

This article uses the first national survey of home health agencies and their patients to characterize the complete length-of-use distribution for an elderly admissions cohort. Of the 26 million older Americans admitted to home health agencies in 1992, 36% received care for at least three months, 22% for at least six months, and 15% for at least one year.

Analyses suggest that one-year limits on Medicare's home health benefit would have affected a relatively small percentage of new admissions (less than 13%) but would have amounted to 300,000 or so beneficiaries in 1992. In contrast, proposals to limit Medicaid would have affected a more substantial proportion of home health agency admissions (about one fourth) but only a relatively small number of older Americans (30,000 in 1992). Such length of use limits would also disproportionately affect those at highest risk for nursing home admission: very old, unmarried, minority women with relatively unstable chronic conditions.

Key Words: Home health, Formal care, Duration analysis, Long-term care

Long-Term Admissions to Home Health Agencies: A Life Table Analysis

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The use of home health care services in the United States has increased dramatically in the past decade, increasing five-fold from \$5.6 billion in 1985 to \$28.6 billion in 1995 (Levit et al., 1996). This expansion has been fueled in part by the growing supply of home health agencies, which more than tripled in number from about 3,000 in 1980 to 9,800 in 1994 (Strahan, 1996). Structural changes in the broader health care industry have also contributed to the growth in home health over this period. For example, Medicare's prospective payment system and the growth of managed care have created incentives to shorten hospital stays, which in turn have increased the demand for post-acute health services in the home (Estes, Swan, & Associates, 1993). In addition, technological developments have expanded the range of medical and therapeutic services that can be provided in the home. Finally, administrative changes to the Medicare program during the 1980s resulted in increases both in the percentage of Medicare enrollees receiving home health benefits and in the number of visits per episode of care (Helbing, Sangl, & Silverman, 1992).

Evidence suggests growth in the home health industry may have been accompanied by a shift in clientele from short-term to long-term users. This certainly appears to be the case for home health pa-

tients covered by Medicare, by far the largest payer for home health agency services. A recent study by the General Accounting Office (1996), for example, suggests that changes in Medicare law, regulations, and policy during the late 1980s has made Medicare's home health benefit available to more beneficiaries for longer periods of time. And, during the same time period, many states expanded Medicaid's long-term home and community-based services by adopting the optional personal care benefit and by setting up home and community-based waiver programs. Such programs, although relatively small, serve almost exclusively long-term, as opposed to post-acute care, patients.

Interest in understanding utilization patterns of home health agency patients has grown in recent years as public and private payers alike search for methods to limit home health expenditures. Congress, for example, has considered numerous proposals to limit the length of Medicare home health episodes, both in terms of the number of visits as well as the length of time for which beneficiaries may receive services. States may also begin to consider Medicaid limits as a way of reinforcing recently enacted limits on welfare reciprocity. In contrast, private insurers increasingly have been including riders in their long-term care policies that allow claimants who would otherwise be institutionalized to use less expensive home health services in the community for longer periods of time. In order to fully understand the distributional effects and cost implications of such strategies, basic descriptive information is needed on the distribution of home health agency utilization, particularly the number and characteristics of long-term users.

Due primarily to data limitations, prior studies of home health utilization patterns have failed to characterize long-term users of home health services. Such

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studies can be categorized into two broad areas. The first set examines characteristics associated with volume of use within specified geographic areas, typically analyzing visits per 1,000 Medicare enrollees at the state or county level (Benjamin, 1986; Kenney, 1993; Kenney & Dubay, 1992; ProPAC, 1992; Swan & Benjamin, 1990). Because the unit of analysis for such studies is at the aggregate level, as a group they provide only limited insight into patient-level predictors of long-term use. A second set of studies addresses individual-level sources of variation in the use of home health services (Branch, Goldberg, Cheh, & Williams, 1993; Coughlin, McBride, Perozek, & Liu, 1992; Goldberg & Schmitz, 1994; Manton, Stallard, & Woodbury, 1994; Manton, Woodbury, Vertrees, & Stallard, 1993; Manton & Hausner, 1987; Mauser & Miller 1994; Phillips et al., 1992; Schore, 1994). These latter studies generally focus on the number of visits occurring in a window of time (typically one year) or on the evaluation of narrow (albeit important) payment reform issues and thus have precluded a detailed analysis of long-term users. In addition, many of these studies draw upon Medicare claims data and thus omit respondents with primary payers other than Medicare.

