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NET CLAIM COSTS AND RESERVES FOR ACCIDENT-ONLY AND INTENSIVE-CARE-ONLY HOSPITAL COVERAGES

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ABSTRACT

This paper presents population hospital utilization data concerning the proportion of total hospital days that is due to injury and the proportion of total hospital days that is spent in intensive care units. In addition, this paper presents continuation data for hospitalizations, subdivided between injury and causes other than injury for both days spent in intensive care units and total hospital days.

The utilization proportions have been applied to claim costs underlying recently published tables of reserve factors for insured hospital benefits in order to obtain corresponding reserve factors for special benefits involving only injury hospitalizations or intensive care treatment during hospitalization. For reasons given in the text, the continuation data have not been used to develop claim costs or reserves.

The data base (population statistics) is described, and its limitations are cited. Tables are included that show the utilization proportions, the resulting net annual claim costs, reserve factor comparisons, and hospital continuance.

I. INTRODUCTION

Reason for Study

EARLY in 1976 the authors encountered a situation involving a hospital policy providing intensive care benefits. A similar, competing product on the market showed substantially higher premiums for the same type of coverage. The authors were asked to determine whether the lower premium rates being used for the first product were adequate. Since no useful data were available in published form, a request was made to the Commission on Professional and Hospital Activities (CPHA), Ann Arbor, Michigan, to provide the raw data for a study of intensive care utilization.

Because severity differs by cause of hospitalization, it was decided that the data on hospital stays should also be distinguished by cause

(accident or sickness) in order to reveal these differences in utilization of intensive care. Since age and sex characteristics of the population affect hospital utilization, data were called for on a sex-distinct basis for the following age categories: 18–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, and 80 and over. Combined male and female data were provided for ages 0–17.

Finally, it was specified that the data be tabulated by length of stay so that useful information could be generated for pricing a wide variety of benefit structures, including accident-only hospital coverages. The intent was also to obtain data showing the effects of different waiting periods and maximum benefit periods.

Source of Data

The reports used for this study were prepared, upon request, by the CPHA. The data used for these reports were taken from the January–December, 1974, *Hospital Record Study*. In the data the identities of individual hospitals were not revealed.

The *Hospital Record Study* is a continuing quarterly study of patients, diagnoses, and procedures in United States short-term general hospitals. A sample of 400,000 case abstracts is created from approximately 14 million patient records processed annually by the Professional Activity Study (PAS). Data from these case abstracts then are projected to represent all cases of patients discharged from nonfederal short-term general hospitals in this country.

In our study the reports we obtained represented results for such a projected sample of all discharges, subject to the following qualifications:

1. Normal maternity cases and stillbirths were excluded. (Normal maternity discharges are defined as those with code 650 in the H-ICDA-2 system.[1])
2. Deaths and newborns were included.
3. Injury patients were defined as those with a final diagnosis explaining admission in the range of codes 800–959.9, inclusive, in the H-ICDA-2 system.
4. Time spent in intensive care units (ICU) and/or in cardiovascular care units (CCU) was summarized in the following two segments:
   a) Patients treated in ICU/CCU including those treated in other specialty units.

[1] See *Hospital Adaptation of ICDA* (H-ICDA), 2d ed. (Ann Arbor, Mich.: Commission on Professional and Hospital Activities, 1973). ICDA is the International Classification of Disease Adapted for Use in the United States by the United States Public Health Service. H-ICDA-2 is the second edition of H-ICDA developed by the CPHA as an expanded and revised version of ICDA-8. The ICDA is revised every ten years.

b) Patients treated in ICU/CCU but not treated in any other specialty units.

It was necessary to consider the data on ICU/CCU patients in these two segments because, where other specialty units also were involved, the days spent only in ICU/CCU could not be isolated. Average length of stay had to be based on the second segment, which is a subset of the first.

All analyses, interpretations, and conclusions based on these data are solely those of the authors, and the CPHA specifically disclaims responsibility for any such analyses, interpretations, or conclusions.

Methods Used in Calculating Net Claim Costs and Reserves

For each age-sex cell raw data were provided as follows:

1. Total number of patients discharged.
2. Total days' stay for patients in item 1.
3. Total number of patients in ICU/CCU (including those treated in other specialty units).
4. Number of patients in ICU/CCU only.
5. Total days' stay for patients in item 4.
6. Days in ICU/CCU for patients in item 4.

