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INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LONG-TERM CARE

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Recorder: P.J. ERIC STALLARD

The new incidence and continuance tables from the National Long-Term Care Survey based on activities-of-daily-living threshold and cognitive impairment will be presented.

MR. P.J. ERIC STALLARD: This session continues the series of long-term care (LTC) sessions that have been scheduled for the Vancouver meeting. Let me introduce the speakers. I'll be the first of the three scheduled speakers. The second speaker will be Bob Yee. Bob and I work together on the Long-Term Care Experience Committee. We will present our first set of results using new data and methods for noninsured, noninstitutional LTC estimates. These results should be regarded as preliminary—the first step in a more extensive series of analyses. Thus, this project is at the beginning of the process, and we want to emphasize that the committee is open to any input, suggestions, or ideas that you may have.

The third speaker will be Jim Robinson. Jim is on the LTC Valuation Methods Task Force. In a very real way, our estimates are an intellectual continuation of the estimates generated by Jim in his work for the task force. The numerical values are very close and we thought it would be extremely valuable to get Jim's input on comparisons of these tables and on their potential uses.

In this session we will cover the following topics in this order:

1. 1982, 1984, and 1989 National Long-Term Care Survey
2. Overview of Model
3. Five-state Model
4. Elimination Period
5. Table Formats
6. Activities of Daily Living (ADLs)
7. ADL Disability Levels
8. Cognitive Impairment (CI)
9. Preexisting Conditions
10. Tabulation Steps
11. Summary of Table Options
12. Presentation of Selected Tables
13. Practical Uses
14. Comparisons with Previously Published Tables
15. Future Uses and Applications
16. Questions and Answers

NATIONAL LONG-TERM CARE SURVEY—1982, 1984, AND 1989

There are really two ways we can begin; we can describe the data and then the model, or the model and then the data. Most of you are familiar with the description of the National Long-Term Care Survey from the task force report. There are a few comments I want to

make that have to do with the coverage, the design, and the consistency of the survey across time. The main thing to remember about the survey is we can make estimates only for the population age 65 years old and over. We can make no estimates below age 65. This limitation has to do with the restrictions of the sampling plan. Originally, a relatively simple sample—it's stratified but the weighting was flat—was drawn from the list of Medicare enrollees that was held by the Health Care Financing Administration in Washington, D.C. in 1982. So we start with that group. That raises a question of coverage. Well, if you have that list, you must have the name and address of every person age 65 or older in the country who is enrolled in the Medicare program. So regardless of whether a person was institutionalized or noninstitutionalized, once they're on the Medicare enrollee list, they have a finite probability of being selected for the survey. That probability was approximately 1 in 769 at the original sample draw. Also, because Medicare enrolls over 99% of the elderly, our estimates will be representative of the experience of the entire noninsured LTC population.

So the sample size in 1982 was about 35,000. The screening was done on seven activities of daily living (ADL) and nine instrumental activities of daily living (IADL). We will define those in detail later. There were about 6,000 detailed assessments of people who lived in the community and who indicated during the screening interview some minimal level of difficulty in performing at least one ADL or IADL. The detailed assessment involved an interview lasting about hour and a quarter. So we obtained a substantial amount of information there.

The 1984 survey was a longitudinal follow-up of the 1982 sample, with a special subsampling of nondisabled persons who were ineligible for detailed assessment in 1982. Of the approximately 20,500 persons eligible for follow-up, there were about 17,300 survivors who were age 67 or older. There was a replenishment sample of about 4,900 persons at age 65 and 66. These people were screened for ADL and IADL limitations and, considering all eligible persons, we generated about 6,000 detailed community interviews in that year, and about 1,700 interviews of people who were in institutions. You may notice, if you've read the task force report in detail, that the noninstitutional, noninsured estimates in that report were based on the 1982–84 linkage of cases.

The estimates for this session, presented in Tables 1 through 8, are based on the 1984–89 sample of cases, and there were some changes in the details of the sampling. Those were basically designed to obtain a larger subsampling, that is, a smaller probability of inclusion, for people who were age 75 or less in 1989, and totally nondisabled in 1984. A by-product, however, was a modest reduction in the sample size for the disabled and institutionalized subpopulations. So we had approximately 4,500 people who were detailed interviewees and approximately 1,350 who were in institutions in 1989. One of the strengths of this survey is the size of the sample for the age-85-and-older population for whom it is very difficult to get any estimates because of the small size of that population nationally. We had over 2,000 people in the total sample for that age group, in each of the three survey periods. In 1994, a follow-up National Long-Term Care Survey was conducted with a similar design to the three previous surveys. The field work is finished, and the tapes have successfully undergone a pre-edit stage and now I am in a consistency edit stage. So I anticipate that within 12 months we will have the estimates in Tables 1 through 8 replaced with a more current set.

We have some limited information on what happened to these people during the time between the surveys. This information was generated by linking the Survey data to Medicare expenditure/reimbursement records. The Medicare records range from 1982 through 1992, right now, and we're getting new data through 1993 currently. The data for 1984 and later contain information on diagnosis related groups (DRGs) for hospitalization and skilled nursing facility (SNF) episodes, and also International Classification of Diseases-9th Revision-Clinical Modifications (ICD-9-CMs) which provide details on 10,000 or more diseases for hospitalization, SNF, and home health agency (HHA) episodes. You can do a great deal with that.

I should comment that all of the National Long-Term Care Survey data are publicly available. They were funded by the federal government under a grant from the National Institute on Aging. Duke University is responsible for overseeing collection of the data and, as soon as the tapes are clean and ready to be released, we release them. And if we publish articles using those data, we typically release files that have the coding of the variables that we've used, so you can replicate our analysis and make any changes you desire.

OVERVIEW OF MODEL

We've talked about data, and now we will talk about the model. The question is why are we even looking at a model? Why don't we just take the data, develop appropriate counts of occurrences and exposures, and directly compute the answer in the form of one or more incidence or continuance tables? The reason is that there is one significant problem which I will describe momentarily. But first let me indicate the goal, which is to generate the LTC incidence and continuance estimates for the noninsured, noninstitutional population so that actuaries could use them in various ways. The problem is that the National Long-Term Care Survey, which is targeted at this population, lets you know a person's status in 1984 and in 1989. But you don't know what happened in between. In addition, there is no other nationally representative survey of this population that provides this information. Therefore, the usual formulas based on occurrence and exposure counts cannot be applied.

So the key issue here is that we have the data on disability status at two points in time, but not in between. Our solution is to introduce a Markov Chain model which is virtually the identical solution used by the task force in dealing with that same problem. So we had to know: If we have a Markov Chain model, what do we have to do to generate valid estimates?

To define a Markov Chain model for this observation plan, it is necessary that you know each person's status in 1984. You also must know their status in 1989. And you assume that the only thing that's required to allocate or distribute the population from a given status in 1984 to the 1989 status is knowledge of their status in 1984. This is the so-called "local independence" assumption. This means that something that happened in 1982, or any other time prior to 1984, is irrelevant. You may say that this is unrealistic, and that very well may be. What you want to do in a Markov Chain model is to define the statuses in such a way that this will become a reasonably plausible way to proceed. So it's an approximation, and any errors introduced can be viewed as a penalty for the lack of information on what actually happened to these people in the five-year period.

FIVE-STATE MODEL

The key requirement for using the Markov Chain model with the five-year observation interval is that we must be able to compute monthly transition rates, so we have to get the 60th root of the five-year transition table or transition matrix. This requires an assumption that the monthly transition rates are constant over the five-year interval. In addition, we have to define the transition matrix to include a noninstitutional LTC status that becomes one of the five categories, groups, statuses, or states used in our analysis. The five states are: (1) active, (2) mild disability, (3) noninstitutional long-term care, (4) institutional long-term care, and (5) dead.

These are somewhat generic at this time. It's also worth recognizing that they form a hierarchy from low level or totally active up to a high level of disability which is death, or totally inactive. In between you have gradations of disability and you need some rule for assigning individual people to the appropriate categories at each of the two times. The middle or third group is noninstitutional LTC, and that's actually the focus of all the calculations in Tables 1–8. What is the rate at which that status occurs among people who are in one of the first two groups, either active or mildly disabled? You can think of the active group possibly as an insurable group The definition of mild disability itself is something that can be adjusted to accommodate a whole range of potential issues. So if you are uninsurable but you aren't yet at a point where you'd be eligible for benefits, you could be in the mildly disabled group. And in fact, in our tables, that's the strategy we used. Bob Yee will comment on this later on.

Institutional LTC is not only nursing home care. About 87% of people who get classified as institutional are in nursing homes. We use the Census Bureau's definition of institutional. Anyone in a nonacute care group-living situation who has professional medical care being provided 24 hours a day. So this definition will include some of the assisted living units in continuing care retirement communities (CCR), for example, as well as other types of group living arrangements that one might not initially think of as being institutions. That's a key point to remember in terms of definitions.