Taken together existing studies suggest that patients dually eligible for Medicare and Medicaid, minorities and unmarried older persons are more likely to be high utilizers of home health care. Although a useful starting point for understanding the utilization patterns among elderly home health agency patients, existing studies fail to provide policy makers with information necessary to understand how imposing reimbursement limits tied to the length of agency use might affect future admissions, as well those currently receiving home health agency services.

This article uses data from the first national survey of home health agencies and their patients to characterize length-of-use patterns for a nationally representative elderly admissions cohort. This analysis is unique in that it includes not only patients financed through the Medicare home health benefit, but patients with other sources of payment as well. This article adds to the existing literature on home health utilization by examining three specific questions: (1) What proportion of older home health agency admissions are long-term users? (2) Among home health agency admissions, what characteristics predict long-term use? and (3) What are the characteristics of long-term admissions? Implications of findings for policy makers interested in imposing reimbursement limits tied to the length of home health agency use are discussed.

Methods

This analysis draws upon a methodology developed by Liu and Palesch (1981) and Liu and Manton (1983a; 1984) in their examination of nursing home length of stay. The methodology involves two steps. First, using data from the 1992 National Home and Hospice Care Survey (NHHCS), a cohort of all elderly home health patients with an admission occurring in 1992 is constructed. Then, life table techniques are used to generate complete length-of-use distributions (in months)

for the elderly admissions cohort. Data and methods are described in detail here.

The National Home and Hospice Care Survey

Conducted by the National Center for Health Statistics, the 1992 NHHCS is the first annual survey of hospices, home health agencies, and their respective patients. The survey was conducted from September through December 1992. The sampling frame consisted of 8,859 home health agencies and hospice agencies identified in the 1991 National Health Provider Inventory and all agencies opened for business between 1991 and June 30, 1992. 1,500 agencies were selected; from each agency six current patients and six patients discharged during the last 12-month period were randomly selected. Response rates were 90%, 99%, and 99% respectively for the sample of agencies, current patients, and discharged patients. Interviews were completed for 6,897 current patients and 6,765 discharged patients. Additional detail on the data collection procedures is available in Strahan (1993) and Hing (1994). This analysis is limited to home health patients aged 65 and older at the time of admission. A total of 3,916 current home health patients and 3,670 discharges met the inclusion criteria, representing 932,000 and 2.3 million home health patients and discharges, respectively.

Both the current patient and discharge samples of the 1992 NHHCS are used to create the 1992 elderly home health admission cohort. Together the two samples ($N = 7,586$) represent all users from January 1, 1992–December 31, 1992—those still in on the last day of 1992 and those discharged in the one-year interval—or approximately 3.2 million elderly patients. The 1992 admission cohort is the subset of all possible users who were *admitted* between January 1, 1992, and December 31, 1992. Thus, the final admissions sample consists of 5,883 elderly admissions, representing about 2.6 million elderly home health patients admitted sometime during 1992.

The NHHCS collected information from each participating agency on a number of agency-level characteristics including size, profit status, staffing, and geographic location. In addition, for each current and discharged patient information was abstracted from agency records on date of admission, demographic characteristics (such as age, race, sex and marital status), health status (including primary and other diagnoses at admission), primary and secondary sources of payment, and charges for care. For the discharge sample the date of discharge and reason for discharge was also assessed from administrative records.

