1.178	1.136	1.023	1.045	1.053	1.031	1.062	1.061
180 . . .	1.054	1.180	1.136	1.023	1.045	1.053	1.031	1.062	1.061
Females									
10 . . .	0.778	0.701	0.613	0.893	0.830	0.736	0.874	0.815	0.715
20 . . .	0.930	0.905	0.863	0.970	0.960	0.926	0.963	0.954	0.915
30 . . .	0.997	0.994	0.991	0.998	0.998	0.995	0.998	0.997	0.995
31 . . .	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
40 . . .	1.021	1.045	1.061	1.010	1.016	1.029	1.012	1.018	1.034
50 . . .	1.033	1.075	1.107	1.015	1.023	1.044	1.018	1.029	1.055
60 . . .	1.042	1.093	1.139	1.018	1.028	1.053	1.022	1.035	1.068
70 . . .	1.050	1.106	1.162	1.019	1.030	1.059	1.024	1.039	1.077
80 . . .	1.058	1.115	1.180	1.020	1.033	1.063	1.026	1.042	1.083
90 . . .	1.067	1.122	1.195	1.020	1.034	1.067	1.028	1.044	1.089
100 . . .	1.075	1.128	1.206	1.020	1.034	1.069	1.029	1.045	1.093
110 . . .	1.083	1.133	1.215	1.020	1.035	1.072	1.030	1.046	1.096
120 . . .	1.092	1.137	1.220	1.020	1.036	1.073	1.032	1.047	1.098
130 . . .	1.100	1.140	1.221	1.020	1.036	1.074	1.033	1.048	1.099
140 . . .	1.108	1.143	1.221	1.020	1.036	1.075	1.034	1.049	1.100
150 . . .	1.113	1.146	1.221	1.020	1.036	1.075	1.035	1.049	1.100
160 . . .	1.113	1.148	1.221	1.020	1.037	1.076	1.035	1.049	1.101
170 . . .	1.113	1.150	1.221	1.020	1.037	1.076	1.035	1.050	1.101
180 . . .	1.113	1.151	1.221	1.020	1.037	1.076	1.035	1.050	1.101

110,076 patient-days in the 12-month period ending August 31, 1963, reported an average of 8.1 days confinement for all patients excluding maternity and psychiatric cases. This compares with our average of 7.8 days for males (of all ages) and 8.3 for females (of all ages).

Our data reveal relative frequencies of hospital confinements for accident and for sickness, for males and females, at the three age groupings used (Table 10).

TABLE 9
AVERAGE DURATION OF CONFINEMENT FOR 1-DAY MAXIMUM
(In Days)

	ACCIDENT			SICKNESS			ACCIDENT AND SICKNESS		
	Ages 0-18	Ages 19-64	Ages 65 and Over	Ages 0-18	Ages 19-64	Ages 65 and Over	Ages 0-18	Ages 19-64	Ages 65 and Over
Males									
30...	4.72	7.65	9.37	3.73	7.47	9.02	3.94	7.49	9.05
60...	4.98	8.45	10.43	3.78	7.74	9.43	4.03	7.83	9.52
90...	4.99	8.81	10.71	3.81	7.78	9.51	4.06	7.91	9.61
120...	4.99	8.98	10.74	3.82	7.81	9.53	4.07	7.95	9.64
150...	4.99	9.04	10.74	3.82	7.82	9.54	4.07	7.97	9.65
180...	4.99	9.08	10.74	3.82	7.82	9.54	4.07	7.98	9.65
Females									
30...	4.80	8.36	10.71	3.68	6.94	8.90	3.83	7.07	9.16
60...	5.02	9.19	12.32	3.75	7.14	9.41	3.92	7.34	9.84
90...	5.14	9.43	12.92	3.76	7.19	9.54	3.94	7.40	10.03
120...	5.26	9.56	13.19	3.76	7.20	9.59	3.96	7.43	10.12
150...	5.36	9.64	13.20	3.76	7.20	9.61	3.97	7.44	10.14
180...	5.36	9.68	13.20	3.76	7.21	9.62	3.97	7.45	10.15

As expected, male risks had relatively more confinements due to accident than female risks at ages 0-18 (21 per cent compared to 13.2 per cent) and at ages 19-64 (12.6 per cent compared to 9.7 per cent). It was an unexpected finding, however, that female risks had relatively more confinements due to accident than males at ages 65 and over (14.6 per cent compared to 9.1 per cent). Could this be an indication that males generally have relatively more sickness than females at these ages and that some of the older females just never wear out, requiring an accident to lay them low?

Another unexpected finding in our study is that the average duration of

hospital confinement due to accident is longer than for sickness. This is found to be the case for all age groupings of both sexes. This could be due to the fact that persons generally are not hospitalized for minor accidents but are often hospitalized for short periods for minor surgeries or for exploratory studies. Or it could be due to the fact that the benefits provided by our policies for hospital confinement due to accident are sufficiently high to make it attractive for some claimants to stay an extra few days in the hospital. Our claims department, however, reports very little if any evidence of this type of malingering.