The first task was to estimate the total number of ICU/CCU days for the patients in item 3. Since we could not separate out the days spent in the other specialty units, we assumed, in effect, that the average stay in ICU/CCU was the same for the patients in item 3 as for the patients in item 4; thus

$$\text{Total days in ICC/CCU for patients in item 3} = \text{Item 6} \times (\text{item 3} \div \text{item 4}).$$

This adjustment merely inflated the number of days in item 6 by the ratio of the numbers of patients in the two subsets. The same procedure was carried out for the injury hospitalization data.

The next step was to calculate ratios by age-sex cell, using the counts of ICU/CCU days and injury days, respectively, with all hospital days in item 2 as the base.[2] These ratios then were graphed. Discontinuities in the raw ratios were smoothed graphically. A particularly significant discontinuity was observed between successive ICU/CCU ratios for central ages 62 and 67 for both sexes. This discontinuity is discussed further in Section III of this paper. Table 1 shows the crude and graduated ratios.

[2] Ratios of injury ICU/CCU days to all injury hospital days were also calculated, but they were not used to calculate reserves, since such a benefit is rare.

TABLE 1

RATIOS TO TOTAL PATIENT DAYS

Attained Age	ICU/CCU Days		Injury Days	
	Crude Values	Graduated Values	Crude Values	Graduated Values
	Male and Female			
0–17	.0210	.0210	.1044	.1044
	Male			
18–24	.0286	.0286	.3417	.3417
25–29	.0252	.0252	.2608	.2608
30–34	.0278	.0278	.2052	.2052
35–39	.0393	.0393	.1640	.1555
40–44	.0497	.0540	.1239	.1239
45–49	.0671	.0652	.0999	.0978
50–54	.0723	.0723	.0809	.0809
55–59	.0749	.0749	.0700	.0657
60–64	.0722	.0741	.0523	.0523
65–69	.0749	.0708	.0425	.0425
70–74	.0606	.0653	.0449	.0449
75–79	.0576	.0576	.0536	.0536
80 and over	.0435	.0435	.0689	.0689
All male adults	.0578	.....	.1035	.....
	Female			
18–24	.0107	.0107	.0693	.0693
25–29	.0083	.0087	.0557	.0557
30–34	.0106	.0106	.0524	.0524
35–39	.0150	.0136	.0533	.0482
40–44	.0169	.0169	.0528	.0488
45–49	.0206	.0206	.0489	.0523
50–54	.0270	.0270	.0567	.0567
55–59	.0372	.0372	.0614	.0614
60–64	.0398	.0423	.0714	.0714
65–69	.0450	.0432	.0897	.0839
70–74	.0378	.0413	.0922	.0956
75–79	.0369	.0369	.1201	.1201
80 and over	.0283	.0283	.1737	.1737
All female adults	.0271	.....	.0840	.....
All adults	.0401	.....	.0922	.....

The study tended to confirm the basis used in the lower-priced intensive care benefit that was being tested for premium adequacy. It showed that the ratio of days confined in ICU/CCU to days hospitalized in all care units is about 6 percent for males, 3 percent for females, and 2 percent for children.

The graduated ratios were applied to net annual claim costs for the $10 daily hospital benefit (ninety-day maximum) from the 1974 Medical Expense Tables published in a paper by Houghton and Wolf.[3] The resulting net annual claim costs, shown in Table 2, were extended at both ends of the age span using the Lagrange three-point formula. For ICU/CCU the values were multiplied by 10 to represent $100 of daily benefit.

Age-specific net annual claim costs were interpolated using a curve-fitting program[4] on the Datacraft time-sharing system. Net premiums

TABLE 2

NET ANNUAL CLAIM COSTS
90-DAY MAXIMUM BENEFIT PERIOD

Attained Age	Male		Attained Age	Female	
	$100 Daily ICU/CCU Benefit	$10 Daily Hospital Benefit for Injury		$100 Daily ICU/CCU Benefit	$10 Daily Hospital Benefit for Injury
17	$ 2.14	$ 2.08	17	$ 0.94	$ 0.45
22	1.30	1.52	21	0.65	0.41
27	1.14	1.18	27	0.63	0.40
32	1.43	1.06	32	0.87	0.43
37	2.52	1.00	37	1.28	0.46
42	4.31	0.99	42	1.81	0.52
47	6.47	0.97	47	2.52	0.64
52	8.84	0.99	52	3.80	0.80
57	11.62	1.02	57	6.09	1.01
62	15.40	1.09	62	8.32	1.40
67	19.86	1.19	67	10.34	2.01
72	24.38	1.68	72	12.22	2.83
77	28.31	2.63	77	14.24	4.64
82	31.64	4.09	82	16.40	8.09
87	34.37	6.04	87	18.70	13.20
92	36.51	8.48	92	21.14	19.95
97	38.05	11.42	97	23.72	28.36

[3] Anthony J. Houghton and Ronald M. Wolf, "Development of the 1974 Medical Expense Tables," *TSA*, XXX, 9.