The information in the NHHCS allows the calculation of length of use for home health agency *spells* rather than entire *careers* (or episodes). Thus, this article focuses on length of use from the agency's point of view, defined as the number of days from admission (the beginning of service) to discharge (the end of service). Of course, home health agencies vary with respect to administrative rules for discharge. For example, some agencies discharge patients on the final date of service; other agencies discharge patients on

a monthly basis to coincide with billing cycles; still others may purge records annually. Because of this administrative variation, the date of discharge may not correspond with the final date of service use across all agencies. In order to minimize measurement error due to administrative idiosyncrasies, length of use is calculated in monthly rather than daily intervals. To the extent that agencies leave patients enrolled months beyond the final service date, estimates of length-of-use will be biased upwards.

Note that transfers from one agency to another (that is, consecutive spells with no break in between) are not captured by the present study. To the extent that such consecutive spells (sometimes called "episodes" in the nursing home literature) are overlooked, our estimates of length of use will be shorter than those assessed from the patient perspective. Analysis of discharge destination for the discharge sample suggests that this phenomenon occurs relatively infrequently: only 0.4% of discharges were recorded as being admitted directly to another home health agency. Thus any bias introduced by such an omission is likely to be minimal.

Calculating Length-of-Use Distributions

This study uses life table methods to calculate the complete length of stay distribution for the 1992 elderly admission cohort. Demographers have traditionally used life tables to calculate the expected amount of time a hypothetical cohort will live if a set of age-specific death rates hold over time. Although most commonly used to estimate mortality histories, the life table also has been used to examine the expected number of years spent in a disabled state (Katz, Branch, Branson, Papsidero, Beck, & Greer, 1983), the length of time spent in a nursing home (Liu & Manton, 1983b; Manton, Woodbury, & Liu, 1984) and the average length of stay in hospitals (Liu et al., 1997). The life table approach assumes constant rates within each interval but does not impose a shape on the overall distribution of length of stay and is thus preferable to other parametric techniques for descriptive purposes. Further, given that the definition of "long-term" is arbitrary, the life table approach is particularly useful in that it allows consideration of a range of alternative definitions.

In this application, a home health use life table is generated. Rather than using age-specific death rates, the life table is estimated from a set of discharge rates, calculated for intervals of time since admission, or "length-of-use" intervals. The discharge rates, denoted ${}_n m_x$, represent the proportion of persons using home health at the beginning of the interval x who are discharged during the interval of length n . These rates are calculated by dividing the weighted number of persons discharged from home health agencies in a given length-of-use interval by the weighted number of current users with the corresponding interval (Manton et al., 1984). Length-of-use intervals are calculated in months by subtracting the date of admission from the date of the interview for current patients and by subtracting the date of admission from the date of discharge for the discharge sample.

From the discharge rates, the probability of experiencing a discharge during the interval x to $x+n$ —denoted ${}_n q_x$ —can be calculated. Calculations employ the usual assumption that discharges are distributed uniformly over the interval (Chiang, 1968). These rates are applied to an initial population (or life table radix). In this case the radix is the weighted number of admissions from the 1992 elderly admission cohort. The remaining standard life table columns are then calculated:

- ${}_n d_x$ the number of discharges in the interval x to $x+n$;
- l_x the number of admissions not discharged by x months;
- ${}_n L_x$ the number of patient-care months in the interval x to $x+n$;
- T_x the number of patient-care months in interval x and subsequent intervals; and
- e_x the expected number of months of care after x months.

Although e_0 is a useful summary measure, representing the average length of use for the admission cohort, the calculation requires an assumption about the length of the final interval. In this analysis, we assume that all spells end after 48 months. The cutoff of 48 months was adopted so that the estimate of q for the final group was robust, (that is, based on reasonably sized numerators and denominators). Sensitivity analyses (not shown) suggest that adding an additional category so that the final cutoff is 60 months increased the expected length minimally from 7.4 months to 7.6 months. Another limitation of e_0 is that it does not provide insight into the distribution of patients across length-of-use intervals. In order to obtain distributional information, three additional columns are calculated. F_x is the cumulative percentage of patients discharged by x months, such that:

$$F_x = 100 * (1 - (l_x/l_0)).$$

Differences F_x and F_{x+n} yield the percentage of patients discharged during the interval x to $x+n$, denoted ${}_n f_x$. Finally, G_x , the proportion still using care at x months, is obtained by subtracting F_x from 100. Note that unlike e_0 , the measures F_x , ${}_n f_x$, and G_x are not sensitive to assumptions about the final interval length.