ELIMINATION PERIOD

One of the tricky things with Markov Chain models is how to handle elimination periods. The problem is the assumption that that information from the past is irrelevant, directly contradicts the intent of the elimination period that the benefit status criteria must be met for some specified minimum period of time before benefits can be received by an insured. What we decided to do for this session, and probably the next set of estimates, is to exploit the fact that we have the option of defining a status any way we want. So in one case, everybody that passes an ADL or cognitive impairment (CI) criterion is put into the noninstitutional LTC group. But then we come back and say, "Wait a second. If you didn't satisfy these criteria for at least three months in 1984, you're going back to the mildly disabled group. We're not going to count you as part of the noninstitutional LTC group." So the modified noninstitutional LTC status, in fact, is defined to include a time screen on it. We do the same thing for 1989 so that when we produce our incidence matrices, we get the incidence of a case of disability in which the first day is actually three months after the true initiation. So, in our continuance tables for this modified status definition, we measure our time from three months onward. This will be the case for all tables indicating a three-month elimination period, namely Tables 2, 3, 6, and 8.

TABLE 1A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, BOTH SEXES
BENEFIT TRIGGER = 2 + ADLS OR 3 + CI-SCORE
ADL TRIGGER = ANY STANDBY HELP, ANY ACTIVE PERSONAL ASSISTANCE OR UNABLE TO PERFORM ADL; NO ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01385	20,238	0.00794	10,960		
70	0.01818	22,584	0.01541	18,268	0.01050	11,921
75	0.02948	29,266	0.02750	26,233	0.02423	22,465
80	0.04501	31,288	0.04401	29,556	0.04247	27,964
85	0.07076	27,307	0.07029	26,296	0.06958	25,666
90	0.11147	17,211	0.11120	16,670	0.11078	16,417
95	0.12403	5,257	0.12384	5,101	0.12354	5,039
100	0.12399	1,044	0.12386	1,014	0.12368	1,004
105	0.13419	187	0.13413	182	0.13405	181

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01529	13,384				
80	0.03867	24,679	0.02620	15,179		
85	0.06786	24,609	0.06285	21,760	0.04330	12,542
90	0.10981	16,094	0.10711	15,267	0.09842	12,832
95	0.12286	4,975	0.12107	4,818	0.11574	4,375
100	0.12325	996	0.12215	977	0.11902	924
105	0.13386	180	0.13337	178	0.13201	173

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.

†Relative rate

‡Absolute rate

TABLE 1B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	20,238	1.00000	22,584	1.00000	29,266	1.00000	31,288	1.00000	27,307
1	0.72220	14,616	0.75409	17,030	0.73569	21,531	0.73556	23,014	0.70782	19,328
2	0.52158	10,556	0.56491	12,758	0.54201	15,863	0.53804	16,834	0.49320	13,468
3	0.37807	7,651	0.42040	9,494	0.39989	11,703	0.39137	12,245	0.33829	9,238
4	0.28026	5,672	0.31079	7,019	0.29545	8,647	0.28310	8,858	0.22840	6,237
5	0.21205	4,291	0.22851	5,161	0.21838	6,391	0.20334	6,362	0.15195	4,149
6	0.15990	3,236	0.16811	3,797	0.16063	4,701	0.14393	4,503	0.10013	2,734
7	0.11979	2,424	0.12386	2,797	0.11750	3,439	0.10029	3,138	0.06540	1,786
8	0.08914	1,804	0.09138	2,064	0.08547	2,501	0.06879	2,152	0.04234	1,156
9	0.06590	1,334	0.06751	1,525	0.06182	1,809	0.04644	1,453	0.02717	742
10	0.04845	981	0.04990	1,127	0.04441	1,300	0.03090	967	0.01728	472
11	0.03565	721	0.03671	829	0.03143	920	0.02036	637	0.01086	297
12	0.02626	532	0.02685	606	0.02190	641	0.01330	416	0.00675	184
13	0.01938	392	0.01953	441	0.01502	440	0.00861	269	0.00414	113
14	0.01432	290	0.01413	319	0.01014	297	0.00553	173	0.00251	69
15	0.01058	214	0.01015	229	0.00675	197	0.00351	110	0.00151	41
16	0.00778	158	0.00718	162	0.00445	130	0.00221	69	0.00091	25
17	0.00569	115	0.00500	113	0.00290	85	0.00137	43	0.00055	15
18	0.00414	84	0.00343	78	0.00188	55	0.00084	26	0.00033	9
19	0.00300	61	0.00232	52	0.00121	35	0.00051	16	0.00020	5

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 2A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, BOTH SEXES
BENEFIT TRIGGER = 2 + ADLS OR 3 + CI-SCORE
ADL TRIGGER = ANY STANDBY HELP, ANY ACTIVE PERSONAL ASSISTANCE OR UNABLE TO PERFORM ADL; THREE-MONTH ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01345	19,727	0.00732	10,112		
70	0.01728	21,537	0.01465	17,399	0.01005	11,418
75	0.02703	26,961	0.02520	24,133	0.02221	20,645
80	0.04253	29,788	0.04154	28,093	0.03999	26,515
85	0.06790	26,629	0.06740	25,619	0.06663	24,974
90	0.11000	17,365	0.10970	16,813	0.10926	16,552
95	0.10283	4,584	0.10267	4,448	0.10243	4,394
100	0.10514	949	0.10504	922	0.10489	913
105	0.11386	172	0.11382	168	0.11374	166

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01399	12,241				
80	0.03617	23,219	0.02332	13,509		
85	0.06479	23,862	0.05937	20,826	0.03749	10,855
90	0.10821	16,206	0.10529	15,310	0.09584	12,677
95	0.10187	4,336	0.10038	4,193	0.09594	3,790
100	0.10453	905	0.10360	887	0.10095	835
105	0.11358	165	0.11314	163	0.11192	158

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡*Absolute rate*

TABLE 2B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	19,727	1.0000	21,537	1.00000	26,961	1.00000	29,788	1.00000	26,629
1	0.71286	14,063	0.75631	16,289	0.74256	20,020	0.73261	21,823	0.69805	18,589
2	0.50816	10,025	0.56957	12,267	0.55063	14,846	0.53263	15,866	0.47889	12,753
3	0.36394	7,180	0.42711	9,199	0.40773	10,993	0.38429	11,448	0.32288	8,598
4	0.26818	5,291	0.31892	6,869	0.30150	8,129	0.27515	8,196	0.21394	5,697
5	0.20293	4,003	0.23722	5,109	0.22243	5,997	0.19523	5,816	0.13960	3,717
6	0.15348	3,028	0.17615	3,794	0.16295	4,393	0.13628	4,060	0.09069	2,415
7	0.11558	2,280	0.13062	2,813	0.11847	3,194	0.09350	2,785	0.05874	1,564
8	0.08668	1,710	0.09672	2,083	0.08548	2,305	0.06304	1,878	0.03793	1,010
9	0.06472	1,277	0.07152	1,540	0.06120	1,650	0.04177	1,244	0.02442	650
10	0.04814	950	0.05276	1,136	0.04343	1,171	0.02725	812	0.01566	417
11	0.03575	705	0.03866	833	0.03031	817	0.01771	527	0.00994	265
12	0.02651	523	0.02810	605	0.02080	561	0.01147	342	0.00623	166
13	0.01963	387	0.02028	437	0.01402	378	0.00741	221	0.00387	103
14	0.01451	286	0.01452	313	0.00929	250	0.00477	142	0.00237	63
15	0.01071	211	0.01030	222	0.00606	163	0.00306	91	0.00144	38
16	0.00784	155	0.00719	155	0.00394	106	0.00194	58	0.00087	23
17	0.00570	113	0.00493	106	0.00255	69	0.00122	36	0.00053	14
18	0.00411	81	0.00333	72	0.00165	44	0.00075	22	0.00032	9
19	0.00295	58	0.00220	47	0.00106	29	0.00046	14	0.00020	5

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 3A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, BOTH SEXES; BENEFIT TRIGGER = 2 + ADL OR 3 + CI-SCORE
ADL TRIGGER = ACTIVE PERSONAL ASSISTANCE MOST OR ALL OF THE TIME,
OR UNABLE TO PERFORM ADL; THREE-MONTH ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01100	16,239	0.00672	9,272		
70	0.01626	20,421	0.01372	16,356	0.00944	10,725
75	0.02506	25,214	0.02329	22,453	0.02046	19,108
80	0.04172	29,570	0.04067	27,797	0.03905	26,134
85	0.06249	24,947	0.06204	23,988	0.06137	23,378
90	0.10277	16,686	0.10248	16,144	0.10204	15,883
95	0.09634	4,599	0.09611	4,457	0.09579	4,397
100	0.09705	966	0.09695	938	0.09681	928
105	0.11523	202	0.11516	196	0.11507	194

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01283	11,224				
80	0.03508	22,663	0.02199	12,735		
85	0.05975	22,323	0.05500	19,478	003645	10,551
90	0.10102	15,524	0.09818	14,597	0.08904	11,941
95	0.09503	4,327	0.09303	4,150	0.08715	3,665
100	0.09648	920	0.09562	898	0.09320	841
105	0.11485	193	0.11429	189	0.11272	180