Turning now to Mr. Houghton's paper, for which he should be highly complimented, I wish to compliment him not only for the excellence of the paper as a whole but particularly for the examples given in the Appendix of the practical use of the hospital continuance table even though

TABLE 10
PERCENTAGE OF HOSPITAL CONFINEMENTS DUE TO ACCIDENT BY
NUMBER OF ADMISSIONS AND BY NUMBER OF PATIENT-DAYS

	MALES			FEMALES		
	0-18	19-64	65 and Over	0-18	19-64	65 and Over
No. of admissions..	21.0	12.6	9.1	13.2	9.7	14.6
No. of patient-days.	25.8	14.3	10.1	17.7	12.7	19.0

it is not a tool, by itself, which can be used to calculate premium rates. Not long ago we had occasion to issue a hospital benefit with a 3-day exclusion. We knew the premium rate we needed for first-day coverage and with the aid of the continuance table prepared by Stanley W. Gingery (*TSA*, IV, 99 ff.) were able to determine reasonable premiums for the modified benefit. Another application of the continuance table is the ability to determine the relative increase in cost of the hospitalization benefit provided by the California Unemployment Compensation Disability Plan (U.C.D.). The first hospital benefit provided by the U.C.D. plan was \$8.00 for 12 days. Political pressure has caused this to increase in 1956 to \$10.00 for 12 days and in 1958 to \$12.00 for 20 days. The first increase represented a 25 per cent increase in value of the benefit. The second increase is worth 78 per cent more than the original benefit on males ages 18-64 and 69 per cent more on females ages 18-64 based on the experience of our company for the years 1961 and 1962. Without the availability of a continuance table, such calculations would not be possible.

(AUTHOR'S REVIEW OF DISCUSSION)

ANTHONY J. HOUGHTON:

I wish to express my appreciation to Mr. Myers and to Mr. Buckman for presenting discussions of my paper. It is particularly interesting to note the practical uses they have made of continuance tables in determining the relative cost of various plans of coverage and the value of deductibles.

In discussing the comparison between the Metropolitan's experience and that of British Columbia, Mr. Myers indicates that he believes the difference is due not so much to the deteriorated lives in the experience, but rather to certain characteristics of Canadian experience. Certainly, within a geographic area, factors such as the degree of urbanization, presence of a large number of proprietary hospitals, and medical techniques can have a significant effect on experience. For example, the practice of confining patients in hospitals for diagnostic tests that could be performed out of the hospital may result in higher frequency rates and shorter average durations.

Mr. Myers further states that, as the effects of selection diminish, incidence rates may increase but that the average duration may decrease because of the inclusion of a large number of short-duration claims. However, in previously published material Mr. Erdenberger shows evidence of the opposite trend in the experience of the Mutual of Omaha.¹ He demonstrated both the average duration of confinement and the frequencies of confinement for individually underwritten policies increase as the policy duration increases. In addition, Mr. Erdenberger has tabulated the experience of mass-enrollment policies which include many persons in deteriorated health who could not qualify for individually underwritten insurance. This experience on mass-enrollment policies indicates that both longer frequencies and longer average durations may be expected when lives in deteriorated health are included.

Mr. Myers shows the magnitude of the overstatement in the approximation formula I used in Problem 4 of the Appendix. I believe that the principal reason this error is within tolerance is that the estimate of the increase in medical cost at some future time involves such a large probable error that any slight error introduced by an approximate formula is insignificant.

The experience which Mr. Buckman presented was rather surprising in that it showed rather short durations for policyholders age 65 and over. A comparison of the percentage of claims persisting at durations 30, 60,

¹ TSA, XIV, D417.

and 90 days indicates significant differences between Metropolitan's and Beneficial's experience (Table 1).

I do not have an explanation for the significant difference in the experiences. The policy on which Mr. Buckman's experience is based is considerably different from that of the Metropolitan's policy, since it provides scheduled benefits for miscellaneous hospital services, such as \$25 for drugs, \$20 for X-ray, and \$10 for laboratory service, etc. Also, in

TABLE 1
PERCENTAGE OF CLAIMS, AGE 65 AND OVER, WHICH
PERSIST AT LEAST 4-DAYS

	MALES		FEMALES	
	Beneficial	Metropolitan	Beneficial	Metropolitan
30.....	3.9	12.5	5.2	13.2
60.....	0.6	2.7	1.0	4.3
90.....	0.1	1.5	0.4	1.8

TABLE 2

	CHILDREN		MALES		FEMALES*	
	Beneficial	Metropolitan	Ages 19-64	Ages 19-59	Ages 19-64	Ages 19-59
			Beneficial	Metropolitan	Beneficial	Metropolitan
Ratio of Patient-Days during First 4-Days to Patient-Days during First 31 Days						
10.....	0.878	0.836	0.776	0.781	0.815	0.874
31.....	1.000	1.000	1.000	1.000	1.000	1.000
70.....	1.024	1.057	1.047	1.067	1.039	1.085
90.....	1.028	1.070	1.053	1.080	1.044	1.099
120.....	1.031	1.083	1.059	1.093	1.047	1.112
Average Duration of Confinement for 4-Day Maximum (in Days)						
31.....	3.898	4.541	7.513	6.702	7.093	7.508
70.....	3.992	4.804	7.864	7.154	7.372	8.142
90.....	4.006	4.860	7.913	7.243	7.404	8.258
120.....	4.019	4.921	7.954	7.328	7.429	8.354

* Maternity claims have been excluded.

view of the large percentage of Beneficial Standard's in-force in California, a rather high-cost area, financial considerations may encourage short hospital stays.

Since Mr. Buckman showed experience from policyholders under age 65, I thought it might be of interest to show comparable Metropolitan figures which are derived from experience on a policy form which provides a 120-day maximum room-and-board benefit. This policy has an age limit of 55 at issue; the experience for adults is, therefore, for ages 19-59 (Table 2).