To characterize long-term users and to compare length-of-use distributions for various subgroups, life table calculations are stratified on specific characteristics of interest. The life table method employed in this article requires that such characteristics be static, relatively stable over time, or measured at the time of admission in both the current user and discharge samples. As a result, this analysis is limited to an examination of the following demographic characteristics: sex, marital status (married/unmarried), age at admission, race (White/non-White), admission diagnoses (limited to the six most prevalent conditions), region (South, Northeast, Midwest, West), and primary source of payment (Medicare, Medicaid, private insurance, out-of-pocket/other).

Results

Characteristics of the 1992 Elderly Admission Cohort

The 1992 home health agency admission cohort consists of approximately 2.6 million elderly people (see Table 1). Two thirds of the admission cohort are women and nearly 9 out of 10 are White. Only 44% are married and the mean age at admission is 78 years. About 30% of patients are found in the Northeast and in the South, whereas agencies in the West and Midwest provide services to about one fifth of patients each. The most prevalent diagnoses at admission include heart disease (34%), hypertension (24%), and diabetes (18%). Medicare is the primary payer for the overwhelming majority of the admission cohort (87%).

Complete Length of Use for the 1992 Elderly Admission Cohort

Life table results for the entire elderly admission cohort are presented in Table 2. The first column provides information about the risk of discharge over time; the next four columns provide information on the volume of patients and patient-care months; the last four columns yield insight into average use and the distribution of discharges over time.

Focusing on the first column of Table 2, the probability of being discharged from a home health agency decreases in the first four months from 0.3581

to 0.0853; thereafter the probabilities increase fairly steadily. The modest spikes at 6, 12, and 24 months cannot be explained with the data at hand. It may be that in order to comply with administrative requirements, many agencies schedule patient reviews at semi-annual intervals. Alternatively, it is possible that other administrative protocols (e.g., culling the records at yearly intervals) explain at least in part these anomalies. If patients are left on the agency rolls beyond the end of service receipt, then the estimates of the risk of discharge will be understated at 9 and 18 months and overstated at 12 and 24 months and the total volume of patient-care months and expected length of use will be overstated. Comparisons (not shown) of length-of-use for the subsample of the admission cohort with Medicare as primary payer with published estimates based on Medicare claims data for 1989–1993 (Goldberg & Schmitz, 1994) suggest that such bias is negligible.

In terms of total volume, the 2.6 million elderly home health admissions in 1992 received a total of 19.3 million patient-months of care. On average, the completed length-of-use for an older person admitted to a home health agency in 1992 is 7.4 months. The second-to-last column shows that the distribution of discharges is highly skewed: about one third of patients are discharged within one month, another third are discharged by four months, and the final third are discharged relatively evenly over the course of four years.

The last column of the life table yields insight into the proportion of home health admissions who may be considered long-term users for a range of definitions. About 36% of the admission cohort or about 930,000 admissions receive home health agency care for three or more months. One in five admissions (22.4%) uses home health for at least 6 months, about 15% are still enrolled after 12 months, and about 8% are admitted for 2 years or longer.

Although long-term users represent the minority of home health agency admissions, they account for the majority of patient-care months. As summarized in Table 3, about three fourths (76%) of the 19.3 million patient-care months are received by patients receiving care for 3 or more months. Just over 50% of patient-care months are provided to the 15% of patients receiving home health care for a year or longer.