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 3B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	16,239	1.00000	20,421	1.00000	25,214	1.00000	29,570	1.00000	24,947
1	0.72524	11,777	0.74659	15,246	0.73120	18,436	0.71632	21,181	0.69231	17,271
2	0.52598	8,541	0.55510	11,336	0.53238	13,423	0.51133	15,120	0.47002	11,726
3	0.38239	6,210	0.41102	8,393	0.38596	9,731	0.36373	10,755	0.31293	7,807
4	0.28219	4,582	0.30308	6,189	0.27862	7,025	0.25784	7,624	0.20430	5,097
5	0.21109	3,428	0.22256	4,545	0.20029	5,050	0.18171	5,373	0.13100	3,268
6	0.15760	2,559	0.16274	3,323	0.14347	3,617	0.12580	3,720	0.08318	2,075
7	0.11718	1,903	0.11849	2,420	0.10241	2,582	0.08541	2,526	0.05237	1,306
8	0.08676	1,409	0.08590	1,754	0.07285	1,837	0.05686	1,681	0.03268	815
9	0.06398	1,039	0.06201	1,266	0.05164	1,302	0.03712	1,098	0.02022	504
10	0.04698	763	0.04458	910	0.03639	918	0.02380	704	0.01241	310
11	0.03435	558	0.03193	652	0.02520	635	0.01512	447	0.00756	189
12	0.02501	406	0.02279	465	0.01711	431	0.00952	281	0.00457	114
13	0.01813	294	0.01621	331	0.01139	287	0.00594	176	0.00274	68
14	0.01309	213	0.01149	235	0.00744	187	0.00367	109	0.00164	41
15	0.00941	153	0.00810	165	0.00477	120	0.00225	67	0.00097	24
16	0.00674	109	0.00561	115	0.00303	76	0.00137	41	0.00057	14
17	0.00481	78	0.00381	78	0.00191	48	0.00083	25	0.00034	8
18	0.00342	56	0.00253	52	0.00119	30	0.00050	15	0.00020	5
19	0.00243	39	0.00165	34	0.00074	19	0.00030	9	0.00011	3

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 4A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
DIRECT INCIDENCE, BOTH SEXES; BENEFIT TRIGGER = 2+ ADL OR 3+ CI-SCORE
ADL TRIGGER = ANY STANDBY HELP, ANY ACTIVE PERSONAL ASSISTANCE, OR UNABLE TO PERFORM ADL; NO ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01378	20,145	0.00790	10,912		
70	0.01787	22,200	0.01518	17,999	0.01047	11,891
75	0.02848	28,279	0.02658	25,358	0.02348	21,765
80	0.04475	31,112	0.04376	29,390	0.04224	27,810
85	0.06812	26,289	0.06770	25,325	0.06705	24,734
90	0.10776	16,637	0.10751	16,116	0.10713	15,876
95	0.12403	5,257	0.12384	5,101	0.12354	5,039
100	0.12399	1,044	0.12386	1,014	0.12368	1,004
105	0.13419	187	0.13413	182	0.13405	181

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01518	13,280				
80	0.03848	24,558	0.02617	15,163		
85	0.06552	23,762	0.06113	21,167	0.04312	12,490
90	0.10625	15,573	0.10387	14,805	0.09599	12,516
95	0.12286	4,975	0.12107	4,818	0.11574	4,375
100	0.12325	996	0.12215	977	0.11902	924
105	0.13386	180	0.13337	178	0.13201	173

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—excludes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 4B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	20,145	1.00000	22,200	1.00000	28,279	1.00000	31,112	1.00000	26,289
1	0.72220	14,549	0.75409	16,740	0.73569	20,804	0.73556	22,885	0.70782	18,608
2	0.52158	10,507	0.56491	12,541	0.54201	15,327	0.53804	16,740	0.49320	12,966
3	0.37807	7,616	0.42040	9,333	0.39989	11,308	0.39137	12,176	0.33829	8,893
4	0.28026	5,646	0.31079	6,899	0.29545	8,355	0.28310	8,808	0.22840	6,004
5	0.21205	4,272	0.22851	5,073	0.21838	6,175	0.20334	6,326	0.15195	3,995
6	0.15990	3,221	0.16811	3,732	0.16063	4,542	0.14393	4,478	0.10013	2,632
7	0.11979	2,413	0.12386	2,750	0.11750	3,323	0.10029	3,120	0.06540	1,719
8	0.08914	1,796	0.09138	2,029	0.08547	2,417	0.06879	2,140	0.04234	1,113
9	0.06590	1,328	0.06751	1,499	0.06182	1,748	0.04644	1,445	0.02717	714
10	0.04845	976	0.04990	1,108	0.04441	1,256	0.03090	961	0.01728	454
11	0.03565	718	0.03671	815	0.03143	889	0.02036	633	0.01086	285
12	0.02626	529	0.02685	596	0.02190	619	0.01330	414	0.00675	177
13	0.01938	390	0.01953	434	0.01502	425	0.00861	268	0.00414	109
14	0.01432	288	0.01413	314	0.01014	287	0.00553	172	0.00251	66
15	0.01058	213	0.01015	225	0.00675	191	0.00351	109	0.00151	40
16	0.00778	157	0.00718	159	0.00445	126	0.00221	69	0.00091	24
17	0.00569	115	0.00500	111	0.00290	82	0.00137	43	0.00055	14
18	0.00414	83	0.00343	76	0.00188	53	0.00084	26	0.00033	9
19	0.00300	60	0.00232	51	0.00121	34	0.00051	16	0.00020	5

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative table ‡Absolute rate

TABLE 5A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, FEMALES; BENEFIT TRIGGER = 2+ ADL OR 3+ CI-SCORE
ADL TRIGGER = ANY STANDBY HELP, ANY ACTIVE PERSONAL ASSISTANCE, OR UNABLE TO PERFORM ADL; NO ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01274	9,922	0.00653	4,734		
70	0.01699	11,621	0.01352	8,736	0.00857	5,288
75	0.03205	18,240	0.02930	15,882	0.02569	13,485
80	0.04806	20,031	0.04662	18,641	0.04485	17,545
85	0.07074	17,554	0.07003	16,755	0.06916	16,294
90	0.10974	11,683	0.10946	11,260	0.10913	11,081
95	0.12024	3,841	0.11989	3,707	0.11947	3,654
100	0.12861	975	0.12839	943	0.12812	932
105	0.14104	228	0.14092	221	0.14077	219

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01534	7,518				
80	0.04034	15,200	0.02551	8,538		
85	0.06702	15,466	0.06094	13,262	0.03766	6,623
90	0.10832	10,839	0.10611	10,202	0.09936	8,487
95	0.11849	3,588	0.11589	3,416	0.10847	2,974
100	0.12749	922	0.12588	896	0.12155	829
105	0.14042	218	0.13953	214	0.13721	204

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 5B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	9,922	1.00000	11,621	1.00000	18,240	1.00000	20,031	1.00000	17,554
1	0.77373	7,677	0.75559	8,780	0.73578	13,420	0.74328	14,888	0.72165	12,668
2	0.59867	5,940	0.56655	6,584	0.54336	9,911	0.55016	11,020	0.51430	9,028
3	0.46268	4,591	0.42156	4,899	0.40273	7,346	0.40553	8,123	0.36197	6,354
4	0.35506	3,523	0.31128	3,617	0.29959	5,464	0.29767	5,963	0.25159	4,416
5	0.27035	2,682	0.22846	2,655	0.22343	4,075	0.21732	4,353	0.17285	3,034
6	0.20427	2,027	0.16810	1,953	0.16607	3,029	0.15683	3,141	0.11794	2,070
7	0.15317	1,520	0.12414	1,443	0.12292	2,242	0.11177	2,239	0.07999	1,404
8	0.11397	1,131	0.09201	1,069	0.09061	1,653	0.07867	1,576	0.05392	946
9	0.08415	835	0.06845	795	0.06651	1,213	0.05468	1,095	0.03612	634
10	0.06177	613	0.05105	593	0.04856	886	0.03756	752	0.02403	422
11	0.04545	451	0.03794	441	0.03504	639	0.02563	513	0.01583	278
12	0.03356	333	0.02808	326	0.02497	455	0.01738	348	0.01032	181
13	0.02487	247	0.02070	241	0.01758	321	0.01172	235	0.00666	117
14	0.01850	184	0.01519	177	0.01222	223	0.00785	157	0.00425	75
15	0.01380	137	0.01109	129	0.00839	153	0.00522	105	0.00269	47
16	0.01026	102	0.00801	93	0.00573	104	0.00344	69	0.00170	30
17	0.00759	75	0.00571	66	0.00388	71	0.00224	45	0.00107	19
18	0.00560	56	0.00402	47	0.00262	48	0.00145	29	0.00067	12
19	0.00411	41	0.00279	32	0.00175	32	0.00092	19	0.00042	7

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 6A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, FEMALES; BENEFIT TRIGGER = 2+ ADL OR 3+ CI-SCORE
ADL TRIGGER = ACTIVE PERSONAL ASSISTANCE MOST OR ALL OF THE TIME, OR UNABLE TO PERFORM ADL; THREE-MONTH ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01139	8,964	0.00758	5,494		
70	0.01552	10,690	0.01237	7,992	0.00837	5,161
75	0.02691	15,471	0.02470	13,479	0.02194	11,575
80	0.04149	17,634	0.04012	16,329	0.03845	15,297
85	0.06427	16,500	0.06351	15,710	0.06259	15,245
90	0.10323	11,474	0.10291	11,048	0.10253	10,867
95	0.10026	3,504	0.09989	3,378	0.09945	3,328
100	0.13748	1,169	0.13725	1,131	0.13699	1,119
105	0.14850	273	0.14836	265	0.14820	262

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01413	6,918				
80	0.03418	13,038	0.01997	6,676		
85	0.06033	14,357	0.05377	11,983	0.02789	4,897
90	0.10158	10,596	0.09899	9,882	0.09099	7,987
95	0.09841	3,259	0.09565	3,078	0.08785	2,623
100	0.13636	1,106	0.13473	1,071	0.13038	987
105	0.14781	260	0.14681	254	0.14420	240