[4] Hiroshi Akima, "A Method of Smooth Curve Fitting," ESSA Technical Report ERL 101-ITS 73, January, 1969.

and reserves were calculated on an IBM 5100 minicomputer using the 1958 CSO Mortality Table and 3 percent interest.

Considerations Involved in the Use of These Tables

There are several important considerations involved in the use of the claim costs developed here: (1) the dependence of the claim costs on the 1974 Medical Expense Tables, (2) the use of population data, (3) regional variations, and (4) the lack of any provision for trend in the utilization of hospital benefits.

Clearly the net annual claim costs and reserve factors resulting from this study cannot be valid if the 1974 Medical Expense Tables are not valid. Therefore, any weaknesses in the latter tables also should be considered weaknesses in the tables presented here.

Second, the use of population data can be brought into question. The ratios of population ICU/CCU days and population injury days to population total days have been applied to tables based on insured data. Since ICU/CCU and accident-only hospital benefits are subject to little or no underwriting, the use of population data in the numerators of the ratios is appropriate. There is a greater possibility of distortion from the denominators of the ratios; these may be too high to be applicable to insured data, thus understating the resulting net annual claim costs.

To test the effect of this possible understatement, we used the civilian noninstitutionalized population for 1974 to compute patient days per capita in ten-year age groupings. The population patient days per capita exceeded the corresponding values from the 1974 Medical Expense Tables by from 2 to 32 percent. The average excess, weighted by population, was 15 percent. The excess generally decreased with advancing age, however. Therefore, it can be considered conservative not to recognize the difference for reserve purposes, although additional loadings are indicated for pricing purposes.

Regional variations in ICU/CCU benefits also must be considered before the tables discussed in this paper are used. The ratio of ICU/CCU rooms to total hospital rooms varies substantially by area. It is reasonable to assume that ICU/CCU utilization varies by area also. Unfortunately, the authors have not been able to discern any reasonable pattern by area from the available data on types of hospital room.

Finally, the tables presented in this paper do not make provision for trend. Since the factors are presented for a fixed level of daily benefit, price trends are not necessary. Utilization trends may exist, however, especially in relation to ICU/CCU benefits. As more specialty units are established, the utilization of these units is likely to increase. It also is

possible that the existence of specific insurance benefits for these units could increase utilization. This study covers only a one-year period, so no indication of trends is available. The authors can only suggest further study.

II. INJURY HOSPITALIZATION

Net annual premiums and midterminal reserve values for injury hospitalization are shown in Table 3 for selected durations and for issue ages 25, 35, 45, and 55. The ratio of each value to the corresponding value in the 1974 Medical Expense Tables for a unit of $10 daily benefit also is given.

Considering the pattern of the claim costs, the resulting reserve values for accident hospitalization appear very much as expected. For male lives under age 65, the pattern, although U-shaped, is relatively uniform and therefore produces low reserve factors. For term-to-age-65 plans the highest positive value for the sample issue ages was $0.36. The aggregate additional reserve for male lives for such plans is not likely to be material compared to that for the all-cause basis.

For female lives under age 65, net premiums are 5–7 percent of the values in the 1974 Medical Expense Tables for all causes. The slope is slightly steeper than that of the 1974 tables, which results in reserve values for females that exceed 10 percent of the all-cause factors at the higher issue ages.

Accident hospital benefits provided on a lifetime plan will develop significant additional reserves for both males and females, especially at the higher issue ages. At the advanced ages females display a substantially higher proportion of accident confinements than males. Reserve factors for females are in some cases several times those for males.

III. INTENSIVE CARE UTILIZATION

Net annual premiums and midterminal reserve values for an intensive care coverage providing a $100 daily benefit are set forth in Table 4 for the same issue ages and durations used to illustrate injury hospitalization results. Ratios of these values to the values in the 1974 Medical Expense Tables adjusted to a $100 daily benefit also are provided.