Characteristics Predicting Long-Term Admissions

Table 4 shows, by various characteristics, the expected length of use in months and the percentage of the admission cohort considered long-term. In this table, four definitions of long-term are provided: 3 or more, 6 or more, 12 or more, and 24 or more months. Because tests for differences in average length of use are not readily available for the life table approach adopted in this analysis, significance tests were calculated instead for differences in the proportion of long-term admissions. For demographic characteristics, stars refer to the statistical significance ($p < .05$) of the difference in percentages across subgroups (for example, the difference in the percentage of male and

Table 1. Characteristics of Agency-Based Home Health Care Patients, 1992

	Current Patients (%)	Discharged Patients (%)	Admission Cohort (%)
Demographic Characteristics			
Female	70.0	66.2	66.4
Unmarried	60.6	56.0	55.9
Mean age at admission	78.6	78.1	78.2
Non-White	14.7	17.1	11.6
Diagnosis at Admission			
Arthritis	21.7	16.4	17.4
Cancer	9.5	12.3	12.4
Diabetes	22.0	17.7	18.4
Fracture	7.5	9.6	9.0
Heart disease	31.9	34.1	34.0
Hypertension	27.5	23.4	23.8
Region			
West	13.0	20.5	19.4
Northeast	30.8	31.2	31.7
Midwest	21.3	18.7	19.3
South	34.9	29.7	29.6
Primary Payer			
Medicare	75.8	87.5	86.6
Medicaid	10.8	3.9	4.5
Private insurance	3.8	5.0	4.9
Out-of-pocket	3.1	1.7	1.7
Other	6.5	1.9	2.2
(Weighted N)	931,854	2,221,149	2,607,035
(Unweighted n)	3,916	3,670	5,883

Table 2. Life Table for Home Health Agency Use, 1992

Length of Use Interval in Months	Probability of Being Discharged (std error) nq_x	No. Using Home Health at Beginning of Interval l_x	No. Discharged During Interval d_x	Patient-Months of Use		Average Remaining Use (in months) e_x	% Discharged By Beginning of the Interval F_x	% Discharged During the Interval f_x	% Still Using Care at x Months G_x
				In This Interval l_x	In This and All Subsequent Intervals T_x				
0	0.3581 (.0141)	2607035	933533	2140268	19311291	7.4	0.0	35.8	100.0
1	0.3289 (.0149)	1673501	550408	1398296	17171023	10.3	35.8	21.1	65.0
2	0.1717 (.0131)	1123092	192781	1026702	15772726	14.0	56.9	7.4	43.1
3	0.2021 (.0168)	930311	188048	836287	14746024	15.9	64.3	7.2	35.7
4	0.0853 (.0092)	742263	63303	710611	13909736	18.7	71.5	2.4	28.5
5	0.1418 (.0201)	678959	96272	630823	13199125	19.4	74.0	3.7	26.0
6	0.1976 (.0215)	582687	115131	1575365	12568301	21.6	77.6	4.4	22.4
9	0.1822 (.0189)	467556	85199	1274869	10992936	23.5	82.1	3.3	17.9
12	0.2625 (.0233)	382356	100383	1992988	9718033	25.4	85.3	3.9	14.7
18	0.2383 (.0443)	281972	67179	1490299	7725077	27.4	89.2	2.6	10.8
24	0.3924 (.0676)	214793	84277	2071860	6234777	29.0	91.8	3.2	8.2
36	0.3349 (.0878)	130516	43710	1303934	4162916	31.9	95.0	1.7	5.0
48	1.0000 (.1223)	86805	86805	2858982	2858982	32.9	96.7	3.3	3.3

female admissions who are long-term admissions is statistically significant at the .05 level when long-term is defined as 3+ and 24+ months). Because admissions diagnoses are not mutually exclusive, for these variables stars refer to the statistical significance of the difference in percentages for persons with and without the specific diagnosis (for example, the difference in the percentage of persons with arthritis and without arthritis who are long-term admissions is statistically significant at the .05 level for all definitions of long-term). Tests for region and primary payer refer to differences from the West and Medicare, respectively.

On average, women, unmarried, and very old (85 and older) patients are more likely to be long-term admissions than other patients. Even more striking, however, are differences in length-of-use by race. Whether defined as 3, 6, or 12 or more months, a higher percentage of non-Whites than Whites may be considered long-term admissions. For example, about 29% of non-Whites use home health for 6 months or longer; in contrast, about 21% of Whites do so.