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 6B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	8,964	1.00000	10,690	1.00000	15,471	1.00000	17,634	1.00000	16,500
1	0.78650	7,050	0.74843	8,001	0.73277	11,337	0.73612	12,981	0.70247	11,590
2	0.61858	5,545	0.55668	5,951	0.53876	8,335	0.53733	9,475	0.48710	8,037
3	0.48499	4,347	0.41148	4,399	0.39745	6,149	0.38895	6,859	0.33340	5,501
4	0.37298	3,343	0.30227	3,231	0.29419	4,552	0.27918	4,923	0.22525	3,717
5	0.28134	2,522	0.22097	2,362	0.21812	3,375	0.19858	3,502	0.15039	2,481
6	0.21057	1,887	0.16192	1,731	0.16056	2,484	0.13950	2,460	0.09982	1,647
7	0.15662	1,404	0.11905	1,273	0.11720	1,813	0.09673	1,706	0.06592	1,088
8	0.11577	1,038	0.08783	939	0.08484	1,313	0.06621	1,168	0.04332	715
9	0.08504	762	0.06501	695	0.06089	942	0.04473	789	0.02832	467
10	0.06217	557	0.04820	515	0.04331	670	0.02986	527	0.01839	303
11	0.04556	408	0.03548	379	0.03043	471	0.01982	350	0.01174	194
12	0.03349	300	0.02590	277	0.02110	326	0.01309	231	0.00737	122
13	0.02471	221	0.01875	200	0.01444	223	0.00860	152	0.00454	75
14	0.01829	164	0.01346	144	0.00976	151	0.00562	99	0.00275	45
15	0.01356	122	0.00957	102	0.00651	101	0.00365	64	0.00164	27
16	0.00998	89	0.00672	72	0.00432	67	0.00233	41	0.00097	16
17	0.00729	65	0.00466	50	0.00286	44	0.00146	26	0.00058	10
18	0.00527	47	0.00319	34	0.00188	29	0.00090	16	0.00034	6
19	0.00379	34	0.00216	23	0.00123	19	0.00055	10	0.00020	3

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 7A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, MALES; BENEFIT TRIGGER = 2 + ADL OR 3 + CI-SCORE
ADL TRIGGER = ANY STANDBY HELP, ANY ACTIVE PERSONAL ASSISTANCE, OR UNABLE TO PERFORM ADL; NO ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.01119	7,641	0.00766	5,023		
70	0.01949	10,831	0.01781	9,607	0.01252	6,482
75	0.02574	10,870	0.02471	10,153	0.02216	8,888
80	0.03971	10,946	0.03927	10,557	0.03827	10,120
85	0.07084	9,561	0.07065	9,317	0.07023	9,151
90	0.12229	5,780	0.12210	5,644	0.12170	5,571
95	0.21435	2,163	0.21427	2,115	0.21410	2,094
100	0.24071	404	0.24066	395	0.24056	392
105	0.24556	67	0.24554	65	0.24548	65

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01543	5,933				
80	0.03581	9,271	0.02764	6,722		
85	0.06918	8,921	0.06588	8,298	0.05100	5,727
90	0.12078	5,499	0.11823	5,342	0.10844	4,723
95	0.21370	2,082	0.21262	2,063	0.20875	1,982
100	0.24033	390	0.23971	387	0.23749	376
105	0.24536	65	0.24501	64	0.24379	63

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 7B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	7,641	1.00000	10,831	1.00000	10,870	1.00000	10,946	1.00000	9,561
1	0.80290	6,135	0.75270	8,153	0.73719	8,013	0.72013	7,883	0.67220	6,427
2	0.64465	4,926	0.56403	6,109	0.54182	5,889	0.51290	5,614	0.44106	4,217
3	0.51534	3,938	0.42077	4,558	0.39703	4,316	0.36129	3,955	0.28248	2,701
4	0.40106	3,065	0.31250	3,385	0.29005	3,153	0.25170	2,755	0.17657	1,688
5	0.30404	2,323	0.23110	2,503	0.21102	2,294	0.17309	1,895	0.10784	1,031
6	0.22885	1,749	0.17037	1,845	0.15196	1,652	0.11635	1,274	0.06471	619
7	0.17149	1,310	0.12522	1,356	0.10823	1,176	0.07634	836	0.03817	365
8	0.12793	978	0.09175	994	0.07624	829	0.04889	535	0.02214	212
9	0.09501	726	0.06703	726	0.05311	577	0.03056	335	0.01263	121
10	0.07026	537	0.04877	528	0.03652	397	0.01867	204	0.00709	68
11	0.05180	396	0.03512	380	0.02455	267	0.01120	123	0.00397	38
12	0.03807	291	0.02501	271	0.01611	175	0.00661	72	0.00221	21
13	0.02790	213	0.01762	191	0.01032	112	0.00383	42	0.00123	12
14	0.02038	156	0.01227	133	0.00645	70	0.00219	24	0.00068	7
15	0.01483	113	0.00844	91	0.00394	43	0.00123	13	0.00038	4
16	0.01068	82	0.00567	61	0.00236	26	0.00069	8	0.00021	2
17	0.00760	58	0.00372	40	0.00139	15	0.00038	4	0.00012	1
18	0.00536	41	0.00238	26	0.00081	9	0.00021	2	0.00007	1
19	0.00373	29	0.00149	16	0.00046	5	0.00012	1	0.00004	0

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE 8A
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*
TOTAL INCIDENCE, MALES; BENEFIT TRIGGER = 2+ ADL OR 3+ CI-SCORE
ADL TRIGGER = ACTIVE PERSONAL ASSISTANCE MOST OR ALL OF THE TIME, OR UNABLE TO PERFORM ADL; THREE-MONTH ELIMINATION PERIOD

Attained Age	Exact age at selection—includes only persons who are active at that age					
	Ultimate		65		70	
	Rel†	Abs‡	Rel	Abs	Rel	Abs
65	0.00727	5,011	0.00365	2,395		
70	0.01713	9,659	0.01545	8,430	0.01054	5,448
75	0.02257	9,670	0.02144	8,934	0.01868	7,556
80	0.04234	11,824	0.04171	11,369	0.04034	10,780
85	0.05753	7,989	0.05742	7,798	0.05718	7,649
90	0.09762	4,922	0.09741	4,809	0.09697	4,727
95	0.19319	2,226	0.19306	2,179	0.19279	2,151
100	0.24236	498	0.24228	488	0.24211	482
105	0.39150	131	0.39142	129	0.39127	127

Attained Age	75		80		85	
	Rel	Abs	Rel	Abs	Rel	Abs
75	0.01133	4,348				
80	0.03701	9,657	0.02598	6,305		
85	0.05660	7,479	0.05471	7,004	0.04682	5,239
90	0.09596	4,649	0.09315	4,452	0.08279	3,742
95	0.19216	2,135	0.19046	2,099	0.18446	1,964
100	0.24174	479	0.24073	474	0.23718	454
105	0.39092	127	0.38996	125	0.38664	121

*Incidence Table: Age-specific relative and absolute annual incidence rate of noninstitutional LTC among persons active or mildly disabled at the start of the year, by ultimate and select subpopulations—includes transfers to and from institutional LTC occurring within the year.
†Relative rate
‡Absolute rate

TABLE 8B
INCIDENCE AND CONTINUANCE FOR NONINSTITUTIONAL LTC*

Years Since Incidence	Age (last birthday) at incidence									
	65		70		75		80		85	
	Rel†	Abs‡	Rel	Abs	Rel	Abs	Rel	Abs	Rel	Abs
0	1.00000	5,011	1.00000	9,659	1.00000	9,670	1.00000	11,824	1.00000	7,989
1	0.80301	4,024	0.74448	7,191	0.72513	7,012	0.67071	7,930	0.67165	5,366
2	0.64483	3,231	0.55375	5,348	0.51443	4,975	0.45366	5,364	0.43744	3,495
3	0.51500	2,581	0.41150	3,975	0.35705	3,453	0.30946	3,659	0.27624	2,207
4	0.39779	1,993	0.30552	2,951	0.24243	2,344	0.21288	2,517	0.16913	1,351
5	0.29754	1,491	0.22594	2,182	0.16174	1,564	0.14684	1,736	0.10035	802
6	0.22152	1,110	0.16384	1,582	0.10848	1,049	0.09862	1,166	0.05762	460
7	0.16476	826	0.11623	1,123	0.07338	710	0.06423	759	0.03200	256
8	0.12244	614	0.08067	779	0.05005	484	0.04056	480	0.01719	137
9	0.09091	456	0.05477	529	0.03443	333	0.02483	294	0.00893	71
10	0.06723	337	0.03654	353	0.02375	230	0.01474	174	0.00451	36
11	0.04875	244	0.02451	237	0.01595	154	0.00846	100	0.00226	18
12	0.03458	173	0.01658	160	0.01039	100	0.00470	56	0.00113	9
13	0.02400	120	0.01131	109	0.00656	63	0.00252	30	0.00057	5
14	0.01630	82	0.00778	75	0.00402	39	0.00131	16	0.00028	2
15	0.01087	54	0.00537	52	0.00238	23	0.00066	8	0.00014	1
16	0.00729	37	0.00360	35	0.00137	13	0.00033	4	0.00006	0
17	0.00493	25	0.00235	23	0.00076	7	0.00017	2	0.00003	0
18	0.00336	17	0.00148	14	0.00041	4	0.00008	1	0.00001	0
19	0.00231	12	0.00091	9	0.00021	2	0.00004	0	0.00000	0

*Continuance Table: Relative and absolute number of persons whose length of noninstitutional LTC episode meets or exceeds the indicated number of years, by age at incidence—initial absolute numbers are from the ultimate incidence table.
†Relative rate ‡Absolute rate

TABLE FORMATS

Let's briefly address the issue of table formats before we get into the contents of the tables. So what I want to do now is to pretend there are no numbers in the tables. We have just a set of empty tables, each with the identical format. For the format, you can just look at Table A and 1B. In the first or "A" tables, we have the incidence table, which contains the rates at which an event occurs—in this case, a transfer into a noninstitutional LTC status, the third status defined earlier. Each entry in the incidence table is an estimate of the rate at which that transfer occurs within a year among people who are outside of the noninstitutional LTC group at the start of the year. For these tables, they're all at a lower level, either totally active or mildly disabled. We present those incidence rates for every fifth year from age 65 to 105.