Claim costs for intensive care drop from their early peak in the late teen years to a low point at about age 27 for both male and female lives, subsequently rising as age increases. As noted earlier, a clear discontinuity occurs at age 65 for both males and females. This discontinuity appears to produce a dip in ICU/CCU utilization at central ages 62 and 72, while the value at age 67 appears higher than it should be.

TABLE 3

INJURY HOSPITALIZATION
NET ANNUAL PREMIUMS AND TWO-YEAR PRELIMINARY TERM MIDTERMINAL RESERVE FACTORS
COMPARISON WITH 1974 MEDICAL EXPENSE TABLES
$10 DAILY HOSPITAL BENEFIT—90-DAY MAXIMUM BENEFIT PERIOD
1958 CSO MORTALITY TABLE, 3 PERCENT INTEREST

Issue Age	Net Annual Premium	% of 1974 Tables	Reserve, Policy Year 5	% of 1974 Tables	Reserve, Policy Year 10	% of 1974 Tables	Reserve, Policy Year 15	% of 1974 Tables	Reserve, Policy Year 25	% of 1974 Tables	Reserve, Policy Year 35	% of 1974 Tables
	Term-to-Age-65 Plan											
Male:												
25	$1.01	11.7%	−$0.33	− 3.0%	−$0.61	− 1.9%	−$0.56	− 1.1%	−$ 0.18	− 0.2%	$ 0.19	0.3%
35	0.98	8.9	0.01	0.1	0.06	0.2	0.22	0.5	0.36	0.8	.....	.....
45	0.99	7.0	0.10	0.9	0.27	1.0	0.31	1.1	.....	.....	.....	.....
55	1.04	5.6	0.09	1.3	0.03	1.4	.....	.....	.....	.....	.....	.....
Female:												
25	0.60	5.5	0.54	5.7	1.62	5.9	2.76	6.6	4.49	7.9	3.62	9.2
35	0.72	5.6	0.71	8.0	2.06	8.6	3.07	9.0	3.02	10.1	.....	.....
45	0.92	6.1	0.73	9.7	1.80	10.1	2.04	11.0	.....	.....	.....	.....
55	1.23	6.8	0.54	12.6	0.18	13.7	.....	.....	.....	.....	.....	.....
	Lifetime Plan											
Male:												
25	$1.11	9.7%	−$0.08	− 0.4%	$0.19	0.3%	$ 0.90	0.9%	$ 3.02	1.8%	$ 6.25	2.6%
35	1.13	7.5	0.41	1.8	1.37	2.0	2.62	2.3	5.95	3.1	11.42	4.6
45	1.24	6.2	0.77	2.9	2.50	3.1	4.54	3.5	10.43	5.1	17.44	8.2
55	1.49	5.4	1.33	4.1	4.34	4.8	8.19	6.1	16.00	9.5	19.19	13.7
Female:												
25	0.90	7.0	1.32	9.0	2.75	6.3	7.39	10.3	14.64	12.0	22.85	14.0
35	1.17	7.5	1.89	11.8	4.17	8.8	10.13	13.2	19.42	15.1	29.82	18.2
45	1.61	8.5	2.57	14.3	5.90	11.3	13.66	16.3	25.79	19.4	41.56	28.0
55	2.39	10.0	3.70	18.1	7.93	13.8	18.83	21.3	37.06	31.0	48.74	47.6