Not surprisingly, differences by admission diagnosis are also apparent. Patients with arthritis, diabetes, and hypertension have consistently longer than average length-

of-use. For example, whereas 22% of all patients are enrolled 6 or more months, among patients with an admission diagnosis of arthritis, 29% are admitted for at least 6 months, and among patients with an admission diagnosis of hypertension or diabetes about 25% are enrolled for at least 6 months. Although the admission diagnosis does not necessarily reflect the condition for which care was received, analysis of length-of-use by primary admission diagnosis (not shown) instead of any diagnosis yielded substantively similar conclusions.

Patterns of utilization by region are also quite strong, with admissions in the South and Midwest the longest (on average lasting 11 and 10 months, respectively) and admissions in the West the shortest (on average fewer than 4 months). When long-term is defined at the extreme, the Midwest and Northeast have the highest percentage of long-term admissions, averaging about one in ten admissions. Such patterns are consistent with reports of regional variation in the use of the Medicare home health benefit (Schore, 1994).

Finally, length-of-use differences by primary payer are quite marked. Admissions with Medicare and private insurance as their primary source of payment use home health agencies on average about one third the length of time of Medicaid-financed admissions and admissions with other primary sources of payment (5 and 6 months, respectively vs 17 and 20 months, respectively). When long-term is defined as 6 or more months, about 21% of Medicare and private insurance admissions are long-term. In contrast, 36% of Medicaid admissions and over 40% of admissions with other sources last 6 or more months. A similar contrast is evident at the extreme: If long-term is defined as 2 years or longer only about 7% of Medicare and privately insured admissions are long-term compared with 19 and 22% of Medicaid admissions and admissions with other sources, respectively.

Table 3. Long-Term Users of Home Health Agency Care: Number and Percent of Admissions and Patient-Care Months, 1992

Definition of Long-Term	Admissions		Patient-Care Months	
	N(000s)	%	N(000s)	%
3+ months	930	35.7	14,746	76.4
6+ months	583	22.4	12,568	65.1
12+ months	382	14.7	9,718	50.3
24+ months	215	8.2	6,235	32.3
48+ months	87	3.3	286	14.8

Table 4. Home Health Agency Length-of-Use Distributions by Demographic Characteristics, 1992

	Average Length of Use	% With Long-Term Admission Defined As			
		3+ months	6+ months	12+ months	24+ months
All Elderly Admissions	7.4	35.7	22.4	14.7	8.2
Sex					
Male	6.8	33.1*	21.3	13.8	6.3*
Female	7.6	37.0	22.6	14.8	8.9
Marital status					
Married	6.1	34.8	20.8*	13.6	7.6
Not married	8.3	36.3	23.5	15.3	8.7
Age					
< 85 years	7.3	34.6*	21.1*	14.4*	7.8
85+ years	7.6	39.7	27.0	16.7	8.9
Race					
White	6.9	34.5*	21.1*	13.9*	7.8
Non-white	10.7	42.7	29.3	17.8	9.8
Admission Diagnosis					
Arthritis	14.0	40.9*	29.0*	21.7*	15.5*
Cancer	4.6	33.1	16.7*	10.7*	5.4*
Diabetes	11.1	35.6	25.3*	17.9*	9.9*
Fracture	4.2	31.2*	15.7*	5.5*	2.4*
Heart disease	6.5	33.1*	21.7*	13.9	7.5
Hypertension	8.1	39.6*	25.8*	17.9*	10.5*
Region					
West	3.8	23.2	13.6	8.4	4.0
Northeast	7.3	37.7*	21.4*	14.5*	9.6*
Midwest	9.8	35.9*	22.4*	16.1*	10.3*
South	10.8	40.9*	27.6*	16.6*	8.4*
Primary Payer					
Medicare	6.0	34.5	20.7	12.8	6.6
Medicaid	16.9	44.4*	35.6*	27.2*	17.6*
Private insurance	5.1	32.7	20.7	13.0	7.6
Other	19.7	53.2*	40.2*	31.6*	22.0*

*p < .05 for difference across subgroups in % with long-term admission.