Running across the top of the tables, you'll see we have ultimate and select tables with the exact age at selection running from age 65 to 85. Then there's the two columns, labeled "Rel" and "Abs." "Rel" is the relative rate. That's the fraction of cases which make the transition within a year. "Abs" is the absolute number of transfers based on the United States population size in 1984, in which there were approximately 28.1 million people age 65 or older. There were approximately 3 million who were mildly disabled, about 2.4 million who were in noninstitutional LTC, and 1.5 million who were in institutional LTC.

After the incidence tables, there are second tables (or the "B" tables) which are the continuance tables. We have time measured in years at the side. Then we have, on the top, age at last birthday prior to the occurrence of the transfer to noninstitutional LTC. We show the fraction or the proportion of cases starting at that given age that are still in that status at each future time, by single years. We can now peek at a number. The first number at year one shows 72.22% of the people who entered noninstitutional LTC at age 65 would still be there 365 days or one year later.

MS. LORETTA J. JACOBS: I just wanted you to explain the table format again. In going across the incidence panel in Table A, if I match the row entry at attained age 70 with the column entries for age 70 as the exact age at selection, the entry labeled "Abs" is 11,921, and the entry labeled "Rel" is 0.01050. How do these relate to the corresponding values in the column labeled "Ultimate," where, for example, the "Abs" entry is 20,238 at age 65 and 22,584 at age 70? I realize that the absolute numbers all relate to one large population underlying these numbers.

MR. STALLARD: You are right. In each of the subtables, we have two columns. The second of each pair gives the absolute number of persons affected. If you look at ultimate incidence at age 65 in Table A, you find a value of 20,238 and then if you go down to the age 65 continuance table, you'll find that same value appears at time zero. If you look at ultimate incidence of 22,584 at age 70 in Table A, and then you go to the entry at time zero in the age 70 continuance table, you find the same number of people in both places. This is because we set the initial size of the continuance population to match the incidence population at the same age, as you go down the column of the ultimate incidence table.

When you go across the incidence tables in Table A, after the ultimate table you next see the incidence table for age 65, which is labeled the exact age at selection. That's a select age. For an insured population we would use the term *issue age*. In either case, the restriction is that the only people we allow into the incidence calculations are those people who are active at age 65. The mildly disabled group at age 65 is excluded from those

calculations. As you go down the table, you'll see that somewhere between 10 and 15 years after the select age, the relative rates in the select tables begin to match those in the ultimate table. That would suggest that the length of the select period is definitely more than ten years. There's some judgment needed to decide when you can go from a select to an ultimate table. But these last few comparisons indicate it should be a substantial amount of time.

Since this question has required us to look at the numbers, I will caution you that there's a credibility issue for the estimates in our tables below age 70 and above about age 90. That will be resolved to a large extent in future work by using the 1994 survey which will give us good estimates through age 95. I made a constancy assumption for the transition rates below age 68, and I generated the estimates for males, females, and the total population independently. Therefore, you get some funny looking comparisons at age 65 in these tables. So the estimates from age 70 to 90 are the ones we consider to be the most reliable. The flattening or constancy of rates beyond age 90 that shows up in these tables is in essence an artifact of the assumption we made that the rates in the Markov transition matrices are constant for all ages beyond age 90, except for transitions where the sample size was still large enough to provide credible rate estimates. By making some assumption that was easy to describe, one could then come back at a later date and evaluate a range of alternative assumptions believed to be more appropriate. Some time this fall or later on this year, we hope to generate a new set of tables where we try linear or perhaps logistic extrapolations. There's a lot of things you can do along this line, but I thought we'd be best off, if we focus our attention on ages 70–90.

MS. JACOBS: In using 2+ ADLs and 3+ on the CI-score (cognitive impairment score) for the benefit trigger, how were those scores defined?

MR. STALLARD: Bob Yee will answer that question now, during his prepared remarks.

MR. ROBERT K.W. YEE: My task today is twofold. First, I will continue the description of the project that Eric Stallard has been providing, with more explanations of the tables that were generated, so that we can start evaluating how useful these tables are for various practical applications. Second, I'd like to present some observations from the perspective of a user of these tables and indicate how an actuary might use these tables. For example, later in the presentation, I'll provide an example of how one might resolve some of the issues a pricing actuary might face in using our estimates of incidence and continuance, especially when you have an integrated design.

Even though this session focuses on noninsured, noninstitutional experience, the National Long-Term Care Survey itself actually provides data on institutionalization, with detailed ADL assessment, so it can augment the institutional information derived from the 1985 National Nursing Home Survey, which has been widely used for valuation and pricing.

The National Long-Term Care Survey provides a lot of information. There are five questionnaires and tons of information. For example, the data record length was over 11,000 bytes for the source data used in generating Tables 1 through 8. When I first got hold of it in 1990 or 1991, we got the tape, loaded it in, and we didn't know what to do. We gave up! We all know that a little knowledge is very dangerous. So we actually hired some researchers to do the computer analysis for us, and that worked out fairly well because we were being very conservative. It's a good reference point to know how our

tabulations compare with certain control values for prevalence or other relevant indicators. When we got involved in the Long-Term Care Experience Committee, Eric did a lot of work trying to clean up and reformat the data to make it more presentable so that people like us can use it fairly easily.

We have tried to limit the information to the level of detail that we normally would like to see and not have to deal with extraneous information which is probably difficult to interpret. The 600-byte data record format that we have set up allows a broad range of tabulation possibilities including: the type of elimination periods; the type of ADLs; the number of ADLs; the frequency of assistance, and whether it's equipment assistance or personal assistance; the type of cognitive triggers, based on the scores on the Short Portable Mental Status Questionnaire or on the probe for dementia and Alzheimer's disease; and the type of care, both formal and informal. In addition to the active status, we have decided to define a special status, mild disability, which we consider a noninsurable type, so you could distinguish when people progress from an insurable status to a noninsurable status before they claim. These are roughly the range of possibilities that we came up with.

ACTIVITIES OF DAILY LIVING (ADLS)

Eric already talked about the elimination period, so I'm going to talk about ADLs. We have chosen the following seven ADLs and they are fairly common: (1) bathing, (2) dressing, (3) toileting, (4) eating, (5) mobility inside one's residence (not in HR 8), transferring, in/out of bed/chair, and continence.

This is a slightly expanded set of ADLs from what is directly reported from the National Long-Term Care Survey. The screening questionnaire in the Survey probes difficulties with continence, but the detailed questionnaire treats continence as part of the toileting ADL. Therefore, continence is not really an ADL that's picked up in standard tabulations. It's only accessible as part of the questionnaire for toileting. Eric has been able to separate it out so we can identify it as a separate ADL in our data file.

If you notice, inside mobility is not in the Congressional Bill HR8, but we decided to retain it anyway in our 600-byte data file because the full set of seven ADLs is very commonly used in insurance policies and in public policy proposals. Although we retained inside mobility in our data file, we decided not to use it in Tables 1–8 for consistency with HR 8. I should also mention that the ADL screening questionnaire in the National Long-Term Care Survey probes limitations in both inside and outside mobility, but the detailed questionnaire treated outside mobility as an IADL, not as a basic ADL.

The ADLs can be subdivided according to types of assistance, personal assistance versus equipment, and also the frequency of assistance. Within either type of assistance, we can classify four different levels of frequency of assistance:

1. All of the time (that is, unable to perform ADL)
2. Most of the time
3. Some of the time
4. Only occasionally

For personal assistance, these four levels apply to "active help" only. The so-called "standby help" is actually a lower level than only occasional active help. The classification of active assistance is consistent with what insurance policies today consider as benefit trigger.

ADL DISABILITY LEVELS

What we have done is taken all these questionnaires and all the statuses and built a hierarchy of the level of ADL disability:

0. Performs the ADL independently
1. Needs help, but does not get help, with the ADL
2. Performs the ADL with special equipment
3. Gets standby help, no equipment
4 Gets standby help, also uses special equipment
5. Gets active help, no equipment
6. Gets active help, also uses special equipment
7. Unable to perform the ADL

This hierarchy is applied to each of the seven ADLs, generating a classification of ADL disability, ranging from no deficiency to totally unable to perform the ADL. We defined the last category as being unable to perform the ADL all of the time, that is, you cannot perform the ADL at all unless you have active help. So, in fact, the hierarchy is actually even more complex than this because, as I said before, active help can split into four levels of frequency.