TABLE 4

ICU/CCU CARE

NET ANNUAL PREMIUMS AND TWO-YEAR PRELIMINARY TERM MIDTERMINAL RESERVE FACTORS

COMPARISON WITH 1974 MEDICAL EXPENSE TABLES

$100 DAILY HOSPITAL BENEFIT—90-DAY MAXIMUM BENEFIT PERIOD

1958 CSO MORTALITY TABLE, 3 PERCENT INTEREST

Issue Age	Net Annual Premium	% of 1974 Tables*	Reserve, Policy Year 5	% of 1974 Tables*	Reserve, Policy Year 10	% of 1974 Tables*	Reserve, Policy Year 15	% of 1974 Tables*	Reserve, Policy Year 25	% of 1974 Tables*	Reserve, Policy Year 35	% of 1974 Tables*
	Term-to-Age-65 Plan											
Male:												
25	$ 4.91	5.7%	$10.00	9.2%	$31.17	9.6%	$50.80	9.8%	$ 70.97	9.6%	$ 48.06	8.7%
35	7.22	6.6	11.91	10.1	31.74	9.8	44.12	9.5	36.74	8.4	.....	.....
45	10.21	7.3	9.34	8.8	21.54	8.2	22.07	7.8	.....	.....	.....	.....
55	13.69	7.4	4.96	7.1	1.49	6.8	.....	.....	.....	.....	.....	.....
Female:												
25	2.37	2.2	4.56	4.8	13.82	5.1	22.59	5.4	36.05	6.4	27.26	6.9
35	3.38	2.6	5.43	6.1	15.62	6.5	24.20	7.1	22.27	7.5	.....	.....
45	4.93	3.3	6.20	8.2	15.22	8.5	14.68	7.9	.....	.....	.....	.....
55	7.34	4.1	2.84	6.6	.77	5.9	.....	.....	.....	.....	.....	.....
	Lifetime Plan											
Male:												
25	$ 6.74	5.9%	$14.85	8.1%	$46.94	8.2%	$79.44	8.2%	$133.84	7.8%	$167.15	6.9%
35	9.71	6.5	18.51	8.2	53.35	7.9	83.86	7.5	129.08	6.6	140.31	5.7
45	13.59	6.8	18.39	6.9	51.68	6.5	79.22	6.1	105.43	5.2	91.86	4.3
55	18.38	6.6	17.74	5.5	45.93	5.1	62.42	4.6	64.10	3.8	43.76	3.1
Female:												
25	3.32	2.6	7.09	4.9	22.05	5.0	37.54	5.3	68.87	5.6	89.44	5.5
35	4.71	3.0	8.96	5.6	27.17	5.8	45.42	5.9	71.58	5.6	73.64	4.5
45	6.75	3.6	11.07	6.2	31.43	6.0	45.42	5.4	55.34	4.2	50.87	3.4
55	9.59	4.0	8.97	4.4	22.09	3.9	29.85	3.4	34.42	2.9	28.63	2.8

* Adjusted to $100 daily benefit.

Two causes for this phenomenon come to mind, although there may be others: (1) misstatement of age or incorrect recording of age for those near the age of medicare eligibility and (2) an increase in the utilization of intensive care facilities by those who have just qualified for medicare reimbursement, either because payment is assured or because more strenuous or unaccustomed postretirement activity takes its toll.

We should point out that the crude ratios of ICU/CCU days to all-care days yield lower cost factors for both male and female lives after age 80 than for ages 75–79. The Lagrange extrapolation made use of the graduated values at ages 67, 72, and 77 to extend the claim cost values to age 100. The lower value for ages over 80 was not used. Of the methods tested for making the extension, this method was deemed to produce the most acceptable, though conservative, results.

For term-to-age-65 plans, male net premiums for ICU/CCU range from 5 to 7.5 percent of the comparable all-care premiums. For females the range is 2–4 percent. The more steeply sloping progression of cost factors for intensive care produces midterminal reserves for this benefit that are a higher proportion of the all-care reserves than is indicated by the ratios of the net premiums. In analyzing the results for lifetime benefit plans, it is important to keep in mind the method used to extend the net annual claim costs.

IV. ADJUSTMENTS FOR WAITING PERIODS AND MAXIMUM BENEFIT PERIODS

As stated in the introductory remarks, the basic data were obtained in the form of distributions by length of stay for each cause (injury or all-cause) and for each type of care received (ICU/CCU or all-care). These four distributions were developed for the age groupings listed earlier. Subtotals were produced for adults under age 65 and for persons aged 65 and over. Data for children of ages 0–17 were aggregated; data for adults were kept separate by sex. This approach facilitated the studies of the effect of waiting periods on claim costs and the effect of different limits on the maximum number of covered days.

Our findings for adults under age 65 are shown in Table 5 for males and females separately. This table shows, for instance, that the first seven days of confinement represent 61.3 percent of the total days for all causes and all care for males, but 67.5 percent of such total days for females. For all-care injury only, the first seven days represent 57 percent of the total for males and 58 percent for females. For intensive care only, the first seven days of confinement represent about 82 percent of the total ICU/CCU days for all causes for both male and female lives.

For injury only, the first seven days of intensive care comprise about 70 percent of the total for males but only 64 percent of the total for females.