Profile of Long-Term Admissions

Such differences in the percentage of long-term admissions by various demographic characteristics imply that the pool of long-term admissions has a distinct profile compared to all home health agency admissions. To illustrate these differences, profiles of all elderly admissions and long-term elderly admissions are provided in Table 5, again under various definitions of long-term. Significance tests in Table 5 refer to the difference between long-term admissions and all elderly admissions in the prevalence of a given characteristic.

Two findings are noteworthy. First, like the pool of all elderly admissions, long-term admissions are predominantly unmarried White women with Medicare as their primary source of payment. Second, and perhaps more importantly, long-term admissions over-represent the very old (85 and older), minorities, those with diagnoses of arthritis, diabetes and hypertension, and those paying for their care with Medicaid or through other sources (including out-of-pocket).

Discussion

The aim of this study was to assess the length-of-use distribution for a nationally representative cohort

of home health agency admissions aged 65 and older. Using the 1992 National Home and Hospice Care Survey, life table techniques were applied to an elderly admissions cohort for 1992. Results show that the mean length of use for an individual admitted to a home health agency is 7.4 months but the majority of patients (64%) are discharged within three months of admission.

Although long-term patients constitute the minority of the admissions cohort, they receive the majority of months of home health care. Whether long-term admissions actually consume the bulk of home health agency resources cannot be addressed with the data at hand. If long-term admissions receive a less expensive basket of care—consisting, for example, of more personal aide visits and fewer skilled and occupational care visits—than short-term patients receive, then it is possible that the distribution of resources across long and short-term admissions may be less skewed than our analysis suggests.

Differences were observed in average length-of-use and the proportion considered long-term admissions by various patient characteristics. The very old, women, non-Whites, unmarried patients, patients with arthritis, diabetes, or hypertension, those living in the Midwest and Northeast, and those with primary payer

Table 5. Characteristics of Elderly Long-Term Admissions to Agency-Based Home Health Care, 1992

	All Admissions	Long-Term Admissions Defined As			
		3+ months (%)	6+ months (%)	12+ months (%)	24+ months (%)
Demographic Characteristics					
Female	66.4	68.9*	67.7	68.0	73.7*
Unmarried	55.9	57.0	58.9*	58.8	59.2
85 and older	20.8	23.1*	25.1*	23.7*	23.0
Non-White	11.6	14.0*	15.4*	14.4*	14.2
Diagnosis at Admission					
Arthritis	17.4	19.9*	22.5*	25.7*	32.6*
Cancer	12.4	11.5	9.3*	9.0*	8.1*
Diabetes	18.4	18.3	20.7*	22.4*	22.0*
Fracture	9.0	7.9	6.4*	3.4*	2.6*
Heart disease	34.0	31.6*	33.0	32.3	30.9
Hypertension	23.8	26.4*	27.5*	29.1*	30.3*
Region					
West	19.4	12.7*	12.0*	11.4*	9.3
Northeast	31.7	33.7*	31.0*	32.3*	36.7*
Midwest	19.3	19.6	19.8	21.8	24.0*
South	29.6	34.1	37.2*	34.5*	29.9
Primary Payer					
Medicare	86.6	84.0*	81.0*	78.1*	73.3*
Medicaid	4.5	5.6*	7.3*	8.7*	10.8*
Private insurance	4.9	4.5	4.6	4.5	4.8
Other	3.9	5.8*	7.1*	8.7*	11.0*
(Weighted N)	2,607,035	930,311	582,687	382,356	214,793

* $p < .05$ for difference between long-term and all elderly admissions.

Medicaid or other sources (including out-of-pocket) are more likely than other patients to be long-term admissions. As a result, the pool of long-term admissions overrepresents minorities, those with unstable chronic diseases, and those covered by Medicaid or paying through other sources.

A weakness of the analyses reported here is that length of use is defined as the difference between admission and discharge dates as recorded in home health agency records. Such estimates may not coincide with the beginning and end of actual service use. Bias resulting from this definitional issue is likely to inflate our length of use estimates compared to actual service duration. Nevertheless, comparisons with Medicare billing records indicate that the extent of bias is likely to be small, especially in light of the aggregation of our results to monthly estimates.