COGNITIVE IMPAIRMENT (CI)

We defined cognitive impairment based on the score on the Short Portable Mental Status Questionnaire (SPMSQ). When the interviewer cannot talk directly to the sampled person because the person has Alzheimer's disease or any other form of dementia, we classify that person as having cognitive impairment. So although that person didn't take the SPMSQ test, we considered them as cognitively impaired. This accounted for approximately 40% of the cognitive impairment in this sample. For those who did take the ten-item test, we classified the score of three or more errors as "mild to severe," and five or more errors as "moderate to severe." For the tables presented at this session, we used the 3+ error criterion in classifying the test takers as cognitively impaired, accounting for the remaining 60% of cognitive impairment in this sample. This procedure defines the variable CI-score that appears in the benefit trigger in Tables 1–8.

PREEXISTING CONDITIONS

For insurance purposes, it's useful to consider how to deal with what are typically uninsurable conditions. In our five-state model, we created a status that may be redefined to include people with these conditions, the mild disability status, which allows us to observe how rapidly people transit from an insurable status to an uninsurable status. This is possible because the 1984 and 1989 National Long-Term Care Surveys are linked to Medicare expenditure and reimbursement data containing medical diagnostic codes. For example, we can identify certain medical conditions that exist within two years of either survey. We could consider persons with one or more of these to be in the uninsurable status, or what Eric called the mild disability status.

In the survey, if we determine that the elderly sampled person is on a nursing home waiting list, we could classify such a person as uninsurable. Also, if they need ADL help, use special equipment to perform an ADL, or are receiving IADL help, we can consider that uninsurable. If the sampled persons are receiving some sort of Medicare disability payment before they reach age 65, we might also classify them uninsurable.

For ages 65 and over, certain medical conditions would suggest that they are uninsurable. The list of medical conditions we considered are pretty typical and they are fairly severe, given the proposed requirement that they occur within two years of the survey. They are as follows:

- Dementia and senility
- Multiple Sclerosis
- Parkinson's Disease
- Metastatic Cancer
- Heart, back, or spine surgery
- Stroke or Transient Ischemic Attack (TIA)
- Use of mechanical aids, respirator, or kidney dialysis

TABULATION STEPS

I will summarize the steps we have taken to tabulate the results as follows:

1. Specify the desired tables
2. Test for constant survival function
3. Design sample processing decisions for each survey
4. Classify status for each participant
5. Specify and apply sample weight
6 Verification

We basically start with the format of the table, as shown in Tables 1–8. It's pretty reasonable. Much work was done before our final tabulation to test whether the survival function in the continuance table is constant for the noninstitutional LTC population. And without that work, I don't think we could really use the data. We have done that, in fact, by using two different data sources. One, we tested the five-year constancy assumption by looking at the 1982 and 1984 Survey. There is a two-year interval there which could be used to generate estimates for comparison with the five-year interval, so we could test for constancy that way. Two, we used the social HMO data, which has from zero to about three years length of time during which there is continuous monitoring for change in ADL disability status in the noninstitutional population. This permitted us to directly estimate the transition rates for a limited set of continuance tables in that population, and to assess the degree to which the constancy assumption held. Neither of the tests on these two sources strongly suggested constancy. On the other hand, they did not provide any evidence that refutes the hypothesis either. So we feel pretty good about the reasonableness of the constancy assumption.

Tracking survey participants over a five-year period is never perfect. We need to decide for each of them where they finally wind up, from 1984 to 1989. We assigned paths and steps leading through the questionnaires using sequences of "if-then" logic, for example, if you do this then you have to go there. Everybody is accounted for and ultimately assigned to one of the five states in the Markov Chain Model. Finally, because this is only a sample and the nonrespondents (about 5% of the sample) are frequently either dead or disabled, it's very critical that we apply the proper sample weights so that we get an unbiased estimate of the total population.

We attempted to validate the final results using the mortality rates of a life table, the 1979–81 U.S. decennial life table. Our results, at least for mortality considerations, are very close to the survival values reported from age 65 to 95 in that life table. So it gives

some reasonable assurance of fit. Eric is now going to continue to describe these tables in more detail.

MR. STALLARD: There is an issue concerning the options available to distinguish formal from informal care that has yet to be mentioned. So we thought we would take care of it at this point before getting into the actual tables. One other clarification relates to the options that Bob Yee set out. Not all of those options were taken into account in Tables 1–8. We have a very finite set of tables. There are several thousand tables that we could have generated. So it's important to recognize the limitations of our results presented today.

SUMMARY OF TABLE OPTIONS

In terms of formal and informal care, once you pass the ADL trigger for our counting rules, there is still a question as to what type of care you receive. Formal care is basically any paid help or any help that comes from an agency whose purpose is to provide help to elderly people, whether or not it was paid. Informal care is care provided by family, friends, neighbors or other people. We can identify the type of help, both by ADL and IADL categories. Within IADL categories, we can identify the specific IADL from a list that includes housework, laundry, cooking, shopping, traveling (either within walking distances or further than walking distances), taking medications, or using the telephone. There are a lot of IADL activities where people need help, although it's at a lower level. We can tell who is getting help with ADLs, and what type of help it is, but not the specific ADL involved (except when there is only one ADL disability). Those are the key things that can be used to extend our analyses.

There are some restrictions you might want to keep in mind if you use the data or as you consider these options. For both years, 1984 and 1989, we know the number of helpers, the type of activity, and the number of days per week, but we only know the number of hours of help per week from 1989. When the 1994 Survey comes out, we'll also know the number of hours of help per week. In the Markov Chain Model for 1984–89, you could use hours of help per week to define the status for the second period, 1989, but you can't use hours to define statuses for the earlier period, 1984. To remedy this, you can estimate average hours of help per week, and if you use both formal and informal care jointly, then you would presumably have an upper limit to the need for hours of care that people would have in an insurable situation.

The main task in setting up the tables is to go through the list of options, lay them out, and then make your decisions using sound judgement and the best available evidence. For 1984 and 1989, it is necessary to assign each sampled person to one of the five groups of the five-state Markov Chain model. This is easy for states four and five—institutional LTC, and dead. State one, the active state, was defined to include persons who could independently perform each of nine IADLs and seven ADLs, and had no more than two errors on the SPMSQ. Preexisting conditions were excluded only to the extent that they resulted in some IADL disability--they were not explicitly evaluated in our current analysis. This left states two and three, mild disability and noninstitutional LTC, as the only other possibilities. The key question that has to be answered is who is in the noninstitutional LTC group versus the mildly disabled group? This is equivalent to defining a benefit trigger. We used the following options in generating Tables 1–8:

1. ADL triggers
   - 2+ ADLs out of six (bathing, dressing, toileting, eating, transferring, and continence), and
   - Each triggered ADL meets conditions regarding its duration, frequency, and level of disability
2. CI triggers
   - 3+ errors on SPMSQ, or
   - Alzheimer's disease/dementia
3. ADL durations—0, 3, 6, or 12 months
   - No elimination period, versus
   - Three-month elimination
4. Frequency of help
   - At least some of the time or only occasionally, versus
   - All or most of the time.
5. Level of ADL disability
   - Standby help or higher, versus
   - Active help or higher
6. Type of transition
   - All, or total, incidence of noninstitutional LTC, versus
   - Direct transfer to noninstitutional LTC from active or mild disability groups (excludes transfers from institutional LTC group).

We dropped mobility from our original list of seven ADLs, primarily because HR8 dropped it—that's the eighth item in the Contract with America which has passed in the House of Representatives and is being reviewed by the Senate. We could have dropped continence, in which case our ADL list would look like the Health Security Act of 1993, but that is not being looked at by anybody now. There are various other ways you could modify this list, for example, by dropping continence and reinstating mobility. That would look like the typical published ADL list you see from the National Long-Term Care Survey, such as in the LTC Insurance Valuation Methods Task Force Report which uses that particular set of six ADLs. For cognitive impairment, we used a 3+ rule to define the eligible CI score. So, three or more errors on the SPMSQ got you into the noninstitutional LTC group.

The HR8 definition of ADL disability includes a requirement for substantial assistance from another individual. This raises issues of duration, frequency, and level of assistance. For ADL durations, we generated some tables with zero (Tables 1, 4, 5, and 7) and others with three-month elimination periods (Tables 2, 3, 6, and 8), but there were other options available from the survey. For frequency of help with an ADL, we made a cut in the middle of the four reported categories, so that the "only occasionally" and "some of the time" responses were assigned to mild disability in Tables 3, 6, and 8. For the level of impairment, we used cuts of 3+ (standby help or higher—Tables 1, 2, 4, 5, and 7) and 5+ (active help or higher—Tables 3, 6, and 8) on the seven-category hierarchy of ADL disability. Categories one and two were always assigned to the mild disability group. So those were the major options.