As would be expected, the value of waiting periods is substantially higher for ICU/CCU taken separately than for all hospital care combined, and, conversely, the saving in cost by imposition of a maximum benefit period is less as a percentage of total cost for ICU/CCU. The results show a relatively greater severity and, therefore, a prolongation of hospital stays for injury cases as compared with other cases, both in ICU/CCU days and in total days. Thus, waiting periods would have more impact on noninjury while the use of a maximum would have more effect on injury hospital benefits. Of course, benefits for injury commonly begin on the first day of hospitalization, while for sickness a three-day or seven-day wait may be required before benefits begin to accrue. Maximum covered stays generally do not differ for injury and other than injury, but intensive care treatment may be limited to fifteen or thirty days.

Table 5 is meant to be illustrative only. Two factors must be considered

TABLE 5

PROPORTION OF TOTAL DAYS WITHIN FIRST 90 DAYS

t	PROPORTION OF TOTAL ICU/CCU DAYS REPRESENTED BY FIRST t DAYS OF ICU/CCU CARE			PROPORTION OF TOTAL DAYS OF HOSPITALIZATION REPRESENTED BY FIRST t DAYS OF HOSPITAL CARE		
	Injury Only	Other than Injury	All Causes	Injury Only	Other than Injury	All Causes
	Male Adult under Age 65					
1	0.224	0.237	0.235	0.130	0.128	0.128
3	0.472	0.565	0.555	0.332	0.347	0.345
7	0.695	0.830	0.815	0.570	0.620	0.613
15	0.862	0.947	0.938	0.756	0.842	0.830
30	0.956	0.982	0.979	0.875	0.948	0.938
90	1.000	1.000	1.000	0.977	0.991	0.989
	Female Adult under Age 65					
1	0.176	0.272	0.264	0.120	0.150	0.148
3	0.409	0.606	0.590	0.320	0.396	0.391
7	0.636	0.838	0.821	0.580	0.681	0.675
15	0.815	0.942	0.932	0.800	0.876	0.872
30	0.954	0.978	0.976	0.919	0.959	0.956
90	1.000	1.000	1.000	0.992	0.993	0.993

in any attempt to use or interpret these results. First, most insurance policies define "hospital stay" to include reentries or recurrences if due to the same cause within a certain time period. This treatment of reentries as continuations of the prior stay differs from that used in the type of hospital discharge survey upon which this paper is based. The effect of the insurance policy definition is to increase the average length of stay while reducing the measured frequency of hospital utilization. Because of these differences, the Table 5 proportions tend to overstate the value of waiting periods for insured benefits and thereby understate the portion of the cost attributable to the intervals beyond these periods.[5] There also is some distortion in the value of the shorter maximum benefit periods, say thirty days or less; for these, the implied savings is understated.

Second, we noted in the basic data an unusually high proportion of stays in excess of ninety days. Although the question was pursued, we never received a satisfactory explanation. The cause for this apparent anomaly may lie in the method used by the CPHA to expand the basic sample.

The adjustment proportions shown in Table 5 are for adults under age 65. To produce appropriate reserve factors, the variation in these proportions by age group should be recognized. Waiting periods have a greater effect for the younger ages. We have not carried out a reserve calculation for the three-day or seven-day sickness waiting period because of the first consideration discussed. The results very likely would not prove useful for valuing hospital benefits provided under insurance contracts. The data source needed for this purpose is a large block of hospital or major medical experience for which frequency and duration of stay are measured on a per-cause basis.

V. SUMMARY

The population data base used in this paper consists of a representative sample of 400,000 hospital discharges from short-term general hospitals in the United States. These hospital stays have been analyzed to determine what proportion relates to accident, and also how much utilization of intensive care facilities occurs. It is suggested that the results may be useful both in pricing and in determining reserves for

[5] On the other hand, an offset to this understatement would occur, since the presence of the waiting period, by discouraging utilization, would tend to reduce costs for the intervals beyond the wait. Unfortunately, the data here do not allow analysis for such possible effects.

accident or intensive care hospital benefits when they are included in insurance products.

We have highlighted various limitations of the data. Particularly apparent is the lack of correspondence of the continuance pattern developed here to the insurance company definition of "hospital stay." This inconsistency results because multiple stays or recurrent hospital confinements are not treated as continuations of prior stays but rather as new confinements.

Despite the limitations involved, the authors believe that the data presented here can be of help to actuaries confronted with the special benefit enhancements frequently found today within a comprehensive plan of hospital coverage. We hope that additional research using an insurance data base will be done in the near future to answer the unresolved questions presented in this paper.