An additional weakness of this analysis is that it focuses on single spells rather than care "careers" in home health agencies. If the probability of ending a spell is affected by whether a prior spell has occurred in the same year (or earlier in the patient's lifetime), length of use distributions might be biased. Unfortunately, no information was obtained on prior spells for either the current patient or discharge samples so it is not possible to address the extent or direction of such bias.

Finally, because this survey only covers agency-based home health patients, the data clearly do not represent the universe of patients receiving care in the home. Home health users omitted from the survey include those receiving services from non-agency-based

providers including paid family members. The extent to which non-agency-based home health providers are used by elderly patients is not known. Nevertheless, because agency-based providers are required by Medicare and by most state Medicaid programs, it is likely that the survey captures the majority of home health patients in the United States.

Despite these weaknesses, the analyses have implications for both policy and planning purposes. Table 6 illustrates the potential effects of hypothetical changes in reimbursement policies tied to calendar time. Calculations are provided for both new admissions (top panel) and current users (middle and bottom panels). For new admissions, we show the percentage (and number) who would eventually be affected by limits of 6, 12, and 24 months. Two sets of calculations are provided for current users: the percentage (and number) who would: (1) be at or beyond a given limit at a point in time (obtained from simple frequency distributions on current length of use) and (2) eventually reach the given limit (calculated from the life table using the weighted sample of current users).

Two points are of particular interest. First, the effect of policies to limit the use of home health agencies varies by primary payer and by whether the focus is on the percentage of patients or absolute number of patients affected. One-year limits on the Medicare home health benefit, for example, would affect a relatively small percentage of new admissions (less than 13%) but would have amounted to 300,000 or so beneficiaries in 1992. In contrast, proposals to limit Medicaid would affect a substantial proportion

Table 6. Percentage and Number of New Admissions and Current Users Affected by Hypothetical Home Health Agency Length of Use Limits, by Primary Payer

	Medicare		Medicaid		Private Insurance	
	%	N(000s)	%	N(000s)	%	N(000s)
Percent and number of new admissions who will reach limit of						
6 months	20.7	467	35.6	42	20.7	27
12 months	12.8	289	27.2	32	13.0	17
24 months	6.6	149	17.6	21	7.6	10
Percent and number of current users at or beyond limit of						
6 months	34.2	241	67.9	69	28.8	10
12 months	19.3	136	48.9	49	20.3	7
24 months	7.5	53	32.9	33	5.8	2
Percent and number of current users who will reach limit of						
6 months	61.6	435	89.3	90	57.5	20
12 months	46.5	328	81.0	82	42.9	15
24 months	28.7	203	65.6	66	28.0	10

of home health agency admissions (about one fourth) but only a relatively small number of older Americans (30,000 in 1992). One-year limits on private insurance would affect roughly the same percentage of policy holders as Medicare limits (13%), amounting to only 17,000 policy holders in 1992.

Second, focusing on the experience of current users rather than new admissions exacerbates the potential effects of limits dramatically. This is because current users overrepresent patients with longer than average length of use (a well-known statistical phenomenon known as length-biased sampling, discussed in detail by Cox, 1967). Among Medicare beneficiaries using home health agencies, less than 13% of new admissions will receive care for a year or longer whereas nearly half (46.5%) of current enrollees will reach a one-year limit. The contrast is even more startling for Medicaid: 27.2% of new admissions will receive care for a year or longer whereas over 80% of current users will eventually reach a one-year limit.

Perhaps more importantly, analysis shows that such policies would disproportionately affect those at highest risk for nursing home admission: very old, unmarried, minority women with relatively unstable chronic conditions. Such findings suggest that policy makers should proceed cautiously as they consider ways to hold down long-term care expenditures. If limits are placed on groups with a high risk for nursing home admission, costs may ultimately be higher for public programs in the long run. Additional analyses are needed regarding the costs of care for these long-term patients. Such analyses await the availability of more detailed data on the home health agency experience of older Americans.

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