PRESENTATION OF SELECTED TABLES

For this session, we have prepared eight tables: As I said, there was a credibility issue, so even though people expect to look at sex-specific tables, we went ahead and generated the combined sex tables in order to allow you to assess if there's a large variation in any given

estimate. For example, if an estimate for both sexes is not near the average of male and female estimates, you can be virtually certain there's a credibility question. That will happen on the front-end ages, and it will also happen occasionally on the back-end ages. So the both-sex tables are actually generated from data that were tabulated without separation by sex group. The eight tables were defined by combinations of level of ADL disability, elimination period, frequency of assistance, type of transfer (direct for Table 4, all types for the rest), and sex:

1. Standby+, no elimination period, all frequencies, both sexes
2. Standby+, three-month elimination period, all frequencies, both sexes
3. Active+, three-month elimination period, high frequency, both sexes
4. Same as Table 1, but with direct transfer from states one and two to state three
5. Same as Table 1, females
6. Same as Table 3, females
7. Same as Table 1, males
8. Same as Table 3, males.

The first four tables span the range of options we thought people would be interested in. The first table did not have an elimination for any time period. The second table introduced a three-month elimination period. The third table combined the three-month elimination with the requirement that you get active help most or all of the time. So we went from standby+ to active+, where plus (+) means at a higher level on the hierarchy of ADL disability. We included the fourth table because institutionalization was a status, and the National Long-Term Care Survey used the Census Bureau's definition. We wanted to know what would happen if within the year we only looked at direct transfers from the active or mild disability statuses to status three, as opposed to allowing somebody to go through an institution and then exit to status three. The logic was that if the numbers were close, then it really didn't matter, from our perspective, how the Census Bureau defined institutional cases. And if you compare the results from Table 4 with Table 1, you'll see that the numbers are very close in terms of the incidence rates.

Tables 5–8 then take the two extreme conditions, which are standby+ with no duration screen, in Tables 5 and 7, and active+ with a duration screen and a frequency screen, in Tables 6 and 8. And that's done for females, and then males. We put females ahead of males because the data for females have more credibility than for males. So as you go down the tables, you're losing credibility to some extent. For those people who were at the earlier sessions this morning, you will see, as you go through the tables, that there's an interchange of what they called the leadership in the rates for males and females. In some cases the female rates are lower than the males and in some cases they're higher. The continuance rates also do not appear to be substantially different across the male/female groups, except for the oldest ages at incidence, where male survival is poorer.

Rather than looking at every number in the tables, I think this is a good time to take a few questions.

MS. JACOBS: I have a question about how to interpret the entries in the continuance tables. In the column under the heading "Rel," the entries appear to indicate the fractions of the original group who retain their status in that group at each indicated time since the start of the disability episode or duration since incurral of a claim. Is that correct?

MR. STALLARD: That's correct. If you look at the absolute numbers, you'll see you have a decreasing number of people who are retained in that status.

MS. JACOBS: Then is it possible to determine from these tables the percentage of disability days that occur beyond each specific time or duration since incurral?

MR. STALLARD: The answer is yes. And in fact we're planning future modifications of this analysis in which that will be the case. I believe the LTC Task Force tables reported the percentage of the total disability days beyond each given point. That's a cumulative distribution. You can make a cut and then get the actual percentage of benefits or care between any two target dates that you want. So that can be done. In fact you could do it using planned extensions of our tables. You could presumably take these and put them in your spreadsheet and work out the calculations under any set of assumptions that you care to use. You wouldn't have to assume 100% days of paid care in a given situation, for example. In fact, in the 100% case you might want to take as the lower bound the reported formal care in the noninsured population, and as the upper bound the total of both formal and informal days of care. So you have those limits and then your final estimates should come out someplace in between. Obviously, it's your problem to figure that part out.

FROM THE FLOOR: The continuance is only for a given age group. Is that right?

MR. STALLARD: That's right. The continuance is defined for people whose disability episode initiates at the given starting age, and who stay in that state without an interruption in that status. If they go to an institutional setting, they have exited from that continuance table. If they die, they've left it. So it is possible to go to an institutional setting and then come back, but that would count as a newly incident case, and would start a new disability episode. Then they would go to the continuance table for whatever their age was when the new episode initiated. We did these computations by month. We could do them by week or we could do them quarterly. There's all sorts of timings that can be worked into the Markov Chain model to fine tune these tables.

FROM THE FLOOR: Is the time scale in the continuance tables measured in months or years?

MR. STALLARD: We could have used months, because the computations were done for months, but to save space we converted to years just before printing the tables. In fact let me just point out while we're here that you have to be a little careful if you go out to the age 85 continuance table because it only takes five years to get above age 90, and we've already cautioned you that our assumptions above age 90 are not totally satisfactory. We would like to look at linear and alternative functional extrapolations of the parameters in the associated Markov transition matrices. So the table has a reverse triangular credibility that you could assign to it.

FROM THE FLOOR: In the incidence tables, am I right in assuming that the exact age at selection refers to the exact day of the birthday at the indicated age, for example, the 65th birthday in the table labeled age 65?

MR. STALLARD: That's right. That's exactly age 65.

FROM THE FLOOR: Is age defined the same way in the continuance tables?

MR. STALLARD: No, age in the continuance table is age at last birthday. So to generate the continuance table I must first determine from the incidence table how many new disability episodes occur between exact age 65 and exact age 66. Once I have determined how many newly incident cases occur, I then assume they all occur at exact age 65.5 and compute the continuance table using the appropriate continuance at age 65.5. What we're doing is just grouping those people using a midpoint type of approximation. The logic is the same as for the standard assumption of a uniform distribution of deaths in life tables.

MR. YEE: I will just spend a few moments discussing how you would make claim costs from this.

PRACTICAL USES

Suppose you wanted to estimate claim costs for home health care. You would just take your incidence and continuance tables, figure out the average or expected length of stay, and multiply by the daily cost, and you would get your estimated claim cost. Similar tables could be constructed for nursing homes, because we have institutional data, and institutional LTC has been defined as one of the states in our five-state model. The key issues that have to be addressed are:

1. Underwriting selection
   —Status one and two (Insurable and Uninsurable)
2. Policy attrition
   —Adjust Status five (dead) to include voluntary lapse
3. Integrated benefits

Claim costs for nursing home or home health care stand-alone benefits can be estimated by transitional probabilities from statuses one or two to statuses three or four. For an integrated benefit design, the transitions of interest are from statuses one, two, three, or four to statuses three or four. I can illustrate quickly how to use the tables to estimate claim costs for an integrated plan. You could look at these data and generate a sequence of matrices which tells you the number of people making the transitions of interest each year. You could take an initial insured group at age 65, you could follow them over 30 or 40 years, and you could get the numbers of claims of each type in each future year. Fairly simply, one way to price integrated benefits is to apply the columns in the annual incidence table indicating the number of people entering each component of that integrated status, figure out the average length of stay for each component, and multiply by the appropriate unit cost for each benefit day. You just sum it up over time, computing present values, and the resulting total yields the total benefit cost for that initial group of insured persons at each issue age. More elaborate policy provisions can be handled if the average unit cost is known, which may be different for different episode durations. If you use a quarterly transitional matrix, you would then need to estimate the average benefit for each quarter for community care and this probably would be different from nursing home care. It's a very powerful way to price an integrated plan.

Now, there are certain adjustments you have to make. We mentioned the mildly disabled and uninsurable status is probably less restrictive than perhaps in some company's underwriting. So you might want to put underwriting selection factors into status one and two. In status five, you should add lapse to it and it becomes a termination state. With that, I think these tables could be very useful—and not just in the form that you see, which are simply incidence and continuance.

COMPARISONS WITH PREVIOUSLY PUBLISHED TABLES

MR. JAMES M. ROBINSON: I've been asked to make a few comments on how the results from the analysis compare to some existing tables, in particular the analysis in chapter 4 of the SOA Long-Term Care Insurance Valuation Methods Task Force Report. There are other tables available, most of which concentrate on institutional care: the 1985 National Nursing Home Tables and Paul Barnhart's 1991 Tables. The Society LTC Experience Committee Report is dominated by institutional experience. That report contains some noninstitutional experience, but it is very difficult, at this point, to draw any firm conclusions on what's going on with home care utilization. So that leaves me with comparing the results to the Society's Valuation Task Force's Chapter 4 results. I'd like to point out some of the differences in the methodology initially, and then indicate what some of the numbers look like when you compare the tables that you have in your hands to Chapter 4 of the Task Force report.

First of all, some of the differences. The state definitions and the approach used by Eric Stallard and Bob Yee are quite a bit different than what we used in the LTC Insurance Valuation Methods Task Force Report. Eric and Bob have pointed out the five statuses that are being used here for 1984 and 1989. For the task force report, we tried to separate the process into two stages. The first stage was based on health statuses in an effort to use the past data to identify the transition from one functional/cognitive impairment level to another, assuming that this was relatively stable over time. So if you consider extrapolation to an insured population, you might expect that this health status transition process might be more reliable than the service utilization component of the noninsured data you're looking at. The initial statuses that we worked with are all in terms of functional impairment level—zero ADLs, one ADL, two ADLs, or three or more ADLs, or cognitively impaired or not—and we studied the transitions amongst those statuses. Later on, the valuation actuary is charged with applying appropriate service utilization assumptions for each of those possible statuses—the thinking being that, while we could look at those service utilization rates by functional and cognitive status from the 1982, 1984, and 1989 National Long-Term Care Survey tapes, in an insured environment it may be more likely that this aspect of the data may be different from what you see in the past, and these service utilization differences may be much greater than for the health status transition rates.

That's a fundamental difference, but beyond that, the methodology is very similar. We, the Task Force, used the 1982–84 data from the National Long-Term Care Survey. At the time, the 1989 tape had a slight problem and rather than waiting for the correction, we went ahead and just used 1982–84. That problem has since been corrected and I've been taking a look at the 1989 tape and it's very interesting. I'm glad to see more use of these surveys as the data are becoming available to the actuarial community.

When we used the 1982–84 data, we summarized the populations into the states that we defined for 1982 and 1984 by looking at the survey responses, got two-year transition matrices, extracted from them transition rates from one status to another, and then built a simulation model, defined simulation cohorts, and then summarized the results in a more traditional actuarial format in terms of the incidence rates and continuance tables that you see in Chapter 4 of the Task Force report.

The ADLs that are used, as has been pointed out, are a little bit different in this analysis than what was used in the task force report. As a matter of fact, the methodology that is

being discussed now in this session allows the user to vary the ADL selections and the sensitivity of the triggers up front when you apply them to the original data. The task force report provides for a fixed set of ADLs. The actuary must make appropriate adjustments to the resulting morbidity values for valuation of contracts using other trigger mechanisms. For the cognitive impairment trigger, the Society's Task Force used six or more incorrect responses to the SPMSQ as opposed to three or more plus Alzheimer's. When you look in chapter 4 of the task force report, what you see are incidence rates of impairment episodes, defined as the onset of a period of time in which the individual has at least one ADL impaired, or is cognitively impaired, continuing until there is a six-month break in that status. So the affected individual would have to recover completely for six months or die in order to terminate the episode. You must keep in mind that the incidence rates described in this session are defined differently. Consider the transition to an institution. Such a transition terminates the episode in the tables that you're looking at today. In the task force report, if you went to an institution and back to, say, a home care environment, and then back to the institution, as long as you had at least one ADL impaired or were cognitively impaired throughout that process, that would all be treated as one impairment period.

With all these differences in mind, when you actually get down and look at the incidence rates from Chapter 4 (which are the same for males and females), I was amazed at how closely the incidence rates track with the numbers that you see today in Tables 1–8. From age 65 to age 90 they're very close. If you look at the values, for example, at age 65 in Tables 1–8, you'll see that there is a high incidence rate of about 14 per 1,000 and a low of about 11 per 1,000 (except for males in Table 8, which is not believed to be reliable at age 65). The task force report shows 12 per 1,000. At age 75, the high out of these tables is 32 per 1,000 and the low is 23 per 1,000. The task force report shows 31 per 1,000. Up at age 85, the high and low for these tables are 71 and 58 per 1,000, respectively, and the task force report shows 64 per 1,000. So despite all the differences in the definitions of states and how you define episodes, apparently all the differences are canceling out for some reason. I haven't had a chance to really explore this, but in some sense it may give you a false sense of security with these data. Don't give the data any more credibility than they're due. Go back to the original data and take a look at how many observations there are in some of these transition matrices. Some of them are pretty sparsely populated.

I've also looked at the average lengths of stay implied by the continuance tables, which is simply a function of the continuance probabilities. They all tend to track similarly, regardless of the tables, in terms of the order of magnitude. At entry age 65, the tables imply about 1,200 days (ranging from 1,142 to 1,395 days, excluding males in Tables 7 and 8) as the average length of stay in the noninstitutional LTC status. At age 75, it's about 1,100 days (ranging from 1,025 to 1,201 days), and at age 85, it's pretty close to 950 days (ranging from 821 to 1,042 days). If you go to the chapter 4 results from the task force report, the average episode durations are considerably smaller than that. The difference could be due to any number of reasons involving the differences I mentioned previously. So the incidence rates are very close. The average lengths of stay are a bit different and there really hasn't been enough time to reconcile the two.

I would emphasize that the methodology is the most valuable thing that you could take away from this session. If you can get your hands on the data (we talked briefly last night about how the actual survey results in a cleansed fashion might be delivered to the

actuarial community) and if you can follow the methodology, then you can use your own judgment in making adjustments, etc., rather than relying on published tables.

FUTURE USES AND APPLICATIONS

I have a few words dealing with possible uses. I think the uses are pretty evident to anybody who has worked in long-term care for a while. Certainly this type of information could form a basis for insurance policy pricing, valuation, costing public programs of various sorts—federal or state programs. Different types of methodologies can be employed in addition to the types that you've heard about at this session. The method that Eric has been using and presenting here is dominated by analytic techniques, extracting transition rates, calculating powers of these transition matrices, and keeping track of how many people are expected to go from one status to another. Another approach that you might find very useful would be to use these transition rates as the basis for a simulation. Then you can apply whatever exotic policy features you like to those simulated cohorts and summarize the results for pricing or valuation.

One last comment in terms of possible uses. If you can get your hands on the National Long-Term Care Survey data, even though you don't understand possibly some of the more exotic methodologies, then you could always do prevalence analysis with the 1984 or the 1989 data. If you have priced a contract, for example, for use throughout the country and now you want to make an adjustment due to an ADL trigger difference in a particular state, or any number of other minor modifications, you can use these prevalence tables to make ad hoc adjustments at the end. First, find out how many people under your conventional policy would fall into the benefit status. Then, with the alteration in the ADL trigger or the cognitive impairment status trigger for your policy, determine what kind of percentage adjustment that makes to the claim population based on prevalence data. So there's a wide range of practical techniques, ranging from ad hoc approaches to very involved transition matrix-based calculations.

FROM THE FLOOR: A question for Mr. Robinson—you have commented on differences in the continuance tables. Is it correct that the tables you prepared for the Task Force report were based on service time?

MR. ROBINSON: No, that's actually not quite right. The reference earlier in the day to service time was based on input assumptions into the valuation diskette that the valuation actuary should provide, indicating that the frequency of service utilization might be, say, three out of seven days per week on the average. That rate would then be used for translating from calendar time to service time. But the tables in chapter 4 simply break up the health status of the population and don't really look at service utilization at all. They simply say, "This is how many people we expect to be in one ADL status, another ADL status, one cognitive impairment status, and so on."

FROM THE FLOOR: How hard would it be to incorporate the tables presented in this session into the calculations in the valuation diskette?

MR. ROBINSON: It would require some retooling. That would be no minor task at this point, but I look forward to trying to blend this information together with the information that's currently being used in the valuation diskette.

MR. YEE: I'd like to add to what Jim said about how to disseminate the data to all of you. The ideal situation is that you get the source data and you get a software tool, so that you automatically get the incidence and continuance. You then can do whatever you want to do with those estimates. Unfortunately, there's a number of technical issues involved in providing the software tool. So the first step is to get the source data to you. I understand it consists of about 30,000 records, each with 150 fields or more. You could probably download it to any PC fairly easily. With proper documentation, you then can do the simple prevalence investigation to start out. The next step is perhaps to generate lots of tables. I think you can appreciate the range of possibilities and the number of tables that could be generated.

FROM THE FLOOR: A question for Mr. Stallard: you said that you used a five-year constancy assumption to make the calculations work. Did you mean that the transition rates underlying the calculations were constant over a five-year period of time, or that they were constant over each set of five years of age?

MR. STALLARD: The constancy assumption was used in order to allow us to go from the data for a group defined by five years of age, as for example if 65–69 were the initial age, and then to link that to the data for the same group five years later at age 70–74. We have another matrix that starts with the data for the group initially at age 70–74 and which is linked to the data for the same group five years later at age 75–79. Similar matrices were generated for successive five-year age groups out to age 100–104. Considering the group initially age 70–74, over the five years from 1984–89 this group ages to 75–79, which forms a parallelogram in the age by time plane. The constancy assumption was required to go from that five-by-five structure down to a one-month-by-one-month structure. And when we do that for example for the data for the group initially age 70–74, we estimate a one-month transition matrix for the age group that starts at age 74 years and 11 months, but has not yet reached their 75th birthday, and brings them to their 75th birthday, but not as far as 75 years and one month. If the elapsed time is only one month, and the age groups are formed by month, then you get a one-month parallelogram as the structure you're looking at in the age by time plane. So the constancy assumption was required to transform each five-year-by-five-year matrix into a one-month-by-one-month matrix, using a matrix power series to generate the 60th root calculation. And once those monthly matrices were obtained, we had one every fifth year, but we had 59 months in between where we didn't know the values.

We used linear interpolation between the values we knew, to complete each set of 60 monthly matrices. So, technically, the rates are not constant after the interpolation, because as you go through the age dimension, you'll move down the interpolation, and by 60 months you'll be at a point where there is a estimate that is different from the age group that is five years older. But you do have to make a constancy assumption to get to this point, and the introduction of variation on the age dimension is different from the introduction of variation on the length-of-episode dimension. We don't consider running across some linearly interpolated values as being anything other than what it is. So the fundamental question was: "Is it reasonable to assume that continuance in a given ADL status has a constant hazard rate or constant force of transition for exit." We went ahead and evaluated that against the social HMO data to see how well constancy worked there. It wasn't perfect, but the hazard rates were surprisingly flat compared to, for example, the 1985 National Nursing Home Tables where you get very rapid depletion in the nursing home surviving population. The reason is perhaps because there's no economic incentive

to either go in or stay out of the noninsured noninstitutional LTC status. They're simply saying, "I have this set of disabilities and I've had it for however long the time period was." So in this group, I think constancy is much more plausible than in a nursing home situation.